

Bottom Ash Data

2022 Week 43

The following analytical report represents bottom ash composite results for week 43 of 2022 (October 23, 2022 to October 29, 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 : **VA22C6545**
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 : 01-Nov-2022 13:30
Date Analysis Commenced : 07-Nov-2022
Issue Date : 14-Nov-2022 07:28

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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	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	BA2243-A-1	BA2243-A-2	BA2243-A-3	BA2243-A-4	BA2243-A-5
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-001	VA22C6545-002	VA22C6545-003	VA22C6545-004	VA22C6545-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.7	26.4	24.7	25.0	24.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.9	10.7	10.9	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	30300	36700	27000	33200	29600	
antimony	7440-36-0	E440	0.10	mg/kg	93.4	96.1	95.7	93.6	92.4	
arsenic	7440-38-2	E440	0.10	mg/kg	20.4	19.2	22.4	17.5	18.8	
barium	7440-39-3	E440	0.50	mg/kg	315	423	433	389	411	
beryllium	7440-41-7	E440	0.10	mg/kg	0.27	0.30	0.42	0.32	0.48	
bismuth	7440-69-9	E440	0.20	mg/kg	6.12	6.80	6.33	6.61	6.39	
boron	7440-42-8	E440	5.0	mg/kg	163	143	164	161	142	
cadmium	7440-43-9	E440	0.020	mg/kg	7.42	7.35	11.6	7.78	7.99	
calcium	7440-70-2	E440	50	mg/kg	117000	116000	122000	113000	114000	
chromium	7440-47-3	E440	0.50	mg/kg	122	146	164	116	142	
cobalt	7440-48-4	E440	0.10	mg/kg	74.4	40.8	300	33.2	95.4	
copper	7440-50-8	E440	0.50	mg/kg	1430	3600	1370	1090	11400	
iron	7439-89-6	E440	50	mg/kg	50200	41900	51800	56600	49000	
lead	7439-92-1	E440	0.50	mg/kg	335	273	286	284	460	
lithium	7439-93-2	E440	2.0	mg/kg	24.6	22.3	25.5	22.3	23.9	
magnesium	7439-95-4	E440	20	mg/kg	9890	10100	11300	10100	10100	
manganese	7439-96-5	E440	1.0	mg/kg	690	728	1170	690	714	
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	16.0	20.8	23.8	17.0	19.0	
nickel	7440-02-0	E440	0.50	mg/kg	192	109	246	107	130	
phosphorus	7723-14-0	E440	50	mg/kg	9990	8620	10400	8980	8340	
potassium	7440-09-7	E440	100	mg/kg	4650	4660	4940	4390	4570	
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.40	0.32	0.31	0.32	
silver	7440-22-4	E440	0.10	mg/kg	5.35	5.64	10.8	3.44	4.88	
sodium	7440-23-5	E440	50	mg/kg	13100	13800	13800	12400	12600	
strontium	7440-24-6	E440	0.50	mg/kg	272	512	316	310	299	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2243-A-1	BA2243-A-2	BA2243-A-3	BA2243-A-4	BA2243-A-5
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-001	VA22C6545-002	VA22C6545-003	VA22C6545-004	VA22C6545-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	11500	11800	11700	12000	10700	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	0.078	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	113	188	96.1	94.9	307	
titanium	7440-32-6	E440	1.0	mg/kg	236	566	284	337	282	
tungsten	7440-33-7	E440	0.50	mg/kg	6.71	11.1	8.73	13.3	12.1	
uranium	7440-61-1	E440	0.050	mg/kg	2.33	2.49	3.13	2.61	2.57	
vanadium	7440-62-2	E440	0.20	mg/kg	36.4	44.4	43.6	38.6	33.9	
zinc	7440-66-6	E440	2.0	mg/kg	3040	3680	3450	9180	6240	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.2	1.7	2.2	1.9	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.3	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.03	9.08	8.93	8.92	9.13	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.48	6.43	6.50	6.50	6.43	
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	1.68	1.80	1.70	1.72	1.80	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.126	0.105	0.110	0.086	0.100	
calcium, TCLP	7440-70-2	E444	10	mg/L	1870	1890	1880	1850	1880	
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	1.19	0.950	1.08	1.03	0.693	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.744	0.887	0.632	0.156	0.647	
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	121	120	121	123	123	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.44	0.47	0.46	0.42	0.46	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2243-A-1	BA2243-A-2	BA2243-A-3	BA2243-A-4	BA2243-A-5
Client sampling date / time					26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-001	VA22C6545-002	VA22C6545-003	VA22C6545-004	VA22C6545-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	17.2	29.5	18.6	18.8	21.0	21.0
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	BA2243-A-6	BA2243-A-7	BA2243-A-8	BA2243-A-9	BA2243-A-10
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-006	VA22C6545-007	VA22C6545-008	VA22C6545-009	VA22C6545-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	25.3	25.4	26.7	24.4	25.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.8	10.7	10.6	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	30100	30900	32300	27000	30500	
antimony	7440-36-0	E440	0.10	mg/kg	95.6	111	706	93.2	220	
arsenic	7440-38-2	E440	0.10	mg/kg	20.8	19.5	26.2	20.1	27.0	
barium	7440-39-3	E440	0.50	mg/kg	395	342	341	324	345	
beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.30	0.26	0.35	0.33	
bismuth	7440-69-9	E440	0.20	mg/kg	9.06	7.24	7.04	6.34	7.69	
boron	7440-42-8	E440	5.0	mg/kg	221	160	143	151	138	
cadmium	7440-43-9	E440	0.020	mg/kg	9.68	8.56	8.31	8.18	11.4	
calcium	7440-70-2	E440	50	mg/kg	124000	123000	101000	118000	126000	
chromium	7440-47-3	E440	0.50	mg/kg	148	134	142	182	461	
cobalt	7440-48-4	E440	0.10	mg/kg	26.4	62.5	74.5	56.8	45.8	
copper	7440-50-8	E440	0.50	mg/kg	2060	8880	2340	3400	1750	
iron	7439-89-6	E440	50	mg/kg	55100	43100	63200	57700	39700	
lead	7439-92-1	E440	0.50	mg/kg	1230	656	4680	2750	377	
lithium	7439-93-2	E440	2.0	mg/kg	26.2	24.9	22.0	27.6	23.7	
magnesium	7439-95-4	E440	20	mg/kg	11500	10600	9630	10100	11200	
manganese	7439-96-5	E440	1.0	mg/kg	799	682	698	763	696	
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	21.3	22.5	21.1	20.7	19.6	
nickel	7440-02-0	E440	0.50	mg/kg	148	239	261	160	277	
phosphorus	7723-14-0	E440	50	mg/kg	9070	9140	8060	10200	10500	
potassium	7440-09-7	E440	100	mg/kg	4730	4780	4470	4590	5100	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.30	0.31	0.27	0.41	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	3.37	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.42	----	5.81	4.18	4.54	
sodium	7440-23-5	E440	50	mg/kg	14700	13000	12300	13000	14600	
strontium	7440-24-6	E440	0.50	mg/kg	326	312	261	318	298	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2243-A-6	BA2243-A-7	BA2243-A-8	BA2243-A-9	BA2243-A-10
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-006	VA22C6545-007	VA22C6545-008	VA22C6545-009	VA22C6545-010	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	10800	11800	11500	10900	13200	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.054	0.051	0.054	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	119	1280	176	134	131	
titanium	7440-32-6	E440	1.0	mg/kg	241	256	401	188	288	
tungsten	7440-33-7	E440	0.50	mg/kg	8.07	17.4	7.71	6.74	10.9	
uranium	7440-61-1	E440	0.050	mg/kg	2.61	2.69	2.40	2.40	2.75	
vanadium	7440-62-2	E440	0.20	mg/kg	37.7	36.4	47.5	39.1	40.1	
zinc	7440-66-6	E440	2.0	mg/kg	6490	11700	5240	3150	3480	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	2.2	1.8	2.9	1.8	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.3	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.75	8.98	8.42	9.04	8.56	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.49	6.47	6.18	6.20	6.37	
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	1.87	2.04	1.84	2.07	1.95	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.103	0.108	0.236	0.116	0.117	
calcium, TCLP	7440-70-2	E444	10	mg/L	1890	1920	1920	1930	1980	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.885	0.763	0.858	2.73	2.96	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.763	0.630	0.988	1.07	0.650	
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	0.33	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	120	127	130	128	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	0.47	0.44	0.52	0.47	0.46	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2243-A-6	BA2243-A-7	BA2243-A-8	BA2243-A-9	BA2243-A-10
Client sampling date / time					26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00	26-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-006	VA22C6545-007	VA22C6545-008	VA22C6545-009	VA22C6545-010	
TCLP Metals					Result	Result	Result	Result	Result	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	22.8	20.7	47.2	34.7	27.2	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2243-A-11	BA2243-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-011	VA22C6545-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
moisture	----	E144	0.25	%	27.9	25.3	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.6	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	57600	30300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	99.8	105	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	22.9	27.9	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	471	364	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.32	0.32	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	7.26	7.38	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	129	159	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	6.94	8.13	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	120000	120000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	225	294	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	805	154	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1160	1530	----	----	----	
iron	7439-89-6	E440	50	mg/kg	54500	58700	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	1990	354	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	31.6	26.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12200	11400	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	823	812	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	19.0	18.6	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	205	209	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9120	10000	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4550	5100	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.27	0.39	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	3.45	19.5	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	12800	14400	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	345	312	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	11100	11400	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2243-A-11	BA2243-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	26-Oct-2022 09:00	26-Oct-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-011	VA22C6545-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	
tin	7440-31-5	E440	2.0	mg/kg	220	100	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	846	252	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	9.39	8.04	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	2.50	2.64	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	44.4	42.7	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	2760	3340	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	3.7	1.9	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.09	9.10	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.29	6.34	---	---	---	
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	1.98	1.96	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.150	0.104	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	1970	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.10	0.915	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.913	0.616	---	---	---	
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	137	132	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.59	0.44	---	---	---	
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	---	---	---	



Analytical Results

Sub-Matrix: Soil					Client sample ID		BA2243-A-11	BA2243-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		26-Oct-2022 09:00	26-Oct-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C6545-011	VA22C6545-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
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	---	---	---	---	---
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	23.0	23.2	---	---	---	---	---
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

<p>Work Order : VA22C6545</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO 0000051213</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 01-Nov-2022 13:30</p> <p>Issue Date : 14-Nov-2022 07:28</p>
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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

- Quality Control Sample Frequency Outliers occur - please see following pages for full details.



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	54.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2243-A-7	E440.Ag	26-Oct-2022	10-Nov-2022	180 days	15 days	✓	11-Nov-2022	165 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-1	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-10	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-11	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-12	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-2	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-3	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-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 BA2243-A-4	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-5	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-6	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-7	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-8	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2243-A-9	E510	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2243-A-1	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2243-A-10	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2243-A-11	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-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 ICMS											
LDPE bag BA2243-A-12	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-2	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-3	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-4	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-5	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-6	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-7	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-8	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2243-A-9	E440	26-Oct-2022	09-Nov-2022	----	----		09-Nov-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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-1	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-10	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-11	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-12	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-2	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-3	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-4	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-5	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2243-A-6	E144	26-Oct-2022	----	----	----		08-Nov-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 BA2243-A-7	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2243-A-8	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2243-A-9	E144	26-Oct-2022	----	----	----		08-Nov-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-1	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-10	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-11	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-12	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-2	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-3	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-4	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-5	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-6	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-7	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-8	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2243-A-9	E108	26-Oct-2022	09-Nov-2022	----	----		09-Nov-2022	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-1	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-10	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-11	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-12	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-2	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-3	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-4	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-5	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-6	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-7	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-8	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2243-A-9	E512	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	28 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-1	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-10	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-11	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-12	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-2	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-3	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-4	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-5	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2243-A-6	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2243-A-7	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2243-A-8	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2243-A-9	E444	07-Nov-2022	09-Nov-2022	----	----		09-Nov-2022	180 days	15 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-1	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-10	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-11	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-12	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-2	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-3	EPP444	26-Oct-2022	07-Nov-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) BA2243-A-4	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-5	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-6	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-7	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-8	EPP444	26-Oct-2022	07-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2243-A-9	EPP444	26-Oct-2022	07-Nov-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 (%)		
			QC	Regular	Actual	Expected	Evaluation
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	736170	0	17	0.0	5.0	✖
Metals in Soil/Solid by CRC ICPMS	E440	736171	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	736175	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	736172	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	739597	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	736170	2	17	11.7	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	736171	2	18	11.1	10.0	✔
Moisture Content by Gravimetry	E144	736175	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	736172	1	18	5.5	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	739597	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	737853	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	736170	1	17	5.8	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	737854	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	736171	1	18	5.5	5.0	✔
Moisture Content by Gravimetry	E144	736175	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	737853	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	737854	1	12	8.3	5.0	✔



Methodology References and Summaries

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

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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: VA22C6545	Page	: 1 of 12
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	: 01-Nov-2022 13:30
PO	: VANCO 0000051213	Date Analysis Commenced	: 07-Nov-2022
C-O-C number	: ----	Issue Date	: 14-Nov-2022 07:28
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 12
Work Order : VA22C6545
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: 736172)											
KS2204171-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	9.23	9.21	0.2%	5%	----
Physical Tests (QC Lot: 736175)											
KS2204168-003	Anonymous	moisture	----	E144	0.25	%	2.83	2.82	0.291%	20%	----
Metals (QC Lot: 736171)											
KS2204171-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	10900	10600	2.56%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	2.57	1.47	54.5%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	1.81	1.52	17.6%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	102	105	2.29%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	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	0.023	0.020	0.003	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	27000	20400	28.0%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	8.82	9.95	12.0%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	22.6	22.1	2.29%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	108	92.5	15.2%	30%	----
		iron	7439-89-6	E440	50	mg/kg	80000	79200	0.926%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	0.72	0.52	0.19	Diff <2x LOR	----
		lithium	7439-93-2	E440	2.0	mg/kg	7.4	7.5	0.2	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	8540	8400	1.60%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	519	477	8.36%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.61	0.57	7.77%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	20.0	20.4	2.11%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	310	299	11	Diff <2x LOR	----
		potassium	7440-09-7	E440	100	mg/kg	630	620	2.64%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.20	<0.20	0.002	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	447	440	1.52%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	85.2	82.2	3.61%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	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: 736171) - continued											
KS2204171-001	Anonymous	thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		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	1180	1130	3.88%	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	0.084	0.075	0.009	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.20	mg/kg	465	463	0.578%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	27.6	28.9	4.61%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	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: 736175)						
moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 736170)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 736171)						
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	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 736171) - continued						
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	----
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: 739597)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 737853)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 737854)						
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	----

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





Laboratory Control Sample (LCS) Report

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

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 736172)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
Physical Tests (QCLot: 736175)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 736170)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	93.5	80.0	120	----
Metals (QCLot: 736171)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.0	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	94.8	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	93.2	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	91.2	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.7	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	88.3	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	84.1	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	91.0	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	90.9	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	91.7	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	90.7	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.2	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	90.6	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	86.4	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.8	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	92.0	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.4	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	90.1	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	84.4	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	88.8	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.2	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.0	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	94.2	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	92.0	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	94.0	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 736171) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	88.6	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	91.9	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	91.4	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	93.9	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.2	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.9	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	87.5	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	84.0	80.0	120	----
Metals (QCLot: 739597)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	89.7	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: Soil/Solid

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 737853)										
VA22C6545-001	BA2243-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	100	50.0	140	----
TCLP Metals (QCLot: 737854)										
VA22C6545-001	BA2243-A-1	antimony, TCLP	7440-36-0	E444	5.05 mg/L	5 mg/L	101	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	98.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.2 mg/L	12.5 mg/L	98.0	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.246 mg/L	0.25 mg/L	98.3	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.58 mg/L	10 mg/L	95.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.243 mg/L	0.25 mg/L	97.4	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	1.21 mg/L	1.25 mg/L	97.0	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	2.32 mg/L	2.5 mg/L	93.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	243 mg/L	250 mg/L	97.3	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.42 mg/L	10 mg/L	94.2	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	253 mg/L	250 mg/L	101	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.38 mg/L	2.5 mg/L	95.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.06 mg/L	5 mg/L	101	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.110 mg/L	0.1 mg/L	110	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.67 mg/L	5 mg/L	93.4	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	99.9	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	90.4	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix:

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: 736170)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----
Metals (QCLot: 736171)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	99.9	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	95.5	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	95.4	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	94.1	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	101	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	109	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	116	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	91.8	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	102	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	92.5	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	93.1	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	93.6	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	93.1	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	96.3	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	97.7	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	97.8	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	95.5	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	93.7	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	78.3	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	99.1	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	97.1	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	94.6	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.6	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	92.5	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	107	70.0	130	----

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 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: 736171) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	99.9	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	99.3	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	89.5	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	83.5	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

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Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)		
Contact:	Steve McKinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
	Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
			brent.kirkpatrick@metrovancover.org		Analysis Request	
			Sarah.Wellman@metrovancover.org			

Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		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:		Fax:							

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers	
BA2243-A-1		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-2		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-3		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-4		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-5		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-6		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-7		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-8		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-9		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-10		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-11		26-Oct-22	9:00	Soil	X	X		X		1
BA2243-A-12		26-Oct-22	9:00	Soil	X	X		X		1

Environmental Division
Vancouver
Work Order Reference
VA22C6545

Telephone : +1 604 263 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	1-Nov-22	0800		NOV - 1 2022	1330	21 °C				