

Bottom Ash Data

2022 Week 29

The following analytical report represents bottom ash composite results for week 29 of 2022 (July 17, 2022 to July 23, 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 : **VA22B7084**
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 : 26-Jul-2022 12:30
Date Analysis Commenced : 02-Aug-2022
Issue Date : 08-Aug-2022 10:11

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>
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, 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.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2229-A-1	BA2229-A-2	BA2229-A-3	BA2229-A-4	BA2229-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-001	VA22B7084-002	VA22B7084-003	VA22B7084-004	VA22B7084-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	17.0	16.5	16.4	16.0	17.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	10.4	10.5	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37400	40000	28100	28500	48400	
antimony	7440-36-0	E440	0.10	mg/kg	112	101	91.0	254	98.7	
arsenic	7440-38-2	E440	0.10	mg/kg	31.5	35.4	26.8	32.3	29.1	
barium	7440-39-3	E440	0.50	mg/kg	522	590	647	401	644	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.43	0.38	0.40	0.41	
bismuth	7440-69-9	E440	0.20	mg/kg	7.15	6.32	6.51	16.8	7.33	
boron	7440-42-8	E440	5.0	mg/kg	208	223	179	229	209	
cadmium	7440-43-9	E440	0.020	mg/kg	12.7	15.8	8.05	8.76	8.88	
calcium	7440-70-2	E440	50	mg/kg	138000	131000	117000	124000	126000	
chromium	7440-47-3	E440	0.50	mg/kg	270	203	160	317	161	
cobalt	7440-48-4	E440	0.10	mg/kg	134	60.6	148	528	638	
copper	7440-50-8	E440	0.50	mg/kg	3100	2410	8140	20900	2220	
iron	7439-89-6	E440	50	mg/kg	68000	60000	81500	63900	70600	
lead	7439-92-1	E440	0.50	mg/kg	847	320	515	4240	508	
lithium	7439-93-2	E440	2.0	mg/kg	27.8	23.3	224	49.4	45.4	
magnesium	7439-95-4	E440	20	mg/kg	11300	11200	10300	11800	11200	
manganese	7439-96-5	E440	1.0	mg/kg	977	994	819	1010	950	
mercury	7439-97-6	E510	0.0500	mg/kg	0.127	0.103	0.0600	0.0686	0.128	
molybdenum	7439-98-7	E440	0.10	mg/kg	29.4	28.9	21.2	30.9	25.9	
nickel	7440-02-0	E440	0.50	mg/kg	445	160	189	419	204	
phosphorus	7723-14-0	E440	50	mg/kg	11800	10800	9490	10400	10500	
potassium	7440-09-7	E440	100	mg/kg	4790	4800	4260	4830	4560	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.35	0.47	0.30	0.29	
silver	7440-22-4	E440	0.10	mg/kg	6.72	5.28	5.63	5.61	4.39	
sodium	7440-23-5	E440	50	mg/kg	14300	14800	13900	14000	14100	
strontium	7440-24-6	E440	0.50	mg/kg	747	304	440	366	321	
sulfur	7704-34-9	E440	1000	mg/kg	12400	11000	9200	11500	10700	
thallium	7440-28-0	E440	0.050	mg/kg	0.062	0.068	<0.050	0.077	0.052	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-1	BA2229-A-2	BA2229-A-3	BA2229-A-4	BA2229-A-5
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-001	VA22B7084-002	VA22B7084-003	VA22B7084-004	VA22B7084-005	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	136	95.6	101	124	89.2	
titanium	7440-32-6	E440	1.0	mg/kg	314	331	267	253	502	
tungsten	7440-33-7	E440	0.50	mg/kg	29.9	19.3	20.2	15.9	21.3	
uranium	7440-61-1	E440	0.050	mg/kg	5.51	5.01	4.30	5.09	4.72	
vanadium	7440-62-2	E440	0.20	mg/kg	67.2	51.1	43.6	54.4	49.1	
zinc	7440-66-6	E440	2.0	mg/kg	4260	8820	5200	3910	4450	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.6	1.5	1.4	2.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	11.6	11.6	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.84	8.74	8.71	8.75	8.63	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.26	6.14	5.78	5.95	5.88	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.69	1.86	1.84	1.81	1.89	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.137	0.282	0.136	0.210	0.180	
calcium, TCLP	7440-70-2	E444	10	mg/L	1640	1760	1680	1750	1800	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.784	1.79	1.13	1.19	1.43	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.05	1.07	0.988	1.43	1.34	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	11.8	<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	112	117	110	118	124	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.44	0.49	1.00	1.00	0.60	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-1	BA2229-A-2	BA2229-A-3	BA2229-A-4	BA2229-A-5
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-001	VA22B7084-002	VA22B7084-003	VA22B7084-004	VA22B7084-005	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	34.4	41.7	46.8	49.2	50.1	
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	BA2229-A-6	BA2229-A-7	BA2229-A-8	BA2229-A-9	BA2229-A-10
(Matrix: Soil/Solid)					Client sampling date / time	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-006	VA22B7084-007	VA22B7084-008	VA22B7084-009	VA22B7084-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.3	17.2	17.1	16.8	16.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	10.6	10.5	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34500	36200	31300	27400	31500	
antimony	7440-36-0	E440	0.10	mg/kg	97.6	87.2	113	92.6	98.6	
arsenic	7440-38-2	E440	0.10	mg/kg	32.6	31.7	38.3	26.0	28.7	
barium	7440-39-3	E440	0.50	mg/kg	559	609	622	600	683	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.36	0.38	0.40	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	6.77	7.53	7.54	5.66	9.85	
boron	7440-42-8	E440	5.0	mg/kg	234	171	333	227	177	
cadmium	7440-43-9	E440	0.020	mg/kg	9.70	8.94	19.9	10.2	10.8	
calcium	7440-70-2	E440	50	mg/kg	129000	120000	131000	123000	127000	
chromium	7440-47-3	E440	0.50	mg/kg	184	182	178	178	171	
cobalt	7440-48-4	E440	0.10	mg/kg	1010	55.6	181	42.0	108	
copper	7440-50-8	E440	0.50	mg/kg	2490	2390	1300	3240	2210	
iron	7439-89-6	E440	50	mg/kg	78100	63400	77200	71400	67400	
lead	7439-92-1	E440	0.50	mg/kg	538	302	906	328	503	
lithium	7439-93-2	E440	2.0	mg/kg	27.8	21.3	25.7	20.7	30.3	
magnesium	7439-95-4	E440	20	mg/kg	10700	10500	10900	11200	10200	
manganese	7439-96-5	E440	1.0	mg/kg	911	873	999	726	953	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0676	0.0756	0.0722	0.0809	0.0746	
molybdenum	7439-98-7	E440	0.10	mg/kg	38.0	25.4	24.4	42.9	23.5	
nickel	7440-02-0	E440	0.50	mg/kg	182	160	180	238	134	
phosphorus	7723-14-0	E440	50	mg/kg	10400	10200	10700	9860	10200	
potassium	7440-09-7	E440	100	mg/kg	4640	4420	5290	4430	4710	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.30	0.40	0.24	0.33	
silver	7440-22-4	E440	0.10	mg/kg	5.00	6.47	4.05	4.03	4.32	
sodium	7440-23-5	E440	50	mg/kg	14700	13900	14400	13600	14000	
strontium	7440-24-6	E440	0.50	mg/kg	319	297	590	314	383	
sulfur	7704-34-9	E440	1000	mg/kg	11200	10600	11200	10500	11000	
thallium	7440-28-0	E440	0.050	mg/kg	0.051	<0.050	0.058	<0.050	0.051	
tin	7440-31-5	E440	2.0	mg/kg	91.2	172	108	85.6	137	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-6	BA2229-A-7	BA2229-A-8	BA2229-A-9	BA2229-A-10
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-006	VA22B7084-007	VA22B7084-008	VA22B7084-009	VA22B7084-010	
					Result	Result	Result	Result	Result	
Metals										
titanium	7440-32-6	E440	1.0	mg/kg	266	283	275	256	259	
tungsten	7440-33-7	E440	0.50	mg/kg	16.2	17.3	15.6	15.4	13.7	
uranium	7440-61-1	E440	0.050	mg/kg	5.19	4.86	5.39	4.75	5.13	
vanadium	7440-62-2	E440	0.20	mg/kg	50.3	47.6	51.5	49.5	49.7	
zinc	7440-66-6	E440	2.0	mg/kg	3740	5130	5390	3270	4370	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	2.6	1.7	1.1	1.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.7	11.6	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.65	8.69	8.84	8.71	8.77	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	5.93	6.12	6.10	5.94	5.90	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.88	1.90	1.92	2.05	1.87	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.142	0.124	0.169	0.194	0.192	
calcium, TCLP	7440-70-2	E444	10	mg/L	1760	1780	1840	1720	1720	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.966	1.40	1.11	1.88	1.13	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.40	1.17	1.19	1.64	1.63	
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	1.94	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	120	115	124	111	116	
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	0.53	0.52	0.56	0.68	
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	
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	64.2	45.1	41.0	50.4	53.9	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-6	BA2229-A-7	BA2229-A-8	BA2229-A-9	BA2229-A-10
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00	20-Jul-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-006	VA22B7084-007	VA22B7084-008	VA22B7084-009	VA22B7084-010	
TCLP Metals					Result	Result	Result	Result	Result	
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	BA2229-A-11	BA2229-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	20-Jul-2022 09:00	20-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-011	VA22B7084-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
moisture	----	E144	0.25	%	16.8	16.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.5	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38000	32300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	80.6	110	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	23.3	30.5	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	714	544	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.41	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	8.63	8.66	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	243	221	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	9.48	13.2	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	111000	133000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	166	192	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	55.0	101	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	22300	18800	----	----	----	
iron	7439-89-6	E440	50	mg/kg	73900	71400	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	612	475	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	30.2	36.3	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10200	11800	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	920	1050	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0700	0.116	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	22.7	32.3	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	156	264	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	8520	11500	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4140	4980	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.25	0.35	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	11.5	7.14	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	13100	14700	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	445	369	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	8900	12300	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	126	127	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-11	BA2229-A-12	----	----	----
Client sampling date / time					20-Jul-2022 09:00	20-Jul-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-011	VA22B7084-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
titanium	7440-32-6	E440	1.0	mg/kg	356	263	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	9.36	61.6	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	4.48	5.13	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	81.8	54.6	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	3980	4580	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.6	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.7	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.85	8.85	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.08	6.14	----	----	----	
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	2.00	1.97	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.224	0.412	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1830	1740	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.791	0.642	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.07	1.02	----	----	----	
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	123	122	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.47	0.48	----	----	----	
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	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	32.8	43.5	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2229-A-11	BA2229-A-12	----	----	----
					Client sampling date / time	20-Jul-2022 09:00	20-Jul-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B7084-011	VA22B7084-012	-----	-----	-----	
					Result	Result	----	----	----	
TCLP Metals										
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	: VA22B7084	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	: 26-Jul-2022 12:30
PO	: VANCO 0000051213	Issue Date	: 08-Aug-2022 10:11
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	VA22B7084-001	BA2229-A-1	bismuth	7440-69-9	E440	43.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	chromium	7440-47-3	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	cobalt	7440-48-4	E440	38.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	lead	7439-92-1	E440	57.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	nickel	7440-02-0	E440	84.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	strontium	7440-24-6	E440	87.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	tin	7440-31-5	E440	149 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B7084-001	BA2229-A-1	tungsten	7440-33-7	E440	60.8 % 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 BA2229-A-1	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-10	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-11	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-12	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-2	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-3	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-4	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-5	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-6	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-7	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-8	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2229-A-9	E510	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	28 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2229-A-1	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2229-A-10	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2229-A-11	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2229-A-12	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-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 BA2229-A-2	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-3	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-4	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-5	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-6	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-7	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-8	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2229-A-9	E440	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	180 days	16 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2229-A-1	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-10	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-11	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-12	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-2	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-3	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-4	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-5	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-6	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2229-A-7	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2229-A-8	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2229-A-9	E144	20-Jul-2022	----	----	----		04-Aug-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-1	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-10	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-11	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-12	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-2	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-3	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-4	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-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 BA2229-A-5	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-6	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-7	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-8	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2229-A-9	E108	20-Jul-2022	05-Aug-2022	----	----		05-Aug-2022	30 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-1	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-10	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-11	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-12	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-2	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-3	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-4	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-5	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-6	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-7	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-8	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2229-A-9	E512	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	28 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-1	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-10	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-11	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-12	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-2	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-3	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-4	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-5	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-6	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-7	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-8	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2229-A-9	E444	02-Aug-2022	03-Aug-2022	----	----		03-Aug-2022	180 days	14 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-1	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-10	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-11	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-12	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-2	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-3	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-4	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----		



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-5	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-6	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-7	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-8	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2229-A-9	EPP444	20-Jul-2022	02-Aug-2022	----	----		----	----	----	

Legend & Qualifier Definitions

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



Quality Control Parameter Frequency Compliance

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

Matrix: **Soil/Solid**

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

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	588583	1	15	6.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	588582	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	588589	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	588587	1	15	6.6	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	588583	2	15	13.3	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	588582	2	15	13.3	10.0	✔
Moisture Content by Gravimetry	E144	588589	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	588587	1	15	6.6	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	587184	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	588583	1	15	6.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	587185	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	588582	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	588589	1	19	5.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	587184	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	587185	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . This method is intended to liberate metals that may be environmentally available.

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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA22B7084
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, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 26-Jul-2022 12:30
Date Analysis Commenced : 02-Aug-2022
Issue Date : 08-Aug-2022 10:11

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Kim Jensen (Department Manager - Metals), Kinny Wu (Lab Analyst), Ophelia Chiu (Department Manager - Organics), Rebecca Sit (Supervisor - Organics Extractions), Robin Weeks (Team Leader - Metals), and Woochan Song (Lab Analyst).

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Work Order : VA22B7084
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: 588587)											
VA22B7084-001	BA2229-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.6	1.1%	5%	----
Physical Tests (QC Lot: 588589)											
VA22B7084-001	BA2229-A-1	moisture	----	E144	0.25	%	17.0	16.7	1.78%	20%	----
Metals (QC Lot: 588582)											
VA22B7084-001	BA2229-A-1	aluminum	7429-90-5	E440	50	mg/kg	37400	29100	24.9%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	112	99.7	11.4%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	31.5	30.8	2.55%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	522	590	12.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.38	0.03	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.15	11.1	43.2%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	208	217	4.12%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.7	9.68	27.0%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	138000	124000	10.6%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	270	198	30.8%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	134	91.1	38.2%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	3100	3020	2.78%	30%	----
		iron	7439-89-6	E440	50	mg/kg	68000	85800	23.2%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	847	471	57.0%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	27.8	22.4	21.3%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11300	11300	0.263%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	977	1180	18.5%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	29.4	39.8	30.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	445	180	84.6%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11800	9890	17.9%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4790	4400	8.40%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.32	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.72	6.37	5.37%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14300	13500	5.89%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	747	293	87.3%	40%	DUP-H
		sulfur	7704-34-9	E440	1000	mg/kg	12400	11000	11.8%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.062	0.054	0.008	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 588582) - continued											
VA22B7084-001	BA2229-A-1	tin	7440-31-5	E440	2.0	mg/kg	136	934	149%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	314	251	22.1%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	29.9	16.0	60.8%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	5.51	4.95	10.7%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	67.2	60.1	11.2%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4260	3820	10.9%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.9	0.2	Diff <2x LOR	----
Metals (QC Lot: 588583)											
VA22B7084-001	BA2229-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.127	0.0682	0.0589	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: 588589)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 588582)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 588582) - continued						
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 588583)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 587184)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 587185)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 588587)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 588589)									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
Metals (QCLot: 588582)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.6	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.8	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.1	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	114	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	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	103	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	101	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.1	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	108	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.2	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100.0	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: 588582) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	95.2	80.0	120	----
Metals (QCLot: 588583)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	112	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: 587184)										
VA22B7084-001	BA2229-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	87.8	50.0	140	----
TCLP Metals (QCLot: 587185)										
VA22B7084-001	BA2229-A-1	antimony, TCLP	7440-36-0	E444	4.92 mg/L	5 mg/L	98.3	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	93.1	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	101	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.214 mg/L	0.25 mg/L	85.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.52 mg/L	10 mg/L	85.2	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.219 mg/L	0.25 mg/L	87.8	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	1.10 mg/L	1.25 mg/L	88.1	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	2.14 mg/L	2.5 mg/L	85.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	221 mg/L	250 mg/L	88.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.13 mg/L	10 mg/L	91.3	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	241 mg/L	250 mg/L	96.5	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.23 mg/L	2.5 mg/L	89.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.48 mg/L	5 mg/L	89.6	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.096 mg/L	0.1 mg/L	96.4	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	96.2	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.03 mg/L	5 mg/L	100	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.69 mg/L	0.75 mg/L	92.3	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	8 mg/L	10 mg/L	82.2	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: 588582)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	90.5	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	100	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	122	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	126	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	107	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	99.1	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	109	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	99.6	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	99.9	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	98.1	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	99.7	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	95.6	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	86.9	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	111	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	103	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	99.0	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	92.8	70.0	130	----

Page : 11 of 11
 Work Order : VA22B7084
 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: 588583)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	107	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 Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
				Analysis Request	

Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite							
Contact:		LSD: (includes 2:1 pH)							
Address:									
Phone:		Quote #:							
Fax:									
Lab Work Order # (lab use only)		ALS Contact:		Sampler:					
708/4									

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
BA2229-A-1		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-2		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-3		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-4		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-5		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-6		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-7		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-8		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-9		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-10		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-11		20-Jul-22	9:00	Soil	X	X			X		1
BA2229-A-12		20-Jul-22	9:00	Soil	X	X			X		1

Environmental Division
 Vancouver
 Work Order Reference
VA22B7084

Telephone : + 1 604 263 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
[Signature]	26-Jul-22	0800	IT	26/22	12:30	23 °C				Yes / No ? If Yes add SIF