Bottom Ash Data

2022 Week 15

The following analytical report represents bottom ash composite results for week 15 of 2022 (April 10, 2022 to April 16, 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	: **VA22A8131**	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	: 19-Apr-2022 12:30
PO	: VANCO 0000051213	Date Analysis Commenced	: 21-Apr-2022
C-O-C number	: ----	Issue Date	: 03-May-2022 16:14
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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kelly Fischer	Technical Specialist	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	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).

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	BA2215-A-1	BA2215-A-2	BA2215-A-3	BA2215-A-4	BA2215-A-5
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
						VA22A8131-001	VA22A8131-002	VA22A8131-003	VA22A8131-004	VA22A8131-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		20.1	21.5	20.8	20.4	20.8
pH (1:2 soil:water)	----	E108	0.10	pH units		11.5	11.6	11.6	11.6	11.6
Metals										
aluminum	7429-90-5	E440	50	mg/kg		37900	37100	38300	35400	36100
antimony	7440-36-0	E440	0.10	mg/kg		173	234	125	113	103
arsenic	7440-38-2	E440	0.10	mg/kg		24.3	23.5	20.4	19.4	18.7
barium	7440-39-3	E440	0.50	mg/kg		636	545	558	503	517
beryllium	7440-41-7	E440	0.10	mg/kg		0.47	0.47	0.41	0.48	0.41
bismuth	7440-69-9	E440	0.20	mg/kg		9.86	8.70	9.10	7.31	7.57
boron	7440-42-8	E440	5.0	mg/kg		204	217	262	244	257
cadmium	7440-43-9	E440	0.020	mg/kg		9.92	10.1	9.22	8.66	8.96
calcium	7440-70-2	E440	50	mg/kg		136000	154000	141000	140000	139000
chromium	7440-47-3	E440	0.50	mg/kg		209	171	164	264	209
cobalt	7440-48-4	E440	0.10	mg/kg		88.2	60.0	102	447	44.0
copper	7440-50-8	E440	0.50	mg/kg		11200	24200	5560	5200	2140
iron	7439-89-6	E440	50	mg/kg		66300	55700	74000	68600	59700
lead	7439-92-1	E440	0.50	mg/kg		390	745	393	918	2020
lithium	7439-93-2	E440	2.0	mg/kg		35.6	30.5	29.6	30.7	25.1
magnesium	7439-95-4	E440	20	mg/kg		12800	13500	13400	12400	12800
manganese	7439-96-5	E440	1.0	mg/kg		820	929	850	1240	916
mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	0.0956	0.147	0.0500	0.0800
molybdenum	7439-98-7	E440	0.10	mg/kg		24.0	19.1	18.2	21.3	25.9
nickel	7440-02-0	E440	0.50	mg/kg		275	428	199	277	207
phosphorus	7723-14-0	E440	50	mg/kg		9730	12100	10300	9320	9570
potassium	7440-09-7	E440	100	mg/kg		5020	5750	5660	5120	5310
selenium	7782-49-2	E440	0.20	mg/kg		0.42	0.85	0.30	0.30	0.34
silver	7440-22-4	E440	0.10	mg/kg		4.58	6.83	6.94	9.82	4.94
sodium	7440-23-5	E440	50	mg/kg		14900	16600	15100	15100	15500
strontium	7440-24-6	E440	0.50	mg/kg		315	354	316	308	326
sulfur	7704-34-9	E440	1000	mg/kg		11500	14100	11600	10700	10900

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2215-A-1	BA2215-A-2	BA2215-A-3	BA2215-A-4	BA2215-A-5
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
						VA22A8131-001	VA22A8131-002	VA22A8131-003	VA22A8131-004	VA22A8131-005
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.060	0.064	0.064	<0.050	0.087
tin	7440-31-5	E440	2.0	mg/kg		88.3	935	151	888	109
titanium	7440-32-6	E440	1.0	mg/kg		391	245	312	291	359
tungsten	7440-33-7	E440	0.50	mg/kg		14.2	8.91	9.26	12.2	12.9
uranium	7440-61-1	E440	0.050	mg/kg		5.29	5.90	5.31	5.06	5.37
vanadium	7440-62-2	E440	0.20	mg/kg		49.3	49.9	47.3	47.2	48.3
zinc	7440-66-6	E440	2.0	mg/kg		5550	4920	3980	4680	10600
zirconium	7440-67-7	E440	1.0	mg/kg		1.1	1.6	1.4	1.8	1.4
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg		0.24	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.9	11.7	11.9	11.7	11.8
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.26	8.89	9.10	9.45	9.22
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		6.25	6.29	6.32	6.20	6.32
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
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		1.67	1.74	1.93	1.76	1.63
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.312	0.133	0.169	0.122	0.138
calcium, TCLP	7440-70-2	E444	10	mg/L		1840	1910	2000	1830	1850
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		1.67	0.929	1.64	1.56	1.05
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.760	0.856	1.13	0.830	0.734
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		134	144	137	130	141
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		0.52	0.53	0.58	0.58	0.68
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2215-A-1	BA2215-A-2	BA2215-A-3	BA2215-A-4	BA2215-A-5
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
						VA22A8131-001	VA22A8131-002	VA22A8131-003	VA22A8131-004	VA22A8131-005
						Result	Result	Result	Result	Result
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		28.9	36.2	32.0	41.9	29.6
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: BA2215-A-6	BA2215-A-7	BA2215-A-8	BA2215-A-9	BA2215-A-10
					Client sampling date / time: 13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
					VA22A8131-006	VA22A8131-007	VA22A8131-008	VA22A8131-009	VA22A8131-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	21.0	20.5	20.6	20.2	22.1
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	11.7	11.6	11.4
Metals									
aluminum	7429-90-5	E440	50	mg/kg	39500	33600	38600	43000	36200
antimony	7440-36-0	E440	0.10	mg/kg	130	142	114	109	107
arsenic	7440-38-2	E440	0.10	mg/kg	23.4	19.8	20.3	23.6	22.1
barium	7440-39-3	E440	0.50	mg/kg	422	619	639	551	526
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.46	0.45	0.46	0.44
bismuth	7440-69-9	E440	0.20	mg/kg	12.0	24.6	10.3	13.2	8.29
boron	7440-42-8	E440	5.0	mg/kg	226	181	216	227	160
cadmium	7440-43-9	E440	0.020	mg/kg	9.76	14.4	9.26	10.6	9.60
calcium	7440-70-2	E440	50	mg/kg	138000	143000	155000	154000	140000
chromium	7440-47-3	E440	0.50	mg/kg	213	186	217	267	159
cobalt	7440-48-4	E440	0.10	mg/kg	167	63.4	200	109	58.0
copper	7440-50-8	E440	0.50	mg/kg	5510	2020	2580	1520	4740
iron	7439-89-6	E440	50	mg/kg	96000	81900	79800	70600	87400
lead	7439-92-1	E440	0.50	mg/kg	1210	1410	5210	1000	622
lithium	7439-93-2	E440	2.0	mg/kg	23.6	28.1	34.9	27.0	27.8
magnesium	7439-95-4	E440	20	mg/kg	14400	14200	13200	14400	12600
manganese	7439-96-5	E440	1.0	mg/kg	1930	874	942	883	1010
mercury	7439-97-6	E510	0.0500	mg/kg	0.0868	0.301	0.0739	0.166	0.148
molybdenum	7439-98-7	E440	0.10	mg/kg	20.6	21.8	23.5	26.4	20.2
nickel	7440-02-0	E440	0.50	mg/kg	186	264	555	250	146
phosphorus	7723-14-0	E440	50	mg/kg	11000	10300	10600	11100	11400
potassium	7440-09-7	E440	100	mg/kg	5030	5410	5640	6260	5540
selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.36	0.33	0.30	0.35
silver	7440-22-4	E440	0.10	mg/kg	4.76	5.46	7.73	5.24	6.09
sodium	7440-23-5	E440	50	mg/kg	14600	15800	16000	17400	15100
strontium	7440-24-6	E440	0.50	mg/kg	388	342	380	356	314
sulfur	7704-34-9	E440	1000	mg/kg	11800	12200	12000	12400	12400
thallium	7440-28-0	E440	0.050	mg/kg	0.062	0.059	0.073	0.061	0.068

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2215-A-6	BA2215-A-7	BA2215-A-8	BA2215-A-9	BA2215-A-10
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
						VA22A8131-006	VA22A8131-007	VA22A8131-008	VA22A8131-009	VA22A8131-010
						Result	Result	Result	Result	Result
Metals										
tin	7440-31-5	E440	2.0	mg/kg		1300	377	121	100	112
titanium	7440-32-6	E440	1.0	mg/kg		295	319	289	271	238
tungsten	7440-33-7	E440	0.50	mg/kg		10.3	11.6	9.98	10.2	12.0
uranium	7440-61-1	E440	0.050	mg/kg		5.36	5.71	5.92	5.84	5.32
vanadium	7440-62-2	E440	0.20	mg/kg		52.0	49.3	50.5	54.6	48.7
zinc	7440-66-6	E440	2.0	mg/kg		7090	5850	4700	4340	4640
zirconium	7440-67-7	E440	1.0	mg/kg		1.9	1.1	1.5	1.9	1.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.7	11.8	11.7	11.7	11.8
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.98	9.08	9.46	8.96	8.88
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		6.21	6.15	6.13	6.15	6.25
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
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		1.80	1.78	1.99	1.92	1.71
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.136	0.145	0.197	0.144	0.210
calcium, TCLP	7440-70-2	E444	10	mg/L		1900	1920	1970	1880	1900
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		1.42	1.74	0.992	0.676	1.26
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.70	1.09	0.946	1.03	0.850
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		138	138	138	134	137
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		0.43	0.56	0.51	0.82	0.45
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	BA2215-A-6	BA2215-A-7	BA2215-A-8	BA2215-A-9	BA2215-A-10
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00	13-Apr-2022 09:00
						VA22A8131-006	VA22A8131-007	VA22A8131-008	VA22A8131-009	VA22A8131-010
						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		36.2	32.8	31.6	37.9	35.8
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: BA2215-A-11	BA2215-A-12	----	----	----
					Client sampling date / time: 13-Apr-2022 09:00	13-Apr-2022 09:00	----	----	----
					VA22A8131-011	VA22A8131-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
moisture	----	E144	0.25	%	20.5	20.2	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	39600	42400	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	94.2	110	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	20.2	20.1	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	536	477	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.44	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	8.70	15.6	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	193	213	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	11.5	1370	----	----	----
calcium	7440-70-2	E440	50	mg/kg	134000	139000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	258	174	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	40.1	156	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	3300	2510	----	----	----
iron	7439-89-6	E440	50	mg/kg	73700	66700	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	329	436	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	23.6	26.6	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	12200	14000	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	1950	927	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.140	0.675	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	21.0	21.8	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	244	279	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	10000	10100	----	----	----
potassium	7440-09-7	E440	100	mg/kg	4840	5230	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.30	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	4.82	4.52	----	----	----
sodium	7440-23-5	E440	50	mg/kg	14600	15500	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	299	338	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	11600	12000	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.051	0.053	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2215-A-11	BA2215-A-12	----	----	----
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	----	----	----
						VA22A8131-011	VA22A8131-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
tin	7440-31-5	E440	2.0	mg/kg		119	118	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		322	386	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		7.37	9.35	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		5.28	5.40	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		51.3	49.3	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		4620	4600	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.5	1.6	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.0	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		10.3	8.82	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.27	6.37	----	----	----
antimony, TCLP	7440-36-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	----	----	----
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	----	----	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	----	----	----
boron, TCLP	7440-42-8	E444	0.50	mg/L		1.73	1.74	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.124	0.155	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		1950	1870	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.03	1.33	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.619	0.681	----	----	----
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		144	134	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.51	0.72	----	----	----
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	----	----	----
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	----	----	----
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2215-A-11	BA2215-A-12	----	----	----
					Client sampling date / time	13-Apr-2022 09:00	13-Apr-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22A8131-011	VA22A8131-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----
zinc, TCLP	7440-66-6	E444	0.50	mg/L		39.8	37.2	----	----	----
zirconium, TCLP	7440-67-7	E444	10	mg/L		<10	<10	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA22A8131**	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	: 19-Apr-2022 12:30
PO	: VANCO 0000051213	Issue Date	: 03-May-2022 16:14
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 Services 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	VA22A8131-001	BA2215-A-1	antimony	7440-36-0	E440	51.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A8131-001	BA2215-A-1	copper	7440-50-8	E440	147 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A8131-001	BA2215-A-1	lithium	7439-93-2	E440	31.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A8131-001	BA2215-A-1	selenium	7782-49-2	E440	0.51 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-1	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-10	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-11	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-12	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-2	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-3	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-4	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 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 BA2215-A-5	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-6	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-7	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-8	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2215-A-9	E510	13-Apr-2022	02-May-2022	----	----		02-May-2022	28 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-1	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-10	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-11	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-12	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 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 BA2215-A-2	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-3	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-4	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-5	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-6	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-7	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-8	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2215-A-9	E440	13-Apr-2022	02-May-2022	----	----		02-May-2022	180 days	19 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-1	E144	13-Apr-2022	----	----	----		30-Apr-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 BA2215-A-10	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-11	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-12	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-2	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-3	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-4	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-5	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-6	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-7	E144	13-Apr-2022	----	----	----		30-Apr-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 BA2215-A-8	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2215-A-9	E144	13-Apr-2022	----	----	----		30-Apr-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-1	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-10	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-11	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-12	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-2	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-3	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-4	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 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 BA2215-A-5	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-6	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-7	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-8	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2215-A-9	E108	13-Apr-2022	02-May-2022	----	----		02-May-2022	30 days	19 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap BA2215-A-1	E532	13-Apr-2022	21-Apr-2022	30 days	8 days	✓	25-Apr-2022	7 days	3 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-1	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-10	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-11	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2215-A-12	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-2	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-3	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-4	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-5	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-6	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-7	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-8	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2215-A-9	E512	29-Apr-2022	----	----	----		01-May-2022	28 days	18 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2215-A-1	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-10	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-11	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-12	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-2	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-3	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-4	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-5	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-6	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2215-A-7	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-8	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2215-A-9	E444	29-Apr-2022	----	----	----		01-May-2022	180 days	18 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-1	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-10	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-11	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-12	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-2	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-3	EPP444	13-Apr-2022	29-Apr-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) BA2215-A-4	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-5	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-6	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-7	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-8	EPP444	13-Apr-2022	29-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2215-A-9	EPP444	13-Apr-2022	29-Apr-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)							
Hexavalent Chromium (Cr VI) by IC	E532	464933	1	8	12.5	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	473175	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	473174	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	473177	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	473176	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	464933	2	8	25.0	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	473175	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	473174	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	473177	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	473176	1	12	8.3	5.0	✓
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	464933	1	8	12.5	5.0	✓
Mercury by CVAAS (TCLP)	E512	473720	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	473175	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	473704	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	473174	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	473177	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	473720	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	473704	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.
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.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

ALS Environmental

QUALITY CONTROL REPORT

Work Order	: **VA22A8131**	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	: 19-Apr-2022 12:30
PO	: VANCO 0000051213	Date Analysis Commenced	: 21-Apr-2022
C-O-C number	: ----	Issue Date	: 03-May-2022 16:14
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 Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

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*
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kelly Fischer	Technical Specialist	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Woochan Song	Lab Analyst	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 Services number is a unique identifier assigned to discrete substances.
DQO = Data Quality Objective.
LOR = Limit of Reporting (detection limit).
RPD = Relative Percentage 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: 473176)											
VA22A8131-001	BA2215-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.7	1.7%	5%	----
Physical Tests (QC Lot: 473177)											
VA22A8131-001	BA2215-A-1	moisture	----	E144	0.25	%	20.1	19.7	2.19%	20%	----
Metals (QC Lot: 473174)											
VA22A8131-001	BA2215-A-1	aluminum	7429-90-5	E440	50	mg/kg	37900	49500	26.6%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	173	103	51.2%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	24.3	19.8	20.3%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	636	647	1.76%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.47	0.44	0.03	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	9.86	10.2	3.69%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	204	185	9.85%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.92	10.2	2.36%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	136000	147000	7.71%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	209	182	14.1%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	88.2	91.8	3.98%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	11200	1700	147%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	66300	81100	20.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	390	365	6.55%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	35.6	25.8	31.8%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	12800	13100	2.79%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	820	969	16.6%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	24.0	25.7	7.11%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	275	218	23.2%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	9730	10800	10.9%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5020	5310	5.65%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.42	# 0.93	0.51	Diff <2x LOR	DUP-H
		silver	7440-22-4	E440	0.10	mg/kg	4.58	4.59	0.183%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14900	15600	4.28%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	315	330	4.81%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11500	12400	7.77%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.060	0.055	0.005	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: 473174) - continued											
VA22A8131-001	BA2215-A-1	tin	7440-31-5	E440	2.0	mg/kg	88.3	105	17.4%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	391	410	4.76%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	14.2	11.6	19.8%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.29	5.35	1.07%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	49.3	47.5	3.83%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5550	5740	3.35%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.7	0.5	Diff <2x LOR	----
Metals (QC Lot: 473175)											
VA22A8131-001	BA2215-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 464933)											
VA22A8131-001	BA2215-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.24	<0.10	0.14	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: 473177)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 473174)						
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: 473174) - 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: 473175)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Speciated Metals (QCLot: 464933)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 473704)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
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	----
TCLP Metals (QCLot: 473720)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----

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: 473176)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 473177)									
moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
Metals (QCLot: 473174)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	114	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	116	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	114	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	110	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	114	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	109	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	113	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	106	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	113	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	107	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	110	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	113	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	115	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	108	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	113	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	111	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	111	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	100	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	108	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	116	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	113	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	107	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: 473174) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	113	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	116	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	110	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	113	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	101	80.0	120	----
Metals (QCLot: 473175)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	107	80.0	120	----
Speciated Metals (QCLot: 464933)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	82.1	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: 473704)										
VA22A8131-001	BA2215-A-1	antimony, TCLP	7440-36-0	E444	4.8 mg/L	5 mg/L	96.9	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	98.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.2 mg/L	12.5 mg/L	97.5	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.237 mg/L	0.25 mg/L	94.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.71 mg/L	10 mg/L	87.1	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	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	1.17 mg/L	1.25 mg/L	93.9	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	2.30 mg/L	2.5 mg/L	91.8	50.0	140	----
		iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	92.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.84 mg/L	10 mg/L	88.4	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	273 mg/L	250 mg/L	109	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.30 mg/L	2.5 mg/L	92.0	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.85 mg/L	5 mg/L	97.0	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.104 mg/L	0.1 mg/L	104	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	90.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.79 mg/L	5 mg/L	95.8	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	99.5	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.6	50.0	150	----
TCLP Metals (QCLot: 473720)										
VA22A8131-001	BA2215-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	105	50.0	140	----

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: **Soil/Solid**

					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: 473174)									
QC-473174-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	121	70.0	130	----
QC-473174-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
QC-473174-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	116	70.0	130	----
QC-473174-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	108	70.0	130	----
QC-473174-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	117	70.0	130	----
QC-473174-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	140	40.0	160	----
QC-473174-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-473174-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	108	70.0	130	----
QC-473174-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	122	70.0	130	----
QC-473174-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	113	70.0	130	----
QC-473174-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	112	70.0	130	----
QC-473174-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	111	70.0	130	----
QC-473174-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	107	70.0	130	----
QC-473174-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	117	70.0	130	----
QC-473174-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	122	70.0	130	----
QC-473174-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	120	70.0	130	----
QC-473174-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	114	70.0	130	----
QC-473174-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	111	70.0	130	----
QC-473174-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	104	70.0	130	----
QC-473174-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	123	70.0	130	----
QC-473174-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	113	70.0	130	----
QC-473174-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	111	70.0	130	----
QC-473174-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	107	40.0	160	----
QC-473174-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	105	70.0	130	----
QC-473174-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	129	70.0	130	----
QC-473174-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	119	70.0	130	----
QC-473174-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	117	70.0	130	----
QC-473174-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	114	70.0	130	----
QC-473174-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	95.3	70.0	130	----

Sub-Matrix: **Soil/Solid**

					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: 473175)									
QC-473175-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	97.6	70.0	130	----
Speciated Metals (QCLot: 464933)									
QC-464933-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	203 mg/kg	78.2	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): 8131 | **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
	BA2215-A-1	13-Apr-22	9:00	Soil	X	X	X	X	1
	BA2215-A-2	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-3	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-4	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-5	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-6	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-7	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-8	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-9	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-10	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-11	13-Apr-22	9:00	Soil	X	X		X	1
	BA2215-A-12	13-Apr-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22A8131

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
	19-Apr-22			Apr 19/22	12:30	18 °C				

2 random lids

18°C

GENF 20.00 Front