

Bottom Ash Data

2022 Week 44

The following analytical report represents bottom ash composite results for week 44 of 2022 (October 30, 2022 to November 5, 2022).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.



CERTIFICATE OF ANALYSIS

<p>Work Order : VA22C7115</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 11</p> <p>Laboratory : Vancouver - Environmental</p> <p>Account Manager : Brent Mack</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : 778-370-3279</p> <p>Date Samples Received : 08-Nov-2022 13:05</p> <p>Date Analysis Commenced : 10-Nov-2022</p> <p>Issue Date : 18-Nov-2022 17:18</p>
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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>
Hamideh Moradi	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		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	BA2244-A-1	BA2244-A-2	BA2244-A-3	BA2244-A-4	BA2244-A-5
(Matrix: Soil/Solid)					Client sampling date / time	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-001	VA22C7115-002	VA22C7115-003	VA22C7115-004	VA22C7115-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	26.6	26.9	28.0	26.8	26.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	10.7	10.7	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	32000	40700	31100	41800	38100	
antimony	7440-36-0	E440	0.10	mg/kg	96.9	91.5	88.5	91.1	90.0	
arsenic	7440-38-2	E440	0.10	mg/kg	17.0	16.4	18.5	14.9	16.1	
barium	7440-39-3	E440	0.50	mg/kg	533	562	442	483	435	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.32	0.31	0.29	0.31	
bismuth	7440-69-9	E440	0.20	mg/kg	8.23	6.27	7.35	6.81	7.28	
boron	7440-42-8	E440	5.0	mg/kg	221	183	171	194	198	
cadmium	7440-43-9	E440	0.020	mg/kg	7.28	7.17	7.40	7.20	7.42	
calcium	7440-70-2	E440	50	mg/kg	130000	126000	119000	117000	122000	
chromium	7440-47-3	E440	0.50	mg/kg	138	137	115	132	131	
cobalt	7440-48-4	E440	0.10	mg/kg	166	122	20.7	35.9	24.5	
copper	7440-50-8	E440	0.50	mg/kg	4280	2220	2910	2150	4540	
iron	7439-89-6	E440	50	mg/kg	55200	76100	46900	50200	61400	
lead	7439-92-1	E440	0.50	mg/kg	433	423	645	313	408	
lithium	7439-93-2	E440	2.0	mg/kg	29.2	23.2	21.2	23.6	31.7	
magnesium	7439-95-4	E440	20	mg/kg	11100	9160	10300	10200	9930	
manganese	7439-96-5	E440	1.0	mg/kg	651	764	570	726	731	
mercury	7439-97-6	E510	0.0500	mg/kg	0.199	0.122	0.156	0.165	0.142	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.5	19.9	16.6	19.1	61.4	
nickel	7440-02-0	E440	0.50	mg/kg	181	121	197	107	117	
phosphorus	7723-14-0	E440	50	mg/kg	11500	10800	11700	10800	10600	
potassium	7440-09-7	E440	100	mg/kg	4380	4170	4560	4280	4880	
selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.28	0.28	0.27	0.34	
silver	7440-22-4	E440	0.10	mg/kg	3.55	4.42	5.74	3.07	5.22	
sodium	7440-23-5	E440	50	mg/kg	14900	13300	14000	14500	14900	
strontium	7440-24-6	E440	0.50	mg/kg	281	459	282	290	470	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2244-A-1	BA2244-A-2	BA2244-A-3	BA2244-A-4	BA2244-A-5
(Matrix: Soil/Solid)					Client sampling date / time	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-001	VA22C7115-002	VA22C7115-003	VA22C7115-004	VA22C7115-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	10200	9300	9300	9500	9700	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	0.120	
tin	7440-31-5	E440	2.0	mg/kg	106	201	163	109	85.5	
titanium	7440-32-6	E440	1.0	mg/kg	290	495	210	408	359	
tungsten	7440-33-7	E440	0.50	mg/kg	10.3	8.73	6.97	7.09	6.29	
uranium	7440-61-1	E440	0.050	mg/kg	2.61	2.40	2.37	2.36	2.57	
vanadium	7440-62-2	E440	0.20	mg/kg	31.1	32.0	29.5	33.4	32.1	
zinc	7440-66-6	E440	2.0	mg/kg	3480	3850	2900	2390	4910	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.1	3.2	2.6	2.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.3	11.2	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.01	8.87	8.86	8.51	8.77	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.69	6.50	6.70	6.58	6.73	
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	2.24	2.47	2.34	2.23	2.34	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.077	0.098	0.122	0.097	0.078	
calcium, TCLP	7440-70-2	E444	10	mg/L	2110	2120	2210	2160	2180	
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	1.02	1.08	0.997	1.40	1.34	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.648	0.801	0.820	0.654	0.673	
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	122	122	130	127	127	
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	0.45	0.39	0.45	0.37	
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	BA2244-A-1	BA2244-A-2	BA2244-A-3	BA2244-A-4	BA2244-A-5
Client sampling date / time					02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-001	VA22C7115-002	VA22C7115-003	VA22C7115-004	VA22C7115-005	
					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	
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	17.2	36.4	15.6	20.8	14.9	
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	BA2244-A-6	BA2244-A-7	BA2244-A-8	BA2244-A-9	BA2244-A-10
(Matrix: Soil/Solid)					Client sampling date / time	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-006	VA22C7115-007	VA22C7115-008	VA22C7115-009	VA22C7115-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	27.0	25.6	26.5	28.1	27.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.8	10.9	10.9	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	46700	28100	30900	36600	32000	
antimony	7440-36-0	E440	0.10	mg/kg	101	97.4	117	84.2	97.4	
arsenic	7440-38-2	E440	0.10	mg/kg	18.6	25.3	25.1	22.7	16.6	
barium	7440-39-3	E440	0.50	mg/kg	494	556	555	553	544	
beryllium	7440-41-7	E440	0.10	mg/kg	0.31	0.35	0.29	2.14	0.32	
bismuth	7440-69-9	E440	0.20	mg/kg	20.4	7.85	16.8	9.97	9.90	
boron	7440-42-8	E440	5.0	mg/kg	206	196	225	245	179	
cadmium	7440-43-9	E440	0.020	mg/kg	7.93	10.5	10.4	6.59	7.27	
calcium	7440-70-2	E440	50	mg/kg	121000	126000	124000	122000	117000	
chromium	7440-47-3	E440	0.50	mg/kg	795	155	181	142	152	
cobalt	7440-48-4	E440	0.10	mg/kg	77.2	395	109	51.4	29.9	
copper	7440-50-8	E440	0.50	mg/kg	1530	3400	2660	4180	1970	
iron	7439-89-6	E440	50	mg/kg	57600	81800	69200	47000	55200	
lead	7439-92-1	E440	0.50	mg/kg	462	1140	1790	374	334	
lithium	7439-93-2	E440	2.0	mg/kg	27.5	29.1	24.6	30.3	24.5	
magnesium	7439-95-4	E440	20	mg/kg	10000	9930	10500	10900	9970	
manganese	7439-96-5	E440	1.0	mg/kg	724	807	1040	675	760	
mercury	7439-97-6	E510	0.0500	mg/kg	0.157	0.187	0.184	0.188	0.182	
molybdenum	7439-98-7	E440	0.10	mg/kg	35.3	20.4	21.6	39.3	19.3	
nickel	7440-02-0	E440	0.50	mg/kg	666	167	165	132	678	
phosphorus	7723-14-0	E440	50	mg/kg	10200	9090	9920	12000	10400	
potassium	7440-09-7	E440	100	mg/kg	4710	4120	4140	4420	4790	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.31	0.32	0.34	0.25	
silver	7440-22-4	E440	0.10	mg/kg	3.15	6.38	6.18	5.28	3.84	
sodium	7440-23-5	E440	50	mg/kg	15100	13200	13800	14300	14200	
strontium	7440-24-6	E440	0.50	mg/kg	269	392	1130	273	269	
sulfur	7704-34-9	E440	1000	mg/kg	10200	9500	9000	9100	9300	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2244-A-6	BA2244-A-7	BA2244-A-8	BA2244-A-9	BA2244-A-10
Client sampling date / time					02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-006	VA22C7115-007	VA22C7115-008	VA22C7115-009	VA22C7115-010	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	103	88.1	223	154	103	
titanium	7440-32-6	E440	1.0	mg/kg	507	275	358	375	306	
tungsten	7440-33-7	E440	0.50	mg/kg	11.0	8.64	7.39	22.8	6.40	
uranium	7440-61-1	E440	0.050	mg/kg	2.49	2.38	2.44	2.40	2.56	
vanadium	7440-62-2	E440	0.20	mg/kg	37.5	33.1	34.6	43.1	35.0	
zinc	7440-66-6	E440	2.0	mg/kg	2820	4300	3720	4070	5850	
zirconium	7440-67-7	E440	1.0	mg/kg	2.9	2.3	1.9	2.0	1.9	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.3	11.2	11.3	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.88	8.60	8.64	8.62	8.84	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.38	6.83	6.59	6.70	6.60	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.22	2.37	2.25	2.25	2.31	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.109	0.074	0.097	0.103	0.072	
calcium, TCLP	7440-70-2	E444	10	mg/L	2090	2170	2100	2100	2150	
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	1.24	0.921	0.858	4.49	1.07	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.01	0.630	0.837	0.821	0.728	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	123	120	124	123	126	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.39	0.42	0.39	0.47	0.38	
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	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2244-A-6	BA2244-A-7	BA2244-A-8	BA2244-A-9	BA2244-A-10
Client sampling date / time					02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00	02-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-006	VA22C7115-007	VA22C7115-008	VA22C7115-009	VA22C7115-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
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	18.8	19.4	18.4	16.6	17.1	17.1
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2244-A-11	BA2244-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	02-Nov-2022 09:00	02-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-011	VA22C7115-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
moisture	----	E144	0.25	%	26.8	26.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.8	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36200	38800	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	103	99.3	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	21.0	15.3	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	457	522	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.30	0.31	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	8.68	8.34	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	143	189	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	6.64	7.61	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	115000	117000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	128	135	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	280	116	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	3810	2670	----	----	----	
iron	7439-89-6	E440	50	mg/kg	62900	50400	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	488	336	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	25.5	24.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	9760	10100	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	671	820	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.155	0.170	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.6	18.8	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	158	160	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9860	10100	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4360	4410	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.87	0.26	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	3.74	4.13	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14800	15200	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	258	265	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	9300	8900	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2244-A-11	BA2244-A-12	----	----	----
Client sampling date / time					02-Nov-2022 09:00	02-Nov-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-011	VA22C7115-012	-----	-----	-----	
					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	116	1040	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	288	542	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	6.63	9.90	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	2.33	2.36	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	36.0	35.3	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5430	2890	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.8	2.3	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.3	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.61	8.71	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.72	6.50	---	---	---	
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	2.34	2.29	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.086	0.145	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2100	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.06	1.05	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.822	0.838	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.98	<0.25	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	125	124	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.34	0.38	---	---	---	
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		BA2244-A-11	BA2244-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		02-Nov-2022 09:00	02-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C7115-011	VA22C7115-012	-----	-----	-----	-----	-----
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	15.0	42.5	---	---	---	---	---
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 : VA22C7115</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 : 08-Nov-2022 13:05</p> <p>Issue Date : 18-Nov-2022 17:18</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

- 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	VA22C7115-001	BA2244-A-1	aluminum	7429-90-5	E440	47.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	boron	7440-42-8	E440	30.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	cobalt	7440-48-4	E440	157 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	copper	7440-50-8	E440	70.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	manganese	7439-96-5	E440	39.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	nickel	7440-02-0	E440	31.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	titanium	7440-32-6	E440	54.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	tungsten	7440-33-7	E440	35.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C7115-001	BA2244-A-1	zirconium	7440-67-7	E440	2.1 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-1	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-10	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-11	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-12	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-2	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-3	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2244-A-4	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-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 BA2244-A-5	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2244-A-6	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2244-A-7	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2244-A-8	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2244-A-9	E510	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	28 days	9 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2244-A-1	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2244-A-10	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2244-A-11	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2244-A-12	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-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 ICMS											
LDPE bag BA2244-A-2	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-3	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-4	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-5	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-6	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-7	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-8	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2244-A-9	E440	02-Nov-2022	10-Nov-2022	----	----		11-Nov-2022	180 days	10 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2244-A-1	E144	02-Nov-2022	----	----	----		10-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 BA2244-A-10	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-11	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-12	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-2	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-3	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-4	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-5	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-6	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2244-A-7	E144	02-Nov-2022	----	----	----		10-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 BA2244-A-8	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2244-A-9	E144	02-Nov-2022	----	----	----		10-Nov-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-1	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-10	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-11	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-12	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-2	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-3	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-4	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-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 BA2244-A-5	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-6	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-7	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-8	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2244-A-9	E108	02-Nov-2022	10-Nov-2022	----	----		10-Nov-2022	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-1	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-10	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-11	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-12	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 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) BA2244-A-2	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-3	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-4	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-5	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-6	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-7	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-8	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2244-A-9	E512	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	28 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2244-A-1	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 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) BA2244-A-10	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-11	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-12	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-2	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-3	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-4	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-5	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-6	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-7	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 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) BA2244-A-8	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2244-A-9	E444	16-Nov-2022	18-Nov-2022	----	----		18-Nov-2022	180 days	17 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-1	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-10	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-11	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-12	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-2	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-3	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-4	EPP444	02-Nov-2022	16-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) BA2244-A-5	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-6	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-7	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-8	EPP444	02-Nov-2022	16-Nov-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2244-A-9	EPP444	02-Nov-2022	16-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	739346	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	739347	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	739349	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	739348	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	739346	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	739347	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	739349	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	739348	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	748306	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	739346	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	748307	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	739347	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	739349	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	748306	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	748307	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, 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.

Page : 16 of 16
 Work Order : VA22C7115
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
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	: VA22C7115	Page	: 1 of 11
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	: 08-Nov-2022 13:05
PO	: VANCO 0000051213	Date Analysis Commenced	: 10-Nov-2022
C-O-C number	: ----	Issue Date	: 18-Nov-2022 17:18
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>
Hamideh Moradi	Analyst	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia



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: 739348)											
VA22C7115-001	BA2244-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	0.5%	5%	----
Physical Tests (QC Lot: 739349)											
VA22C7115-001	BA2244-A-1	moisture	----	E144	0.25	%	26.6	25.9	3.02%	20%	----
Metals (QC Lot: 739346)											
VA22C7115-001	BA2244-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.199	0.228	0.0288	Diff <2x LOR	----
Metals (QC Lot: 739347)											
VA22C7115-001	BA2244-A-1	aluminum	7429-90-5	E440	50	mg/kg	32000	52000	47.7%	40%	DUP-H
		antimony	7440-36-0	E440	0.10	mg/kg	96.9	81.0	17.9%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	17.0	15.6	8.96%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	533	521	2.34%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.30	0.03	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.23	8.54	3.67%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	221	163	30.0%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	7.28	6.75	7.63%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	130000	117000	10.3%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	138	127	8.24%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	166	20.1	157%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	4280	2040	70.8%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	55200	49800	10.2%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	433	300	36.3%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	29.2	25.0	15.6%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11100	9330	17.2%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	651	974	39.8%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	17.5	23.6	29.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	181	133	31.0%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11500	10000	13.6%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4380	4080	7.04%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.25	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	3.55	3.73	4.94%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14900	13600	9.23%	40%	----



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: 739347) - continued											
VA22C7115-001	BA2244-A-1	strontium	7440-24-6	E440	0.50	mg/kg	281	260	7.67%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	10200	8700	15.9%	30%	----
		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	106	77.8	30.2%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	290	508	54.6%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	10.3	7.19	35.9%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	2.61	2.37	9.70%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	31.1	32.5	4.30%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3480	3300	5.35%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	# 3.7	2.1	Diff <2x LOR	DUP-H

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: 739349)						
moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 739346)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 739347)						
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: 739347) - 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	----
TCLP Metals (QCLot: 748306)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 748307)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 739348)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 739349)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 739346)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.0	80.0	120	----
Metals (QCLot: 739347)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.6	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	97.3	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	96.8	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	91.4	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	93.2	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.2	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	89.3	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	91.4	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	92.9	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	87.1	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	88.6	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	89.5	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	91.9	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.8	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.6	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	92.3	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	92.8	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	95.2	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	90.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	96.5	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	87.5	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	90.2	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.3	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	92.9	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.9	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.4	80.0	120	----



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 739347) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.7	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	90.4	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.8	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.2	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	96.0	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	93.0	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	91.4	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	84.2	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: 748306)										
VA22C7115-001	BA2244-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	90.7	50.0	140	----
TCLP Metals (QCLot: 748307)										
VA22C7115-001	BA2244-A-1	antimony, TCLP	7440-36-0	E444	5.62 mg/L	5 mg/L	112	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	105	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	0.255 mg/L	0.25 mg/L	102	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.55 mg/L	10 mg/L	95.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.246 mg/L	0.25 mg/L	98.2	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.25 mg/L	1.25 mg/L	100	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.43 mg/L	2.5 mg/L	97.1	50.0	140	----
		iron, TCLP	7439-89-6	E444	248 mg/L	250 mg/L	99.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.6 mg/L	10 mg/L	106	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	280 mg/L	250 mg/L	112	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.50 mg/L	2.5 mg/L	100	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.28 mg/L	5 mg/L	106	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.123 mg/L	0.1 mg/L	123	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.3 mg/L	5 mg/L	106	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.41 mg/L	5 mg/L	108	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	103	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: 739346)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	97.5	70.0	130	----
Metals (QCLot: 739347)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	94.8	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	87.7	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	93.4	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	87.8	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	84.7	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	105	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	102	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	82.7	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	97.2	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	89.2	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	88.1	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	90.1	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	87.2	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	95.7	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	91.8	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	94.4	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	87.8	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	91.0	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	90.2	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	99.6	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	92.4	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	89.6	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	86.5	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	78.5	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	106	70.0	130	----

Page : 11 of 11
 Work Order : VA22C7115
 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: 739347) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	88.7	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	93.9	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	86.9	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	73.8	70.0	130	----



Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)		
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)		
Contact:	Steve McKinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
Address:	5150 Riverbend Drive Bumaby 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	
	<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?	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:						

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
BA2244-A-1	Environmental Division Vancouver Work Order Reference VA22C7115  Telephone : +1 604 253 4188	02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-2		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-3		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-4		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-5		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-6		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-7		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-8		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-9		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-10		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-11		02-Nov-22	9:00	Soil	X	X	X	1	
BA2244-A-12		02-Nov-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:
<i>[Signature]</i>	8-Nov-22	0800	JC	8 Nov 22	1305	22 °C				Yes / No ? If Yes add SIF