Bottom Ash Data

2022 Week 19

The following analytical report represents bottom ash composite results for week 19 of 2022 (May 8, 2022 to May 14, 2022).

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA22B0767**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 17-May-2022 13:15
PO	: VANCO 0000051213	Date Analysis Commenced	: 25-May-2022
C-O-C number	: ----	Issue Date	: 02-Jun-2022 09:34
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 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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia

General Comments

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

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

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

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

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

Unit	*Description*
%	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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-1	BA2219-A-2	BA2219-A-3	BA2219-A-4	BA2219-A-5
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
						VA22B0767-001	VA22B0767-002	VA22B0767-003	VA22B0767-004	VA22B0767-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		15.8	15.8	17.0	17.0	17.4
pH (1:2 soil:water)	----	E108	0.10	pH units		10.1	9.93	10.0	10.2	10.0
Metals										
aluminum	7429-90-5	E440	50	mg/kg		39100	39000	36700	41600	37300
antimony	7440-36-0	E440	0.10	mg/kg		138	149	126	124	107
arsenic	7440-38-2	E440	0.10	mg/kg		25.9	28.0	25.9	22.6	19.4
barium	7440-39-3	E440	0.50	mg/kg		566	512	531	439	585
beryllium	7440-41-7	E440	0.10	mg/kg		0.43	0.46	0.45	0.69	0.40
bismuth	7440-69-9	E440	0.20	mg/kg		8.67	9.74	8.43	7.98	5.94
boron	7440-42-8	E440	5.0	mg/kg		201	271	162	163	174
cadmium	7440-43-9	E440	0.020	mg/kg		13.5	15.5	11.7	11.2	11.4
calcium	7440-70-2	E440	50	mg/kg		143000	158000	142000	144000	135000
chromium	7440-47-3	E440	0.50	mg/kg		323	216	200	156	159
cobalt	7440-48-4	E440	0.10	mg/kg		59.3	88.4	94.0	68.9	32.8
copper	7440-50-8	E440	0.50	mg/kg		2540	5310	5210	5960	3230
iron	7439-89-6	E440	50	mg/kg		72700	56200	78000	61600	73300
lead	7439-92-1	E440	0.50	mg/kg		574	774	556	586	466
lithium	7439-93-2	E440	2.0	mg/kg		25.8	27.4	24.9	29.4	21.1
magnesium	7439-95-4	E440	20	mg/kg		13900	13700	11400	12300	13000
manganese	7439-96-5	E440	1.0	mg/kg		1170	888	978	1550	943
mercury	7439-97-6	E510	0.0500	mg/kg		0.147	0.130	0.128	0.0954	0.0907
molybdenum	7439-98-7	E440	0.10	mg/kg		44.3	62.0	48.6	39.6	36.8
nickel	7440-02-0	E440	0.50	mg/kg		188	205	166	208	148
phosphorus	7723-14-0	E440	50	mg/kg		11800	14200	12600	11300	12600
potassium	7440-09-7	E440	100	mg/kg		5440	6160	4860	4970	5010
selenium	7782-49-2	E440	0.20	mg/kg		0.52	0.53	0.36	0.37	0.42
silver	7440-22-4	E440.Ag	0.10	mg/kg		3.98	----	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		----	24.3	7.10	6.40	5.74
sodium	7440-23-5	E440	50	mg/kg		17000	18600	15700	16100	17400
strontium	7440-24-6	E440	0.50	mg/kg		326	343	321	336	302

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-1	BA2219-A-2	BA2219-A-3	BA2219-A-4	BA2219-A-5
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
						VA22B0767-001	VA22B0767-002	VA22B0767-003	VA22B0767-004	VA22B0767-005
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		14100	15800	12800	13200	11300
thallium	7440-28-0	E440	0.050	mg/kg		0.076	0.087	0.072	0.075	0.068
tin	7440-31-5	E440	2.0	mg/kg		343	185	121	283	97.9
titanium	7440-32-6	E440	1.0	mg/kg		741	570	430	554	596
tungsten	7440-33-7	E440	0.50	mg/kg		47.7	74.8	56.9	31.2	33.1
uranium	7440-61-1	E440	0.050	mg/kg		6.35	6.62	5.21	5.39	4.91
vanadium	7440-62-2	E440	0.20	mg/kg		56.2	60.9	51.8	48.9	47.8
zinc	7440-66-6	E440	2.0	mg/kg		5400	4780	5150	4300	3460
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	1.4	1.4	2.0	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	11.3	11.4	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.44	8.47	8.36	8.48	8.31
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444	0.010	pH units		6.11	6.21	6.18	5.72	6.18
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		2.02	2.06	1.97	1.71	2.07
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.202	0.145	0.534	0.152	0.185
calcium, TCLP	7440-70-2	E444	10	mg/L		2080	1980	1970	1840	2180
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.15	1.58	0.752	2.50	1.63
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.841	0.786	0.635	0.975	0.884
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	7.2	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L		0.60	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		127	123	123	103	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		0.71	1.17	0.51	0.51	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

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2219-A-1	BA2219-A-2	BA2219-A-3	BA2219-A-4	BA2219-A-5
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
Analyte	CAS Number	Method	LOR	Unit		VA22B0767-001	VA22B0767-002	VA22B0767-003	VA22B0767-004	VA22B0767-005
						Result	Result	Result	Result	Result
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
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		62.9	41.5	37.0	67.6	35.6
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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-6	BA2219-A-7	BA2219-A-8	BA2219-A-9	BA2219-A-10
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
						VA22B0767-006	VA22B0767-007	VA22B0767-008	VA22B0767-009	VA22B0767-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		15.5	16.8	14.9	16.0	16.9
pH (1:2 soil:water)	----	E108	0.10	pH units		10.0	9.97	10.1	10.1	10.0
Metals										
aluminum	7429-90-5	E440	50	mg/kg		36500	30700	48700	53900	50400
antimony	7440-36-0	E440	0.10	mg/kg		159	116	103	148	115
arsenic	7440-38-2	E440	0.10	mg/kg		27.2	18.3	23.8	19.5	23.0
barium	7440-39-3	E440	0.50	mg/kg		486	589	601	651	604
beryllium	7440-41-7	E440	0.10	mg/kg		0.40	0.36	0.40	0.41	0.43
bismuth	7440-69-9	E440	0.20	mg/kg		16.3	6.34	15.4	7.11	8.44
boron	7440-42-8	E440	5.0	mg/kg		170	174	189	194	254
cadmium	7440-43-9	E440	0.020	mg/kg		14.3	15.4	11.1	8.81	11.0
calcium	7440-70-2	E440	50	mg/kg		165000	129000	135000	129000	139000
chromium	7440-47-3	E440	0.50	mg/kg		240	133	152	251	163
cobalt	7440-48-4	E440	0.10	mg/kg		431	41.3	137	154	170
copper	7440-50-8	E440	0.50	mg/kg		2360	2000	1970	3300	2840
iron	7439-89-6	E440	50	mg/kg		66600	59000	54600	79300	52800
lead	7439-92-1	E440	0.50	mg/kg		622	382	602	490	377
lithium	7439-93-2	E440	2.0	mg/kg		50.4	19.3	26.4	27.2	22.8
magnesium	7439-95-4	E440	20	mg/kg		14100	10600	11300	10900	11900
manganese	7439-96-5	E440	1.0	mg/kg		1310	699	742	994	844
mercury	7439-97-6	E510	0.0500	mg/kg		0.262	0.0904	0.151	0.0751	0.0778
molybdenum	7439-98-7	E440	0.10	mg/kg		48.9	28.8	33.1	37.2	43.9
nickel	7440-02-0	E440	0.50	mg/kg		202	200	175	195	146
phosphorus	7723-14-0	E440	50	mg/kg		13500	11000	12500	9040	11000
potassium	7440-09-7	E440	100	mg/kg		5760	4860	5140	4770	5270
selenium	7782-49-2	E440	0.20	mg/kg		0.51	0.40	0.41	0.32	0.44
silver	7440-22-4	E440	0.10	mg/kg		8.91	12.2	7.20	6.91	6.99
sodium	7440-23-5	E440	50	mg/kg		18300	15800	16300	15400	17400
strontium	7440-24-6	E440	0.50	mg/kg		353	289	302	288	314
sulfur	7704-34-9	E440	1000	mg/kg		15700	11100	11000	11000	12100
thallium	7440-28-0	E440	0.050	mg/kg		0.078	0.056	0.079	0.059	0.063

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-6	BA2219-A-7	BA2219-A-8	BA2219-A-9	BA2219-A-10
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
						VA22B0767-006	VA22B0767-007	VA22B0767-008	VA22B0767-009	VA22B0767-010
						Result	Result	Result	Result	Result
Metals										
tin	7440-31-5	E440	2.0	mg/kg		133	114	122	171	105
titanium	7440-32-6	E440	1.0	mg/kg		488	596	649	888	769
tungsten	7440-33-7	E440	0.50	mg/kg		50.9	34.2	38.3	23.5	46.1
uranium	7440-61-1	E440	0.050	mg/kg		6.33	4.68	5.11	4.67	5.24
vanadium	7440-62-2	E440	0.20	mg/kg		60.2	45.6	48.6	48.5	51.9
zinc	7440-66-6	E440	2.0	mg/kg		5680	3490	4020	4640	4540
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	1.2	1.9	2.0	2.2
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	11.4	11.4	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.39	8.43	8.54	8.66	8.45
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444	0.010	pH units		5.87	6.05	5.91	6.32	6.27
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		2.01	1.88	1.76	1.98	2.04
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.178	0.153	0.155	0.244	0.240
calcium, TCLP	7440-70-2	E444	10	mg/L		1900	1870	1970	2090	2040
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		8.47	1.62	0.924	0.900	1.29
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.45	1.61	1.11	1.44	0.747
iron, TCLP	7439-89-6	E444	5.0	mg/L		6.5	<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		120	113	114	124	126
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.65	0.58	0.65	0.47	0.63
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-6	BA2219-A-7	BA2219-A-8	BA2219-A-9	BA2219-A-10
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00	11-May-2022 09:00
						VA22B0767-006	VA22B0767-007	VA22B0767-008	VA22B0767-009	VA22B0767-010
						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
zinc, TCLP	7440-66-6	E444	0.50	mg/L		43.3	110	48.0	31.5	33.8
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**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2219-A-11	BA2219-A-12	----	----	----
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	----	----	----
						VA22B0767-011	VA22B0767-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
moisture	----	E144	0.25	%		16.4	16.6	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		9.92	9.95	----	----	----
Metals										
aluminum	7429-90-5	E440	50	mg/kg		30700	41400	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg		134	117	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg		28.7	23.0	----	----	----
barium	7440-39-3	E440	0.50	mg/kg		569	496	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg		0.38	0.37	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg		7.36	14.1	----	----	----
boron	7440-42-8	E440	5.0	mg/kg		169	179	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg		11.3	18.8	----	----	----
calcium	7440-70-2	E440	50	mg/kg		138000	146000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg		427	171	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg		36.0	244	----	----	----
copper	7440-50-8	E440	0.50	mg/kg		5570	2950	----	----	----
iron	7439-89-6	E440	50	mg/kg		78700	65200	----	----	----
lead	7439-92-1	E440	0.50	mg/kg		519	806	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg		26.7	25.0	----	----	----
magnesium	7439-95-4	E440	20	mg/kg		11300	12300	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg		918	919	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg		0.138	0.126	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg		41.7	36.4	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg		864	155	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg		13000	11600	----	----	----
potassium	7440-09-7	E440	100	mg/kg		4970	5080	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg		0.42	0.41	----	----	----
silver	7440-22-4	E440.Ag	0.10	mg/kg		5.25	----	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		----	12.2	----	----	----
sodium	7440-23-5	E440	50	mg/kg		16400	16500	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg		332	346	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg		11500	11900	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2219-A-11	BA2219-A-12	----	----	----
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B0767-011	VA22B0767-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.070	0.072	----	----	----
tin	7440-31-5	E440	2.0	mg/kg		138	102	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		359	458	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		40.2	32.6	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		5.09	5.12	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		47.6	51.8	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		3900	4650	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.2	2.3	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.54	8.58	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.86	2.86	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.97	6.23	----	----	----
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		2.03	2.00	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.140	0.169	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		2170	1980	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.71	1.16	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.05	2.35	----	----	----
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		128	120	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.78	0.67	----	----	----
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	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2219-A-11	BA2219-A-12	----	----	----
					Client sampling date / time	11-May-2022 09:00	11-May-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22B0767-011	VA22B0767-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
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		32.7	63.0	----	----	----
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	: **VA22B0767**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	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	: 17-May-2022 13:15
PO	: VANCO 0000051213	Issue Date	: 02-Jun-2022 09:34
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	VA22B0767-001	BA2219-A-1	chromium	7440-47-3	E440	39.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B0767-001	BA2219-A-1	lead	7439-92-1	E440	42.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22B0767-001	BA2219-A-1	tin	7440-31-5	E440	101 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-1	E440.Ag	11-May-2022	31-May-2022	180 days	21 days	✓	01-Jun-2022	159 days	0 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-11	E440.Ag	11-May-2022	31-May-2022	180 days	21 days	✓	01-Jun-2022	159 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-1	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-10	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-11	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-12	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-2	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-3	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-4	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-5	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-6	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-7	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-8	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2219-A-9	E510	11-May-2022	28-May-2022	----	----		30-May-2022	28 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-1	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-10	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-11	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-12	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-2	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-3	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-4	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-5	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-6	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-7	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-8	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2219-A-9	E440	11-May-2022	28-May-2022	----	----		30-May-2022	180 days	20 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-1	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-10	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-11	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-12	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-2	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-3	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-4	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-5	E144	11-May-2022	----	----	----		26-May-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-6	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-7	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-8	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2219-A-9	E144	11-May-2022	----	----	----		26-May-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-1	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-10	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-11	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-12	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-2	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-3	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-4	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-5	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-6	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-7	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-8	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2219-A-9	E108	11-May-2022	28-May-2022	----	----		28-May-2022	30 days	17 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-1	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-10	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-11	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-12	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-2	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-3	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-4	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-5	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-6	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-7	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-8	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2219-A-9	E512	25-May-2022	----	----	----		26-May-2022	28 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-1	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-10	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-11	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-12	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-2	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-3	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-4	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-5	E444	25-May-2022	----	----	----		26-May-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-6	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-7	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-8	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2219-A-9	E444	25-May-2022	----	----	----		26-May-2022	180 days	16 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-1	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-10	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-11	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-12	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-2	EPP444	11-May-2022	25-May-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-3	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-4	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-5	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-6	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-7	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-8	EPP444	11-May-2022	25-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2219-A-9	EPP444	11-May-2022	25-May-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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	499896	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	499895	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	499898	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	499897	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	506360	1	2	50.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	499896	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	499895	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	499898	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	499897	1	12	8.3	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	506360	1	2	50.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	500631	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	499896	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	500632	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	499895	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	499898	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	500631	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	500632	1	12	8.3	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) 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 HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 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

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

QUALITY CONTROL REPORT

Work Order	: **VA22B0767**	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	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	: 17-May-2022 13:15
PO	: VANCO 0000051213	Date Analysis Commenced	: 25-May-2022
C-O-C number	: ----	Issue Date	: 02-Jun-2022 09:34
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.

Signatories	*Position*	*Laboratory Department*
Angela Ren	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Caleb Deroche	Lab Analyst	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia

General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percent Difference
# = Indicates a QC result that did not meet the ALS DQO.

Workorder Comments

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

Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Physical Tests (QC Lot: 499897)											
VA22B0767-001	BA2219-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.1	10.0	1.2%	5%	----
Physical Tests (QC Lot: 499898)											
VA22B0767-001	BA2219-A-1	moisture	----	E144	0.25	%	15.8	16.6	4.82%	20%	----
Metals (QC Lot: 499895)											
VA22B0767-001	BA2219-A-1	aluminum	7429-90-5	E440	50	mg/kg	39100	42600	8.64%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	138	132	4.27%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	25.9	23.5	9.65%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	566	546	3.45%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.45	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.67	8.90	2.66%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	201	190	5.68%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	13.5	12.4	8.69%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	143000	155000	8.08%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	323	216	39.5%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	59.3	65.6	10.0%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	2540	3280	25.5%	30%	----
		iron	7439-89-6	E440	50	mg/kg	72700	60700	18.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	574	884	42.6%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	25.8	28.4	9.34%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	13900	14500	4.24%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1170	892	27.0%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	44.3	60.6	31.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	188	174	7.35%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	11800	11100	5.88%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5440	5860	7.40%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.52	0.46	0.06	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	17000	19200	12.2%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	326	364	11.0%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	14100	14100	0.283%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.076	0.073	0.003	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	343	112	101%	40%	DUP-H

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: 499895) - continued											
VA22B0767-001	BA2219-A-1	titanium	7440-32-6	E440	1.0	mg/kg	741	589	22.9%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	47.7	37.7	23.5%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	6.35	5.93	6.76%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	56.2	58.4	3.87%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5400	5320	1.44%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.6	0.2	Diff <2x LOR	----
Metals (QC Lot: 499896)											
VA22B0767-001	BA2219-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.147	0.135	0.0121	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: 499898)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 499895)						
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: 499895) - 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: 499896)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 506360)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 500631)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 500632)						
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				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 499897)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 499898)									
moisture	----	E144	0.25	%	50 %	99.6	90.0	110	----
Metals (QCLot: 499895)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	112	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.7	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.4	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.3	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	99.2	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	99.7	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	97.2	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.0	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	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	100	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	110	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.6	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.7	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	112	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	113	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 499895) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.7	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	109	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	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	96.3	80.0	120	----
Metals (QCLot: 499896)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.0	80.0	120	----
Metals (QCLot: 506360)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	87.5	80.0	120	----

Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 500631)										
VA22B0767-001	BA2219-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.0	50.0	140	----
TCLP Metals (QCLot: 500632)										
VA22B0767-001	BA2219-A-1	antimony, TCLP	7440-36-0	E444	5.84 mg/L	5 mg/L	117	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	108	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.0 mg/L	12.5 mg/L	112	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		boron, TCLP	7440-42-8	E444	11.0 mg/L	10 mg/L	110	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.269 mg/L	0.25 mg/L	108	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	1.29 mg/L	1.25 mg/L	103	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	2.56 mg/L	2.5 mg/L	102	50.0	140	----
		iron, TCLP	7439-89-6	E444	257 mg/L	250 mg/L	103	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.3 mg/L	10 mg/L	103	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	288 mg/L	250 mg/L	115	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.51 mg/L	2.5 mg/L	100	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.38 mg/L	5 mg/L	108	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.111 mg/L	0.1 mg/L	111	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.36 mg/L	5 mg/L	107	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.80 mg/L	0.75 mg/L	107	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	98.4	50.0	150	----

Reference Material (RM) Report

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

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 499895)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	104	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	97.5	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	95.9	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	105	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	110	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	97.8	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	107	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	108	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.2	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	98.3	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	109	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	112	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	101	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	90.7	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 499896)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ___ of ___

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	smckinney@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	rjohnson4@covanta.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Request
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org			
					Sarah.Wellman@metrovancouver.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?		☐ Yes	☐ No	Job #:				
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
Lab Work Order # (lab use only)	0767			ALS Contact:		Sampler:		

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
	BA2219-A-1	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-2	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-3	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-4	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-5	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-6	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-7	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-8	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-9	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-10	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-11	11-May-22	9:00	Soil	X	X		X	1
	BA2219-A-12	11-May-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22B0767

Telephone : +1 604 253 4188

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	17-May-22	0900		May 17	1:15	20 °C				