

Bottom Ash Data

2022 Week 31

The following analytical report represents bottom ash composite results for week 31 of 2022 (July 31, 2022 to August 6, 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 : **VA22B8439**
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 : 09-Aug-2022 12:40
Date Analysis Commenced : 11-Aug-2022
Issue Date : 16-Aug-2022 13:18

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
Dan Gebert	Laboratory Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2231-A-1	BA2231-A-2	BA2231-A-3	BA2231-A-4	BA2231-A-5
(Matrix: Soil/Solid)					Client sampling date / time	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-001	VA22B8439-002	VA22B8439-003	VA22B8439-004	VA22B8439-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	18.4	19.6	20.4	19.0	20.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	10.6	10.7	10.6	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	48500	40000	49000	34200	46000	
antimony	7440-36-0	E440	0.10	mg/kg	107	113	116	129	129	
arsenic	7440-38-2	E440	0.10	mg/kg	29.2	34.7	40.9	29.2	38.4	
barium	7440-39-3	E440	0.50	mg/kg	533	552	483	618	600	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.36	0.45	0.39	0.32	
bismuth	7440-69-9	E440	0.20	mg/kg	9.22	8.81	17.3	7.16	58.2	
boron	7440-42-8	E440	5.0	mg/kg	188	189	167	165	135	
cadmium	7440-43-9	E440	0.020	mg/kg	9.37	10.9	11.2	7.35	11.5	
calcium	7440-70-2	E440	50	mg/kg	124000	120000	129000	122000	112000	
chromium	7440-47-3	E440	0.50	mg/kg	184	108	145	149	230	
cobalt	7440-48-4	E440	0.10	mg/kg	28.7	31.2	111	45.6	84.2	
copper	7440-50-8	E440	0.50	mg/kg	1810	20000	1840	2080	2760	
iron	7439-89-6	E440	50	mg/kg	51000	43200	42500	63200	85600	
lead	7439-92-1	E440	0.50	mg/kg	686	504	596	4530	545	
lithium	7439-93-2	E440	2.0	mg/kg	22.8	20.3	24.9	21.2	22.1	
magnesium	7439-95-4	E440	20	mg/kg	9920	10500	10400	8880	9690	
manganese	7439-96-5	E440	1.0	mg/kg	701	718	892	801	1070	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0643	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	180	164	249	239	236	
nickel	7440-02-0	E440	0.50	mg/kg	144	118	430	180	90.1	
phosphorus	7723-14-0	E440	50	mg/kg	10400	9840	13600	11100	9980	
potassium	7440-09-7	E440	100	mg/kg	5370	5150	5750	5270	5050	
selenium	7782-49-2	E440	0.20	mg/kg	0.25	0.44	0.32	0.25	0.23	
silver	7440-22-4	E440	0.10	mg/kg	5.44	14.2	5.81	8.19	12.4	
sodium	7440-23-5	E440	50	mg/kg	16400	14600	17500	15000	14100	
strontium	7440-24-6	E440	0.50	mg/kg	300	366	304	282	325	
sulfur	7704-34-9	E440	1000	mg/kg	11500	10500	12300	10200	10000	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2231-A-1	BA2231-A-2	BA2231-A-3	BA2231-A-4	BA2231-A-5
Client sampling date / time					03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-001	VA22B8439-002	VA22B8439-003	VA22B8439-004	VA22B8439-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.056	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	114	88.7	91.2	104	94.8	
titanium	7440-32-6	E440	1.0	mg/kg	613	475	340	590	762	
tungsten	7440-33-7	E440	0.50	mg/kg	11.0	13.8	13.9	12.0	8.99	
uranium	7440-61-1	E440	0.050	mg/kg	4.90	4.36	5.60	4.33	4.51	
vanadium	7440-62-2	E440	0.20	mg/kg	50.2	46.3	54.5	44.7	46.8	
zinc	7440-66-6	E440	2.0	mg/kg	3400	11000	3560	5670	3320	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	1.6	3.2	1.2	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.4	11.4	11.4	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.10	7.95	8.51	8.65	8.80	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.11	6.14	6.12	6.08	5.97	
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	2.62	2.35	2.27	2.42	2.22	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.143	0.173	0.317	0.152	0.162	
calcium, TCLP	7440-70-2	E444	10	mg/L	2220	2270	2150	2300	2250	
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	1.84	1.56	2.04	1.94	1.62	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.16	0.535	1.03	0.989	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	127	128	127	134	128	
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	0.66	0.68	0.44	0.54	0.55	
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	BA2231-A-1	BA2231-A-2	BA2231-A-3	BA2231-A-4	BA2231-A-5
Client sampling date / time					03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-001	VA22B8439-002	VA22B8439-003	VA22B8439-004	VA22B8439-005	
					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	30.6	34.0	33.6	33.0	39.7	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2231-A-6	BA2231-A-7	BA2231-A-8	BA2231-A-9	BA2231-A-10
(Matrix: Soil/Solid)					Client sampling date / time	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-006	VA22B8439-007	VA22B8439-008	VA22B8439-009	VA22B8439-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	18.0	19.8	20.3	20.2	19.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	10.7	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	54200	44700	34600	43200	35500	
antimony	7440-36-0	E440	0.10	mg/kg	133	130	115	101	111	
arsenic	7440-38-2	E440	0.10	mg/kg	31.6	49.3	28.9	32.3	54.4	
barium	7440-39-3	E440	0.50	mg/kg	555	588	626	574	555	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.38	0.33	0.41	0.32	
bismuth	7440-69-9	E440	0.20	mg/kg	8.77	9.84	17.9	7.45	30.3	
boron	7440-42-8	E440	5.0	mg/kg	162	194	147	129	180	
cadmium	7440-43-9	E440	0.020	mg/kg	9.35	9.22	8.42	7.76	8.58	
calcium	7440-70-2	E440	50	mg/kg	122000	132000	128000	120000	120000	
chromium	7440-47-3	E440	0.50	mg/kg	174	268	143	155	281	
cobalt	7440-48-4	E440	0.10	mg/kg	75.8	222	50.1	44.8	31.2	
copper	7440-50-8	E440	0.50	mg/kg	823	1550	6650	1610	7300	
iron	7439-89-6	E440	50	mg/kg	47500	76200	63100	63700	107000	
lead	7439-92-1	E440	0.50	mg/kg	434	474	512	607	1180	
lithium	7439-93-2	E440	2.0	mg/kg	24.9	50.4	25.4	19.0	20.0	
magnesium	7439-95-4	E440	20	mg/kg	9440	11800	10000	9970	10800	
manganese	7439-96-5	E440	1.0	mg/kg	809	1060	771	971	1270	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	224	224	186	679	173	
nickel	7440-02-0	E440	0.50	mg/kg	153	225	94.5	189	111	
phosphorus	7723-14-0	E440	50	mg/kg	10800	12200	11200	13000	11100	
potassium	7440-09-7	E440	100	mg/kg	5380	5480	5190	4980	4970	
selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.29	0.30	0.27	0.34	
silver	7440-22-4	E440	0.10	mg/kg	4.15	4.77	5.89	8.64	4.90	
sodium	7440-23-5	E440	50	mg/kg	14800	16000	15200	14700	15800	
strontium	7440-24-6	E440	0.50	mg/kg	400	286	287	367	247	
sulfur	7704-34-9	E440	1000	mg/kg	11100	11500	10600	9800	10900	
thallium	7440-28-0	E440	0.050	mg/kg	0.054	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2231-A-6	BA2231-A-7	BA2231-A-8	BA2231-A-9	BA2231-A-10
Client sampling date / time					03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-006	VA22B8439-007	VA22B8439-008	VA22B8439-009	VA22B8439-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	104	105	81.7	104	426	
titanium	7440-32-6	E440	1.0	mg/kg	923	353	346	602	521	
tungsten	7440-33-7	E440	0.50	mg/kg	21.6	11.0	14.7	27.2	13.8	
uranium	7440-61-1	E440	0.050	mg/kg	4.93	4.92	4.58	4.33	4.57	
vanadium	7440-62-2	E440	0.20	mg/kg	48.3	48.6	44.9	47.4	49.6	
zinc	7440-66-6	E440	2.0	mg/kg	11800	3420	6740	3720	4970	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.3	2.0	2.0	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	11.4	11.4	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.73	8.66	8.82	8.58	8.78	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	5.88	5.93	5.98	6.11	6.14	
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	2.31	2.22	2.31	2.31	2.38	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.179	0.173	0.174	0.211	0.130	
calcium, TCLP	7440-70-2	E444	10	mg/L	2310	2280	2350	2280	2300	
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	2.30	1.99	1.39	1.14	1.50	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.14	1.22	1.41	1.10	1.06	
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	132	133	132	130	134	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.56	0.50	0.50	0.82	0.59	
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	BA2231-A-6	BA2231-A-7	BA2231-A-8	BA2231-A-9	BA2231-A-10
Client sampling date / time					03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00	03-Aug-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-006	VA22B8439-007	VA22B8439-008	VA22B8439-009	VA22B8439-010	
					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	39.3	71.1	41.0	36.8	28.6	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2231-A-11	BA2231-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	03-Aug-2022 09:00	03-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-011	VA22B8439-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	20.6	21.9	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	46300	35700	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	82.2	113	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	44.3	33.5	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	513	510	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.37	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	70.9	101	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	262	203	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	8.08	9.05	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	128000	111000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	170	127	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	33.1	365	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1390	2340	----	----	----	
iron	7439-89-6	E440	50	mg/kg	53200	53800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	538	389	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	23.5	31.3	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10200	10400	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	917	703	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	263	202	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	209	168	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10400	11700	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5330	5180	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.30	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.66	4.92	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17200	15300	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	219	299	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	10500	11200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.067	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2231-A-11	BA2231-A-12	----	----	----
Client sampling date / time					03-Aug-2022 09:00	03-Aug-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-011	VA22B8439-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	78.7	173	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	527	394	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	12.2	16.5	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.00	6.66	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	50.6	42.8	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4020	8910	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.9	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.03	8.90	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.14	6.07	----	----	----	
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	2.33	2.20	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.133	0.137	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2270	2180	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.67	1.17	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.928	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	133	131	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.65	0.50	----	----	----	
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	BA2231-A-11	BA2231-A-12	----	----	----
					Client sampling date / time	03-Aug-2022 09:00	03-Aug-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B8439-011	VA22B8439-012	-----	-----	-----	
					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	31.5	29.6	----	----	----	
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	: VA22B8439	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	: 09-Aug-2022 12:40
PO	: VANCO 0000051213	Issue Date	: 16-Aug-2022 13:18
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

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

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	VA22B8439-001	BA2231-A-1	chromium	7440-47-3	E440	32.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8439-001	BA2231-A-1	lead	7439-92-1	E440	53.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8439-001	BA2231-A-1	nickel	7440-02-0	E440	30.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B8439-001	BA2231-A-1	titanium	7440-32-6	E440	53.5 % 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.

Reference Material (RM) Sample								
Metals	QC-MRG2-5980620 03	----	copper	7440-50-8	E440	134 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-1	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-10	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-11	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-12	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-2	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-3	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-4	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 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 BA2231-A-5	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-6	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-7	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-8	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2231-A-9	E510	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	28 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2231-A-1	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2231-A-10	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2231-A-11	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2231-A-12	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 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 BA2231-A-2	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-3	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-4	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-5	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-6	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-7	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-8	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2231-A-9	E440	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	180 days	10 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2231-A-1	E144	03-Aug-2022	----	----	----		11-Aug-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 BA2231-A-10	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-11	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-12	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-2	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-3	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-4	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-5	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-6	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2231-A-7	E144	03-Aug-2022	----	----	----		11-Aug-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 BA2231-A-8	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2231-A-9	E144	03-Aug-2022	----	----	----		11-Aug-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-1	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-10	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-11	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-12	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-2	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-3	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-4	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 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 BA2231-A-5	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-6	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-7	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-8	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2231-A-9	E108	03-Aug-2022	11-Aug-2022	----	----		12-Aug-2022	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-1	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-10	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-11	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-12	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-2	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-3	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-4	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-5	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-6	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-7	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-8	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2231-A-9	E512	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	28 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-1	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-10	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-11	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-12	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-2	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-3	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-4	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-5	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-6	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-7	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-8	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2231-A-9	E444	13-Aug-2022	15-Aug-2022	----	----		15-Aug-2022	180 days	12 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-1	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-10	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-11	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-12	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-2	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-3	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-4	EPP444	03-Aug-2022	13-Aug-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) BA2231-A-5	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-6	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-7	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-8	EPP444	03-Aug-2022	13-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2231-A-9	EPP444	03-Aug-2022	13-Aug-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	598063	1	15	6.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	598062	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	598065	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	598064	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	598063	2	15	13.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	598062	2	15	13.3	10.0	✔
Moisture Content by Gravimetry	E144	598065	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	598064	1	20	5.0	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	602405	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	598063	1	15	6.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	602404	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	598062	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	598065	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	602405	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	602404	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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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 : **VA22B8439**
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

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Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 09-Aug-2022 12:40
Date Analysis Commenced : 11-Aug-2022
Issue Date : 16-Aug-2022 13:18

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Dan Gebert	Laboratory Analyst	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Parnian Sane	Analyst	Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia

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Work Order : VA22B8439
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: 598064)											
VA22B8439-001	BA2231-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.6	0.8%	5%	----
Physical Tests (QC Lot: 598065)											
VA22B8439-001	BA2231-A-1	moisture	----	E144	0.25	%	18.4	19.6	6.21%	20%	----
Metals (QC Lot: 598062)											
VA22B8439-001	BA2231-A-1	aluminum	7429-90-5	E440	50	mg/kg	48500	38800	22.4%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	107	105	1.96%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	29.2	30.4	4.02%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	533	521	2.27%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.38	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	9.22	8.52	7.91%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	188	178	5.81%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.37	10.3	9.15%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	124000	130000	4.39%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	184	133	32.1%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	28.7	33.2	14.6%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	1810	2080	14.0%	30%	----
		iron	7439-89-6	E440	50	mg/kg	51000	42100	19.1%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	686	398	53.2%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	22.8	24.8	8.44%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	9920	11500	14.8%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	701	708	0.948%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	180	204	13.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	144	106	30.4%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	10400	10900	4.21%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5370	5370	0.123%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.25	0.22	0.03	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.44	6.78	21.9%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16400	15400	6.61%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	300	326	8.58%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11500	11200	2.30%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.056	0.052	0.004	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: 598062) - continued											
VA22B8439-001	BA2231-A-1	tin	7440-31-5	E440	2.0	mg/kg	114	95.4	18.2%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	613	354	53.5%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	11.0	12.2	10.1%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.90	4.73	3.59%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	50.2	48.0	4.28%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3400	3000	12.5%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.4	1.9	0.5	Diff <2x LOR	----
Metals (QC Lot: 598063)											
VA22B8439-001	BA2231-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

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

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 598065)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 598062)						
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: 598062) - 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: 598063)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 602404)						
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	----
TCLP Metals (QCLot: 602405)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 598064)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 598065)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 598062)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.5	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	117	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.6	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.8	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.9	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.2	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.2	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	95.0	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.6	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.4	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	108	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.2	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	98.0	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.7	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	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	100	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.2	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	108	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	112	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.5	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	98.3	80.0	120	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 598062) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	106	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	98.6	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.1	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	93.6	80.0	120	----
Metals (QCLot: 598063)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	96.8	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**

					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: 602404)										
VA22B8439-001	BA2231-A-1	antimony, TCLP	7440-36-0	E444	5.33 mg/L	5 mg/L	107	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.2 mg/L	12.5 mg/L	106	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.233 mg/L	0.25 mg/L	93.1	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.232 mg/L	0.25 mg/L	92.6	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	1.18 mg/L	1.25 mg/L	94.9	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	2.36 mg/L	2.5 mg/L	94.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	241 mg/L	250 mg/L	96.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.50 mg/L	10 mg/L	95.0	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	286 mg/L	250 mg/L	114	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.36 mg/L	2.5 mg/L	94.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.22 mg/L	5 mg/L	104	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.102 mg/L	0.1 mg/L	102	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	97.5	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.75 mg/L	5 mg/L	95.1	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.9	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	91.8	50.0	150	----
TCLP Metals (QCLot: 602405)										
VA22B8439-001	BA2231-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	95.6	50.0	140	----



Reference Material (RM) Report

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

Sub-Matrix:

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: 598062)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	118	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	109	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	107	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	108	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	105	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	# 134	70.0	130	MES
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	111	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	113	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	104	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	109	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	114	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	112	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	96.1	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	107	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	107	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	100.0	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	91.6	70.0	130	----

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 Work Order : VA22B8439
 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: 598063)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.2	70.0	130	----

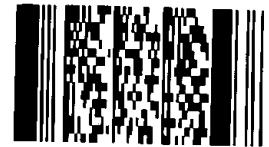
Qualifiers

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



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
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS
			brent.kirkpatrick@metrovancover.org		Analysis Res
			Sarah.Welman@metrovancover.org		

Environmental Division
 Vancouver
 Work Order Reference
VA22B8439



Telephone : + 1 604 253 4188

Invoice To		Client / Project Information		Please indicate below Filtered, Pres	
Same as Report ? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:			
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite		
Company:		LSD:	(includes 2:1 pH)		
Contact:		Quote #:			
Address:					
Phone:					
Fax:					
Lab Work Order # (lab use only)		ALS Contact:	Sampler:		
8439					

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)		Chrome 6	MET-CSR+FULL-VA (all metals)		Number
					X	X		X	X	
BA2231-A-1		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-2		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-3		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-4		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-5		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-6		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-7		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-8		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-9		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-10		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-11		03-Aug-22	9:00	Soil	X	X		X		1
BA2231-A-12		03-Aug-22	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)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
<i>[Signature]</i>	9-Aug-22	0900				25, 25°C	<i>[Signature]</i>	Aug. 9/22	12:40	

GENF 20.00 Front
[Signature]