

Bottom Ash Data

2022 Week 22

The following analytical report represents bottom ash composite results for week 22 of 2022 (May 29, 2022 to June 4, 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 : **VA22B2631**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Robin Johnson
Address : 5150 Riverbend Drive
 Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
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 : 07-Jun-2022 13:00
Date Analysis Commenced : 12-Jun-2022
Issue Date : 20-Jun-2022 12:28

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>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Asha Tauckoor	Laboratory Analyst	Organics, Burnaby, British Columbia
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Woochan Song	Lab Analyst	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLHM	Detection Limit Adjusted: Sample has high moisture content.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2222-A-1	BA2222-A-2	BA2222-A-3	BA2222-A-4	BA2222-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-001	VA22B2631-002	VA22B2631-003	VA22B2631-004	VA22B2631-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	21.1	20.9	21.0	20.4	20.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.3	11.1	11.2	11.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34500	45300	38800	50000	28300	
antimony	7440-36-0	E440	0.10	mg/kg	109	109	96.2	176	127	
arsenic	7440-38-2	E440	0.10	mg/kg	28.0	22.1	18.5	20.0	24.1	
barium	7440-39-3	E440	0.50	mg/kg	410	458	398	365	325	
beryllium	7440-41-7	E440	0.10	mg/kg	0.45	0.54	0.48	0.45	0.47	
bismuth	7440-69-9	E440	0.20	mg/kg	10.4	10.1	9.70	13.6	16.7	
boron	7440-42-8	E440	5.0	mg/kg	179	215	205	204	198	
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	392	11.6	11.3	13.8	
calcium	7440-70-2	E440	50	mg/kg	155000	144000	155000	149000	176000	
chromium	7440-47-3	E440	0.50	mg/kg	193	143	251	134	210	
cobalt	7440-48-4	E440	0.10	mg/kg	62.9	52.3	49.7	824	43.2	
copper	7440-50-8	E440	0.50	mg/kg	1680	1440	2410	5760	5350	
iron	7439-89-6	E440	50	mg/kg	61800	57200	68900	65100	81900	
lead	7439-92-1	E440	0.50	mg/kg	753	412	303	617	853	
lithium	7439-93-2	E440	2.0	mg/kg	47.7	42.7	23.7	53.4	24.4	
magnesium	7439-95-4	E440	20	mg/kg	12000	11100	11300	10800	12200	
manganese	7439-96-5	E440	1.0	mg/kg	850	780	770	1220	894	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0559	<0.0500	<0.0500	0.103	0.0548	
molybdenum	7439-98-7	E440	0.10	mg/kg	88.1	71.8	79.5	69.4	90.9	
nickel	7440-02-0	E440	0.50	mg/kg	146	218	223	126	208	
phosphorus	7723-14-0	E440	50	mg/kg	10600	10000	11400	11500	14200	
potassium	7440-09-7	E440	100	mg/kg	5700	5440	5350	5500	5480	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.31	0.35	0.36	0.41	
silver	7440-22-4	E440	0.10	mg/kg	4.10	3.34	3.97	5.38	10.6	
sodium	7440-23-5	E440	50	mg/kg	15800	15300	14900	16000	15400	
strontium	7440-24-6	E440	0.50	mg/kg	309	302	320	326	321	
sulfur	7704-34-9	E440	1000	mg/kg	11900	11900	12500	12500	14600	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-1	BA2222-A-2	BA2222-A-3	BA2222-A-4	BA2222-A-5
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-001	VA22B2631-002	VA22B2631-003	VA22B2631-004	VA22B2631-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.057	<0.050	0.050	0.060	0.064	
tin	7440-31-5	E440	2.0	mg/kg	99.4	544	268	130	131	
titanium	7440-32-6	E440	1.0	mg/kg	231	412	222	362	195	
tungsten	7440-33-7	E440	0.50	mg/kg	6.59	5.39	6.34	8.49	10.0	
uranium	7440-61-1	E440	0.050	mg/kg	5.45	4.93	5.19	5.37	6.43	
vanadium	7440-62-2	E440	0.20	mg/kg	53.8	67.4	52.7	56.8	56.5	
zinc	7440-66-6	E440	2.0	mg/kg	9630	3310	3540	4820	4580	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.2	2.0	2.4	1.4	
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	1.01 ^{DLHM}	----	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	11.9	12.0	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.93	8.85	8.91	9.31	8.99	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.27	6.34	6.26	6.33	6.33	
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	2.21	1.98	2.20	1.98	1.97	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.175	0.162	0.183	0.171	0.296	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	2070	2340	2190	2140	
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	1.80	1.09	1.13	1.04	0.842	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.42	0.918	1.52	1.18	0.806	
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	125	130	142	130	130	
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	1.40	0.76	0.59	0.89	0.93	
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	BA2222-A-1	BA2222-A-2	BA2222-A-3	BA2222-A-4	BA2222-A-5
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-001	VA22B2631-002	VA22B2631-003	VA22B2631-004	VA22B2631-005	
					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	33.0	53.4	47.2	32.6	40.7	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-6	BA2222-A-7	BA2222-A-8	BA2222-A-9	BA2222-A-10
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-006	VA22B2631-007	VA22B2631-008	VA22B2631-009	VA22B2631-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.7	20.6	20.3	20.4	20.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	10.9	11.1	11.0	11.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	28900	35300	40600	49600	47200	
antimony	7440-36-0	E440	0.10	mg/kg	110	111	100	92.3	100	
arsenic	7440-38-2	E440	0.10	mg/kg	24.0	19.3	19.9	18.6	23.6	
barium	7440-39-3	E440	0.50	mg/kg	328	394	483	482	425	
beryllium	7440-41-7	E440	0.10	mg/kg	0.46	0.45	0.49	0.41	0.43	
bismuth	7440-69-9	E440	0.20	mg/kg	13.5	11.6	11.6	8.55	10.1	
boron	7440-42-8	E440	5.0	mg/kg	202	214	185	188	201	
cadmium	7440-43-9	E440	0.020	mg/kg	12.3	10.7	10.6	8.80	9.14	
calcium	7440-70-2	E440	50	mg/kg	160000	151000	148000	147000	147000	
chromium	7440-47-3	E440	0.50	mg/kg	196	158	180	152	154	
cobalt	7440-48-4	E440	0.10	mg/kg	51.8	196	43.3	203	140	
copper	7440-50-8	E440	0.50	mg/kg	3130	3020	2260	2440	1260	
iron	7439-89-6	E440	50	mg/kg	52900	61600	66600	69700	71600	
lead	7439-92-1	E440	0.50	mg/kg	469	318	432	277	474	
lithium	7439-93-2	E440	2.0	mg/kg	25.4	26.4	24.6	42.7	51.6	
magnesium	7439-95-4	E440	20	mg/kg	12000	12200	10700	10500	10200	
manganese	7439-96-5	E440	1.0	mg/kg	1050	1230	1160	808	958	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0512	0.147	<0.0500	0.0623	0.254	
molybdenum	7439-98-7	E440	0.10	mg/kg	86.7	74.4	70.0	229	70.4	
nickel	7440-02-0	E440	0.50	mg/kg	145	136	159	495	205	
phosphorus	7723-14-0	E440	50	mg/kg	13000	11400	9870	12000	11400	
potassium	7440-09-7	E440	100	mg/kg	6170	5800	5390	5020	5360	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.28	0.29	0.38	0.26	
silver	7440-22-4	E440	0.10	mg/kg	5.16	3.79	11.3	3.35	3.77	
sodium	7440-23-5	E440	50	mg/kg	16600	16300	15400	14000	14600	
strontium	7440-24-6	E440	0.50	mg/kg	324	298	306	289	606	
sulfur	7704-34-9	E440	1000	mg/kg	13400	12500	11400	11100	11800	
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.051	0.059	0.058	0.056	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-6	BA2222-A-7	BA2222-A-8	BA2222-A-9	BA2222-A-10
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-006	VA22B2631-007	VA22B2631-008	VA22B2631-009	VA22B2631-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	126	90.6	104	150	126	
titanium	7440-32-6	E440	1.0	mg/kg	155	228	331	339	257	
tungsten	7440-33-7	E440	0.50	mg/kg	8.32	6.96	7.21	6.63	6.21	
uranium	7440-61-1	E440	0.050	mg/kg	6.78	5.18	5.24	4.70	5.04	
vanadium	7440-62-2	E440	0.20	mg/kg	51.6	49.8	49.8	47.8	48.8	
zinc	7440-66-6	E440	2.0	mg/kg	5780	3260	4720	2900	2970	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.4	1.2	1.6	2.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.02	8.63	9.00	8.44	8.97	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.37	6.56	6.43	6.53	6.38	
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	2.46	1.88	1.92	1.86	2.57	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.188	0.143	0.170	0.132	1.32	
calcium, TCLP	7440-70-2	E444	10	mg/L	2060	2020	2170	2020	2120	
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	1.66	0.911	3.90	1.64	1.80	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.06	0.749	0.550	0.824	0.824	
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	116	120	126	119	128	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.62	0.48	0.57	0.49	0.55	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-6	BA2222-A-7	BA2222-A-8	BA2222-A-9	BA2222-A-10
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00	01-Jun-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-006	VA22B2631-007	VA22B2631-008	VA22B2631-009	VA22B2631-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	33.5	38.8	35.7	18.8	31.6	
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	BA2222-A-11	BA2222-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	01-Jun-2022 09:00	01-Jun-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-011	VA22B2631-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	20.7	19.5	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.1	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	43100	39300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	118	113	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	32.0	20.6	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	408	338	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.52	0.47	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	13.9	13.2	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	206	205	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	9.49	12.2	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	143000	157000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	194	189	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	191	479	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	7900	3500	----	----	----	
iron	7439-89-6	E440	50	mg/kg	77200	54300	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	324	449	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	30.5	26.1	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11300	11500	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	850	1010	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0572	0.0580	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	64.3	79.6	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	273	142	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9830	11600	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5450	5690	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.33	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	6.86	5.34	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	16600	16100	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	342	334	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	11200	13100	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.066	0.079	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-11	BA2222-A-12	----	----	----
Client sampling date / time					01-Jun-2022 09:00	01-Jun-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-011	VA22B2631-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	106	234	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	378	219	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	12.6	16.2	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.80	5.71	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	51.7	54.6	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5360	5190	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	2.0	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.69	9.04	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.08	6.40	---	---	---	
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	1.76	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.210	0.136	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2190	1900	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	3.55	1.32	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.999	0.769	---	---	---	
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	140	115	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.64	0.40	---	---	---	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	---	---	---	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	---	---	---	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2222-A-11	BA2222-A-12	----	----	----
					Client sampling date / time	01-Jun-2022 09:00	01-Jun-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B2631-011	VA22B2631-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	48.3	29.7	----	----	----	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA22B2631	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Robin Johnson	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Jun-2022 13:00
PO	: VANCO 0000051213	Issue Date	: 20-Jun-2022 12:28
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number: Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22B2631-001	BA2222-A-1	aluminum	7429-90-5	E440	57.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	arsenic	7440-38-2	E440	43.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	cobalt	7440-48-4	E440	41.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	copper	7440-50-8	E440	152 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	lead	7439-92-1	E440	57.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	lithium	7439-93-2	E440	44.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	titanium	7440-32-6	E440	63.4 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	tungsten	7440-33-7	E440	45.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B2631-001	BA2222-A-1	zinc	7440-66-6	E440	62.4 % 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 : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-1	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-10	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-11	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-12	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-2	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-3	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-4	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-5	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-6	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-7	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-8	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2222-A-9	E510	01-Jun-2022	17-Jun-2022	----	----		18-Jun-2022	28 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2222-A-1	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2222-A-10	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2222-A-11	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2222-A-12	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 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		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-2	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-3	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-4	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-5	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-6	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-7	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-8	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2222-A-9	E440	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	180 days	16 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2222-A-1	E144	01-Jun-2022	----	----	----		16-Jun-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		
				Rec	Actual			Rec	Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-10	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-11	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-12	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-2	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-3	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-4	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-5	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-6	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2222-A-7	E144	01-Jun-2022	----	----	----		16-Jun-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 BA2222-A-8	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2222-A-9	E144	01-Jun-2022	----	----	----		16-Jun-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-1	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-10	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-11	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-12	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-2	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-3	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-4	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-5	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-6	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-7	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-8	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2222-A-9	E108	01-Jun-2022	17-Jun-2022	----	----		17-Jun-2022	30 days	16 days	✔	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC											
Glass soil jar/Teflon lined cap BA2222-A-1	E532	01-Jun-2022	12-Jun-2022	30 days	12 days	✔	14-Jun-2022	7 days	1 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-1	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-10	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-11	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 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 : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-12	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-2	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-3	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-4	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-5	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-6	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-7	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-8	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 days	17 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2222-A-9	E512	14-Jun-2022	----	----	----		18-Jun-2022	28 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) BA2222-A-1	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-10	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-11	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-12	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-2	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-3	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-4	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-5	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2222-A-6	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 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) BA2222-A-7	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2222-A-8	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2222-A-9	E444	14-Jun-2022	----	----	----		19-Jun-2022	180 days	18 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-1	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-10	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-11	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-12	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-2	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-3	EPP444	01-Jun-2022	14-Jun-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) BA2222-A-4	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-5	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-6	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-7	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-8	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2222-A-9	EPP444	01-Jun-2022	14-Jun-2022	----	----		----	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Hexavalent Chromium (Cr VI) by IC	E532	521085	1	20	5.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	525857	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	525858	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	525866	1	17	5.8	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	525859	1	14	7.1	5.0	✔
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	521085	2	20	10.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	525857	2	14	14.2	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	525858	2	14	14.2	10.0	✔
Moisture Content by Gravimetry	E144	525866	1	17	5.8	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	525859	1	14	7.1	5.0	✔
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	521085	1	20	5.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	529127	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	525857	1	14	7.1	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	529128	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	525858	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	525866	1	17	5.8	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	529127	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	529128	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAAS ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order	: VA22B2631	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Robin Johnson	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Jun-2022 13:00
PO	: VANCO 0000051213	Date Analysis Commenced	: 12-Jun-2022
C-O-C number	: ----	Issue Date	: 20-Jun-2022 12:28
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>
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Asha Tauckoor	Laboratory Analyst	Vancouver Organics, Burnaby, British Columbia
Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Woochan Song	Lab Analyst	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 11
Work Order : VA22B2631
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: 525859)											
VA22B2631-001	BA2222-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	10.9	1.5%	5%	----
Physical Tests (QC Lot: 525866)											
VA22B2631-001	BA2222-A-1	moisture	----	E144	0.25	%	21.1	20.9	0.947%	20%	----
Metals (QC Lot: 525857)											
VA22B2631-001	BA2222-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0559	0.0515	0.0044	Diff <2x LOR	----
Metals (QC Lot: 525858)											
VA22B2631-001	BA2222-A-1	aluminum	7429-90-5	E440	50	mg/kg	34500	62600	57.9%	40%	DUP-H
		antimony	7440-36-0	E440	0.10	mg/kg	109	112	3.09%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	28.0	18.0	43.6%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	410	440	7.14%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.45	0.44	0.009	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	10.4	12.9	21.9%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	179	192	7.13%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	11.0	11.6	5.51%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	155000	155000	0.0633%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	193	184	4.64%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	62.9	95.5	41.2%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1680	12300	152%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	61800	58600	5.31%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	753	416	57.7%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	47.7	30.4	44.3%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	12000	10900	9.95%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	850	830	2.47%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	88.1	80.0	9.64%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	146	130	11.5%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10600	11200	4.63%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5700	6110	6.98%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.31	0.03	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.10	4.64	12.4%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15800	17000	6.97%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	309	314	1.70%	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: 525858) - continued											
VA22B2631-001	BA2222-A-1	sulfur	7704-34-9	E440	1000	mg/kg	11900	13700	14.0%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.065	0.007	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	99.4	102	2.95%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	231	446	63.4%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	6.59	10.4	45.3%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	5.45	5.69	4.16%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	53.8	52.2	3.02%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	9630	5050	62.4%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.1	2.0	0.9	Diff <2x LOR	----
Speciated Metals (QC Lot: 521085)											
VA22B2631-001	BA2222-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.50	mg/kg	1.01	0.63	0.38	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: 525866)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 525857)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 525858)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 525858) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Speciated Metals (QCLot: 521085)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 529127)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 529128)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<1.00	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 525859)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 525866)									
moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
Metals (QCLot: 525857)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	80.0	120	----
Metals (QCLot: 525858)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	97.4	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	109	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.9	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	111	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.4	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.2	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	101	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	102	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	98.4	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.1	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	94.3	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	94.7	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	104	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 525858) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.1	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.3	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	117	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.6	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.2	80.0	120	----
Speciated Metals (QCLot: 521085)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	80.7	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 $\geq 1 \times$ spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 529127)										
VA22B2631-001	BA2222-A-1	mercury, TCLP	7439-97-6	E512	0.0008 mg/L	0.001 mg/L	85.2	50.0	140	----
TCLP Metals (QCLot: 529128)										
VA22B2631-001	BA2222-A-1	antimony, TCLP	7440-36-0	E444	5.23 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.4	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.8 mg/L	12.5 mg/L	94.5	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.234 mg/L	0.25 mg/L	93.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.59 mg/L	10 mg/L	85.9	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.240 mg/L	0.25 mg/L	95.9	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	1.16 mg/L	1.25 mg/L	92.8	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	2.24 mg/L	2.5 mg/L	89.7	50.0	140	----
		iron, TCLP	7439-89-6	E444	220 mg/L	250 mg/L	88.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.96 mg/L	10 mg/L	89.6	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	239 mg/L	250 mg/L	95.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.28 mg/L	2.5 mg/L	91.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.66 mg/L	5 mg/L	93.2	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.107 mg/L	0.1 mg/L	107	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	88.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.62 mg/L	5 mg/L	92.4	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.72 mg/L	0.75 mg/L	96.4	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	91.2	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: 525857)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	119	70.0	130	---
Metals (QCLot: 525858)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	114	70.0	130	---
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	---
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	---
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	---
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	120	70.0	130	---
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	---
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	---
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	---
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	---
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	---
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	98.0	70.0	130	---
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	107	70.0	130	---
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	107	70.0	130	---
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	112	70.0	130	---
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	---
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	---
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	106	70.0	130	---
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	---
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	---
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	---
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	---
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	114	70.0	130	---
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	109	40.0	160	---
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	104	70.0	130	---
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	112	70.0	130	---
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	122	70.0	130	---
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	107	70.0	130	---

Page : 11 of 11
 Work Order : VA22B2631
 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: 525858) - continued									
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	97.6	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	83.4	70.0	130	----
Speciated Metals (QCLot: 521085)									
	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	131 mg/kg	88.5	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

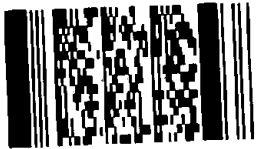
www.alsglobal.com

COC # _____

Page ____ of ____

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

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

Lab Work Order # (lab use only)		ALS Contact:	Sampler:					Number of Containers		
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)	
Environmental Division Vancouver Work Order Reference VA22B2631  Telephone : + 1 604 253 4188		2631								
		BA2222-A-1	01-Jun-22	9:00	Soil	X	X	X	X	1
		BA2222-A-2	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-3	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-4	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-5	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-6	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-7	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-8	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-9	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-10	01-Jun-22	9:00	Soil	X	X		X	1
		BA2222-A-11	01-Jun-22	9:00	Soil	X	X		X	1
BA2222-A-12	01-Jun-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>	7-Jul-22	0800	<i>[Signature]</i>	6/7/2022	1pm	21.5 °C				Yes / No ? If Yes add SIF