Bottom Ash Data

2022 Week 14

The following analytical report represents bottom ash composite results for week 14 of 2022 (April 3, 2022 to April 9, 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	: **VA22A7607**	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	: 12-Apr-2022 11:15
PO	: VANCO 0000051213	Date Analysis Commenced	: 23-Apr-2022
C-O-C number	: ----	Issue Date	: 02-May-2022 12:33
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*
Dee Lee	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
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	BA2214-A-1	BA2214-A-2	BA2214-A-3	BA2214-A-4	BA2214-A-5
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-001	VA22A7607-002	VA22A7607-003	VA22A7607-004	VA22A7607-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		21.4	19.7	20.2	20.1	21.2
pH (1:2 soil:water)	----	E108	0.10	pH units		10.1	9.93	10.1	10.1	10.3
Metals										
aluminum	7429-90-5	E440	50	mg/kg		31400	34500	37100	32000	42100
antimony	7440-36-0	E440	0.10	mg/kg		139	129	127	135	129
arsenic	7440-38-2	E440	0.10	mg/kg		24.5	20.1	20.0	20.5	18.5
barium	7440-39-3	E440	0.50	mg/kg		415	424	386	306	413
beryllium	7440-41-7	E440	0.10	mg/kg		0.42	0.42	0.41	0.41	0.42
bismuth	7440-69-9	E440	0.20	mg/kg		7.51	9.59	7.89	7.02	13.2
boron	7440-42-8	E440	5.0	mg/kg		175	147	162	194	207
cadmium	7440-43-9	E440	0.020	mg/kg		15.6	14.8	13.2	13.4	10.7
calcium	7440-70-2	E440	50	mg/kg		132000	133000	136000	128000	128000
chromium	7440-47-3	E440	0.50	mg/kg		184	173	144	116	174
cobalt	7440-48-4	E440	0.10	mg/kg		28.9	31.7	65.5	36.9	76.7
copper	7440-50-8	E440	0.50	mg/kg		1230	3370	1860	2720	1080
iron	7439-89-6	E440	50	mg/kg		46300	54600	47400	38200	50800
lead	7439-92-1	E440	0.50	mg/kg		661	842	407	281	326
lithium	7439-93-2	E440	2.0	mg/kg		22.3	25.8	28.1	24.2	26.0
magnesium	7439-95-4	E440	20	mg/kg		12000	12300	12800	12200	12700
manganese	7439-96-5	E440	1.0	mg/kg		715	736	673	648	1060
mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg		21.4	21.1	20.6	36.6	22.3
nickel	7440-02-0	E440	0.50	mg/kg		178	98.9	123	94.1	119
phosphorus	7723-14-0	E440	50	mg/kg		11400	11200	12800	10200	9920
potassium	7440-09-7	E440	100	mg/kg		6810	7080	6320	6650	6200
selenium	7782-49-2	E440	0.20	mg/kg		0.37	0.39	0.37	0.36	0.35
silver	7440-22-4	E440	0.10	mg/kg		4.10	7.83	4.71	8.33	5.70
sodium	7440-23-5	E440	50	mg/kg		16800	17800	16500	16900	18300
strontium	7440-24-6	E440	0.50	mg/kg		320	416	313	313	310
sulfur	7704-34-9	E440	1000	mg/kg		15500	17300	16700	16900	13900

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2214-A-1	BA2214-A-2	BA2214-A-3	BA2214-A-4	BA2214-A-5
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-001	VA22A7607-002	VA22A7607-003	VA22A7607-004	VA22A7607-005
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.080	0.074	0.067	0.064	0.060
tin	7440-31-5	E440	2.0	mg/kg		103	103	102	92.1	98.2
titanium	7440-32-6	E440	1.0	mg/kg		355	383	352	379	737
tungsten	7440-33-7	E440	0.50	mg/kg		8.83	8.77	11.5	6.54	6.36
uranium	7440-61-1	E440	0.050	mg/kg		5.29	5.71	5.32	5.46	5.37
vanadium	7440-62-2	E440	0.20	mg/kg		43.5	65.0	50.1	44.2	48.3
zinc	7440-66-6	E440	2.0	mg/kg		5490	4060	4300	3680	4110
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	1.6	1.7	1.7	1.5
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.1	11.3	11.2	11.2	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.55	8.71	8.94	8.78	8.54
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		6.17	6.06	6.00	6.33	6.10
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		1.82	1.76	1.87	1.96	1.82
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.185	0.190	0.176	0.180	0.251
calcium, TCLP	7440-70-2	E444	10	mg/L		1960	1800	1780	2030	1750
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.809	0.833	0.969	1.32	0.873
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.649	1.17	0.561	1.15	1.30
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	1.22	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		140	124	123	140	129
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L		1.09	0.51	0.55	0.88	1.56
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

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2214-A-1	BA2214-A-2	BA2214-A-3	BA2214-A-4	BA2214-A-5
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-001	VA22A7607-002	VA22A7607-003	VA22A7607-004	VA22A7607-005
						Result	Result	Result	Result	Result
TCLP Metals										
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		45.4	44.6	56.4	29.1	40.0
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	BA2214-A-6	BA2214-A-7	BA2214-A-8	BA2214-A-9	BA2214-A-10
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-006	VA22A7607-007	VA22A7607-008	VA22A7607-009	VA22A7607-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		19.3	20.1	20.9	19.8	21.1
pH (1:2 soil:water)	----	E108	0.10	pH units		10.3	10.1	10.2	10.2	10.2
Metals										
aluminum	7429-90-5	E440	50	mg/kg		32300	39000	29800	37800	40700
antimony	7440-36-0	E440	0.10	mg/kg		117	120	106	114	126
arsenic	7440-38-2	E440	0.10	mg/kg		20.5	20.0	18.6	18.9	21.2
barium	7440-39-3	E440	0.50	mg/kg		432	427	450	517	436
beryllium	7440-41-7	E440	0.10	mg/kg		0.37	0.36	0.35	0.42	0.36
bismuth	7440-69-9	E440	0.20	mg/kg		7.85	7.38	6.52	7.50	7.19
boron	7440-42-8	E440	5.0	mg/kg		145	179	154	208	156
cadmium	7440-43-9	E440	0.020	mg/kg		12.3	12.1	11.9	10.8	14.3
calcium	7440-70-2	E440	50	mg/kg		128000	132000	120000	119000	126000
chromium	7440-47-3	E440	0.50	mg/kg		126	140	143	133	138
cobalt	7440-48-4	E440	0.10	mg/kg		38.6	60.8	921	53.2	38.2
copper	7440-50-8	E440	0.50	mg/kg		2110	1020	1780	4240	1230
iron	7439-89-6	E440	50	mg/kg		53600	43200	48400	69300	54000
lead	7439-92-1	E440	0.50	mg/kg		1170	300	307	519	349
lithium	7439-93-2	E440	2.0	mg/kg		21.0	23.0	27.8	24.2	22.8
magnesium	7439-95-4	E440	20	mg/kg		12100	12400	11300	13700	11600
manganese	7439-96-5	E440	1.0	mg/kg		674	639	650	1510	816
mercury	7439-97-6	E510	0.0500	mg/kg		<0.0500	<0.0500	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg		20.8	24.0	23.3	18.4	22.3
nickel	7440-02-0	E440	0.50	mg/kg		109	139	132	121	185
phosphorus	7723-14-0	E440	50	mg/kg		10100	12200	10200	9760	10200
potassium	7440-09-7	E440	100	mg/kg		5710	5850	5480	5680	6000
selenium	7782-49-2	E440	0.20	mg/kg		0.35	0.32	0.34	0.35	0.37
silver	7440-22-4	E440	0.10	mg/kg		4.34	5.32	3.95	3.48	13.4
sodium	7440-23-5	E440	50	mg/kg		16300	16500	15200	16900	18000
strontium	7440-24-6	E440	0.50	mg/kg		314	318	289	288	315
sulfur	7704-34-9	E440	1000	mg/kg		14500	15800	13400	13500	15700
thallium	7440-28-0	E440	0.050	mg/kg		0.059	0.060	0.053	0.075	0.066

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2214-A-6	BA2214-A-7	BA2214-A-8	BA2214-A-9	BA2214-A-10
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-006	VA22A7607-007	VA22A7607-008	VA22A7607-009	VA22A7607-010
						Result	Result	Result	Result	Result
Metals										
tin	7440-31-5	E440	2.0	mg/kg		467	89.9	91.6	107	90.4
titanium	7440-32-6	E440	1.0	mg/kg		346	423	314	494	431
tungsten	7440-33-7	E440	0.50	mg/kg		5.91	5.50	7.62	7.36	5.35
uranium	7440-61-1	E440	0.050	mg/kg		5.37	4.97	4.70	4.97	5.41
vanadium	7440-62-2	E440	0.20	mg/kg		57.5	48.9	43.0	50.1	48.5
zinc	7440-66-6	E440	2.0	mg/kg		4510	3240	3180	4450	5200
zirconium	7440-67-7	E440	1.0	mg/kg		1.3	1.4	1.2	1.2	1.4
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.3	11.3	11.3	11.2	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		8.96	8.91	8.85	8.80	9.29
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		6.13	5.84	6.09	6.15	6.12
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		1.78	1.66	1.91	1.79	1.75
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.238	0.207	0.251	0.188	0.186
calcium, TCLP	7440-70-2	E444	10	mg/L		1830	1750	1920	1870	1910
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.883	0.967	1.89	1.09	1.43
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.31	1.00	0.947	1.02	0.300
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	0.51	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		144	118	127	125	138
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		0.48	0.90	0.83	0.56	0.70
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	BA2214-A-6	BA2214-A-7	BA2214-A-8	BA2214-A-9	BA2214-A-10
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00	06-Apr-2022 09:00
						VA22A7607-006	VA22A7607-007	VA22A7607-008	VA22A7607-009	VA22A7607-010
						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		35.3	74.0	66.9	60.7	44.3
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: BA2214-A-11	BA2214-A-12	----	----	----
					Client sampling date / time: 06-Apr-2022 09:00	06-Apr-2022 09:00	----	----	----
					VA22A7607-011	VA22A7607-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
moisture	----	E144	0.25	%	21.3	20.6	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.1	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	45600	35600	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	117	92.6	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	21.8	18.3	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	529	466	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.40	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	9.15	7.72	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	148	196	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	11.4	8.83	----	----	----
calcium	7440-70-2	E440	50	mg/kg	124000	125000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	127	123	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	35.0	30.8	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	1310	1020	----	----	----
iron	7439-89-6	E440	50	mg/kg	39800	39500	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	262	227	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	19.3	23.4	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	10400	12000	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	739	610	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	16.4	18.1	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	83.3	88.7	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	13700	10000	----	----	----
potassium	7440-09-7	E440	100	mg/kg	5910	5680	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.42	0.28	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	3.43	5.31	----	----	----
sodium	7440-23-5	E440	50	mg/kg	16800	15900	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	293	292	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	13900	12200	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.059	<0.050	----	----	----

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2214-A-11	BA2214-A-12	----	----	----
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	----	----	----
						VA22A7607-011	VA22A7607-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
tin	7440-31-5	E440	2.0	mg/kg		98.9	82.0	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		567	505	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		6.49	8.85	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		4.90	4.29	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		48.7	43.2	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		6130	2660	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.8	1.3	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.2	11.3	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.31	9.43	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.13	6.17	----	----	----
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		1.77	1.77	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.184	0.177	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		1880	1830	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		1.84	1.69	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.22	0.744	----	----	----
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		126	123	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.67	0.66	----	----	----
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	BA2214-A-11	BA2214-A-12	----	----	----
					Client sampling date / time	06-Apr-2022 09:00	06-Apr-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22A7607-011	VA22A7607-012	--------	--------	--------
						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		37.5	60.2	----	----	----
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	: **VA22A7607**	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	: 12-Apr-2022 11:15
PO	: VANCO 0000051213	Issue Date	: 02-May-2022 12:33
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	VA22A7607-001	BA2214-A-1	bismuth	7440-69-9	E440	174 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A7607-001	BA2214-A-1	boron	7440-42-8	E440	37.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A7607-001	BA2214-A-1	chromium	7440-47-3	E440	33.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A7607-001	BA2214-A-1	cobalt	7440-48-4	E440	67.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A7607-001	BA2214-A-1	tungsten	7440-33-7	E440	49.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-1	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-10	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-11	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-12	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-2	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-3	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-4	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 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 BA2214-A-5	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-6	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-7	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-8	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2214-A-9	E510	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	28 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-1	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-10	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-11	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-12	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 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 BA2214-A-2	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-3	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-4	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-5	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-6	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-7	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-8	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2214-A-9	E440	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	180 days	24 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-1	E144	06-Apr-2022	----	----	----		28-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 BA2214-A-10	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-11	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-12	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-2	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-3	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-4	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-5	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-6	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-7	E144	06-Apr-2022	----	----	----		28-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 BA2214-A-8	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2214-A-9	E144	06-Apr-2022	----	----	----		28-Apr-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-1	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-10	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-11	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-12	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-2	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-3	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-4	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 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 BA2214-A-5	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-6	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-7	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-8	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2214-A-9	E108	06-Apr-2022	30-Apr-2022	----	----		30-Apr-2022	30 days	24 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-1	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-10	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-11	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-12	E512	23-Apr-2022	----	----	----		25-Apr-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
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-2	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-3	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-4	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-5	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-6	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-7	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-8	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2214-A-9	E512	23-Apr-2022	----	----	----		25-Apr-2022	28 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-1	E444	23-Apr-2022	----	----	----		25-Apr-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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-10	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-11	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-12	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-2	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-3	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-4	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-5	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-6	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-7	E444	23-Apr-2022	----	----	----		25-Apr-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
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-8	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2214-A-9	E444	23-Apr-2022	----	----	----		25-Apr-2022	180 days	19 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-1	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-10	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-11	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-12	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-2	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-3	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2214-A-4	EPP444	06-Apr-2022	23-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)										
BA2214-A-5	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)										
BA2214-A-6	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)										
BA2214-A-7	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)										
BA2214-A-8	EPP444	06-Apr-2022	23-Apr-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)										
BA2214-A-9	EPP444	06-Apr-2022	23-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)							
Mercury in Soil/Solid by CVAAS	E510	471796	1	18	5.5	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	471795	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	471801	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	471798	1	19	5.2	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	471796	2	18	11.1	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	471795	2	19	10.5	10.0	✓
Moisture Content by Gravimetry	E144	471801	1	18	5.5	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	471798	1	19	5.2	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	466723	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	471796	1	18	5.5	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	466724	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	471795	1	19	5.2	5.0	✓
Moisture Content by Gravimetry	E144	471801	1	18	5.5	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	466723	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	466724	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.

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.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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	: **VA22A7607**	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	: 12-Apr-2022 11:15
PO	: VANCO 0000051213	Date Analysis Commenced	: 23-Apr-2022
C-O-C number	: ----	Issue Date	: 02-May-2022 12:33
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*
Dee Lee	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
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: 471798)											
VA22A7607-001	BA2214-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.1	10.2	0.9%	5%	----
Physical Tests (QC Lot: 471801)											
VA22A7607-001	BA2214-A-1	moisture	----	E144	0.25	%	21.4	21.5	0.342%	20%	----
Metals (QC Lot: 471795)											
VA22A7607-001	BA2214-A-1	aluminum	7429-90-5	E440	50	mg/kg	31400	46400	38.6%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	139	116	18.4%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	24.5	19.9	20.5%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	415	444	6.79%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.41	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.51	106	174%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	175	255	37.1%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	15.6	20.7	27.8%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	132000	136000	2.74%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	184	131	33.8%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	28.9	58.2	67.2%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1230	1390	11.9%	30%	----
		iron	7439-89-6	E440	50	mg/kg	46300	38200	19.1%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	661	514	24.9%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	22.3	26.6	17.3%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12000	13400	11.0%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	715	883	21.1%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	21.4	19.6	8.81%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	178	223	22.8%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	11400	10800	5.29%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6810	6340	7.08%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.39	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.10	4.58	11.1%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16800	16500	1.73%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	320	313	2.05%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	15500	17800	13.7%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.080	0.075	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: 471795) - continued											
VA22A7607-001	BA2214-A-1	tin	7440-31-5	E440	2.0	mg/kg	103	91.3	12.2%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	355	442	21.8%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	8.83	5.36	49.0%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	5.29	5.46	3.08%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	43.5	51.6	17.0%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5490	4640	16.6%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.4	2.1	0.6	Diff <2x LOR	----
Metals (QC Lot: 471796)											
VA22A7607-001	BA2214-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	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: 471801)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 471795)						
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: 471795) - 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: 471796)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 466723)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 466724)						
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	----

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: 471798)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 471801)									
moisture	----	E144	0.25	%	50 %	99.2	90.0	110	----
Metals (QCLot: 471795)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.0	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	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	102	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.0	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.4	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.8	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	96.6	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.7	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	95.2	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.5	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.6	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	91.4	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.4	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.3	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.8	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	94.0	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.3	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.8	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.9	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	94.8	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.7	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: 471795) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.2	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.5	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	97.4	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	92.7	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	104	80.0	120	----
Metals (QCLot: 471796)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	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: 466723)										
VA22A7607-001	BA2214-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	100	50.0	140	----
TCLP Metals (QCLot: 466724)										
VA22A7607-001	BA2214-A-1	antimony, TCLP	7440-36-0	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.5 mg/L	5 mg/L	89.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.8 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.228 mg/L	0.25 mg/L	91.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.05 mg/L	10 mg/L	90.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.216 mg/L	0.25 mg/L	86.6	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	1.08 mg/L	1.25 mg/L	86.6	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	2.06 mg/L	2.5 mg/L	82.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	215 mg/L	250 mg/L	86.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.88 mg/L	10 mg/L	88.8	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	243 mg/L	250 mg/L	97.2	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.11 mg/L	2.5 mg/L	84.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.67 mg/L	5 mg/L	93.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.098 mg/L	0.1 mg/L	98.5	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	91.2	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.62 mg/L	5 mg/L	92.5	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.68 mg/L	0.75 mg/L	91.3	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	90.3	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: **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: 471795)									
QC-471795-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	108	70.0	130	----
QC-471795-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	103	70.0	130	----
QC-471795-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	112	70.0	130	----
QC-471795-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
QC-471795-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	120	70.0	130	----
QC-471795-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	127	40.0	160	----
QC-471795-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	105	70.0	130	----
QC-471795-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
QC-471795-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
QC-471795-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
QC-471795-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-471795-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
QC-471795-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	----
QC-471795-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	115	70.0	130	----
QC-471795-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	112	70.0	130	----
QC-471795-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
QC-471795-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
QC-471795-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-471795-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
QC-471795-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	122	70.0	130	----
QC-471795-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
QC-471795-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
QC-471795-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
QC-471795-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	101	70.0	130	----
QC-471795-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
QC-471795-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	121	70.0	130	----
QC-471795-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----
QC-471795-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	99.8	70.0	130	----
QC-471795-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	85.6	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: 471796)									
QC-471796-003	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

www.alsglobal.com

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)		7607		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
	BA2214-A-1	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-2	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-3	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-4	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-5	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-6	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-7	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-8	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-9	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-10	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-11	06-Apr-22	9:00	Soil	X	X		X	1
	BA2214-A-12	06-Apr-22	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA22A7607

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
	12-Apr-22	0900	JC	12 Apr 22	11:15 AM	19 °C				