Bottom Ash Data

2022 Week 52

The following analytical report represents bottom ash composite results for week 52 of 2022 (December 25, 2022 to December 31, 2022).

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

CERTIFICATE OF ANALYSIS

Work Order	: **VA23A0032**	Page	: 1 of 11
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby BC Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 03-Jan-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 03-Jan-2023
C-O-C number	: ----	Issue Date	: 09-Jan-2023 19:22
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*
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
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	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/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2252-A-1	BA2252-A-2	BA2252-A-3	BA2252-A-4	BA2252-A-5
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
						VA23A0032-001	VA23A0032-002	VA23A0032-003	VA23A0032-004	VA23A0032-005
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		26.3	28.4	28.6	28.7	28.6
pH (1:2 soil:water)	----	E108	0.10	pH units		10.1	10.1	10.1	10.2	10.1
Metals										
aluminum	7429-90-5	E440	50	mg/kg		35500	44000	42700	56200	52900
antimony	7440-36-0	E440	0.10	mg/kg		106	94.9	107	105	93.8
arsenic	7440-38-2	E440	0.10	mg/kg		24.1	13.6	42.2	12.3	12.2
barium	7440-39-3	E440	0.50	mg/kg		669	661	605	640	661
beryllium	7440-41-7	E440	0.10	mg/kg		0.42	0.42	0.40	0.54	0.45
bismuth	7440-69-9	E440	0.20	mg/kg		7.42	8.02	6.81	5.23	25.8
boron	7440-42-8	E440	5.0	mg/kg		159	163	157	179	154
cadmium	7440-43-9	E440	0.020	mg/kg		8.24	6.72	7.78	6.20	5.88
calcium	7440-70-2	E440	50	mg/kg		152000	145000	158000	149000	143000
chromium	7440-47-3	E440	0.50	mg/kg		246	143	206	296	161
cobalt	7440-48-4	E440	0.10	mg/kg		139	281	83.6	57.9	456
copper	7440-50-8	E440	0.50	mg/kg		2600	1330	6090	1760	3030
iron	7439-89-6	E440	50	mg/kg		64700	63600	70800	77100	62200
lead	7439-92-1	E440	0.50	mg/kg		422	456	348	330	301
lithium	7439-93-2	E440	2.0	mg/kg		33.7	32.6	34.2	35.2	51.5
magnesium	7439-95-4	E440	20	mg/kg		12200	12100	12200	10700	12900
manganese	7439-96-5	E440	1.0	mg/kg		1440	836	1210	869	841
mercury	7439-97-6	E510	0.0500	mg/kg		0.0945	0.0824	0.106	0.282	0.0657
molybdenum	7439-98-7	E440	0.10	mg/kg		57.0	86.5	81.7	86.7	54.4
nickel	7440-02-0	E440	0.50	mg/kg		143	250	247	426	163
phosphorus	7723-14-0	E440	50	mg/kg		14400	13400	16200	14900	14100
potassium	7440-09-7	E440	100	mg/kg		5450	5560	5690	5610	5290
selenium	7782-49-2	E440	0.20	mg/kg		0.34	0.36	0.34	0.35	0.34
silver	7440-22-4	E440	0.10	mg/kg		5.34	4.04	5.45	4.73	10.9
sodium	7440-23-5	E440	50	mg/kg		17800	18400	17600	18900	18900
strontium	7440-24-6	E440	0.50	mg/kg		350	305	327	312	314

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2252-A-1	BA2252-A-2	BA2252-A-3	BA2252-A-4	BA2252-A-5
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
						VA23A0032-001	VA23A0032-002	VA23A0032-003	VA23A0032-004	VA23A0032-005
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		10600	9600	11000	8600	8400
thallium	7440-28-0	E440	0.050	mg/kg		0.053	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		114	112	123	126	1330
titanium	7440-32-6	E440	1.0	mg/kg		326	550	452	920	682
tungsten	7440-33-7	E440	0.50	mg/kg		25.5	25.4	23.9	20.6	40.8
uranium	7440-61-1	E440	0.050	mg/kg		3.13	2.65	2.94	2.75	2.72
vanadium	7440-62-2	E440	0.20	mg/kg		29.7	29.6	29.3	31.4	29.8
zinc	7440-66-6	E440	2.0	mg/kg		3340	4420	3240	3050	2960
zirconium	7440-67-7	E440	1.0	mg/kg		3.9	3.8	5.0	4.6	4.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.3	11.3	11.3	11.2	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.50	6.22	6.22	5.34	6.24
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444	0.010	pH units		6.48	6.57	6.61	6.50	6.48
antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		1.72	1.79	1.68	1.64	1.61
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.093	0.074	0.050	0.298	0.064
calcium, TCLP	7440-70-2	E444	10	mg/L		1910	1920	1890	1860	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		1.45	1.08	1.11	1.33	1.67
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.770	0.699	0.626	0.737	0.670
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		123	121	128	119	118
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		0.36	0.43	0.40	0.44	0.36
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2252-A-1	BA2252-A-2	BA2252-A-3	BA2252-A-4	BA2252-A-5
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit		VA23A0032-001	VA23A0032-002	VA23A0032-003	VA23A0032-004	VA23A0032-005
						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		8.98	11.3	11.7	16.7	12.5
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/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2252-A-6	BA2252-A-7	BA2252-A-8	BA2252-A-9	BA2252-A-10
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
						VA23A0032-006	VA23A0032-007	VA23A0032-008	VA23A0032-009	VA23A0032-010
						Result	Result	Result	Result	Result
Physical Tests										
Moisture	----	E144	0.25	%		30.4	28.0	28.2	28.5	29.3
pH (1:2 soil:water)	----	E108	0.10	pH units		10.1	10.1	10.1	10.1	10.2
Metals										
aluminum	7429-90-5	E440	50	mg/kg		42200	46400	40800	42700	41500
antimony	7440-36-0	E440	0.10	mg/kg		83.5	84.6	95.1	83.3	125
arsenic	7440-38-2	E440	0.10	mg/kg		12.8	12.1	13.3	11.6	15.0
barium	7440-39-3	E440	0.50	mg/kg		723	634	594	620	620
beryllium	7440-41-7	E440	0.10	mg/kg		0.39	0.44	0.40	0.53	0.43
bismuth	7440-69-9	E440	0.20	mg/kg		5.91	6.09	5.68	5.90	7.42
boron	7440-42-8	E440	5.0	mg/kg		154	157	186	155	150
cadmium	7440-43-9	E440	0.020	mg/kg		6.40	5.30	6.84	5.62	8.03
calcium	7440-70-2	E440	50	mg/kg		129000	128000	144000	138000	158000
chromium	7440-47-3	E440	0.50	mg/kg		374	288	137	360	190
cobalt	7440-48-4	E440	0.10	mg/kg		178	101	125	120	53.2
copper	7440-50-8	E440	0.50	mg/kg		2420	5510	4800	925	3340
iron	7439-89-6	E440	50	mg/kg		86000	79900	58700	71700	65000
lead	7439-92-1	E440	0.50	mg/kg		308	243	303	271	630
lithium	7439-93-2	E440	2.0	mg/kg		38.2	27.8	26.6	33.1	29.7
magnesium	7439-95-4	E440	20	mg/kg		10400	11100	12700	11400	12300
manganese	7439-96-5	E440	1.0	mg/kg		1080	1080	908	1210	951
mercury	7439-97-6	E510	0.0500	mg/kg		0.268	0.106	0.0752	0.100	0.122
molybdenum	7439-98-7	E440	0.10	mg/kg		47.8	45.9	54.3	46.9	76.8
nickel	7440-02-0	E440	0.50	mg/kg		1180	237	373	248	158
phosphorus	7723-14-0	E440	50	mg/kg		12100	13900	12800	12400	17000
potassium	7440-09-7	E440	100	mg/kg		5120	5090	4990	4940	5600
selenium	7782-49-2	E440	0.20	mg/kg		0.25	0.24	0.42	0.25	0.40
silver	7440-22-4	E440.Ag	0.10	mg/kg		----	11.8	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		8.44	----	4.12	3.97	7.18
sodium	7440-23-5	E440	50	mg/kg		17200	17600	17100	16500	17900
strontium	7440-24-6	E440	0.50	mg/kg		297	330	300	301	342

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2252-A-6	BA2252-A-7	BA2252-A-8	BA2252-A-9	BA2252-A-10
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
						VA23A0032-006	VA23A0032-007	VA23A0032-008	VA23A0032-009	VA23A0032-010
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		9200	8200	8500	8300	12500
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		137	208	148	124	141
titanium	7440-32-6	E440	1.0	mg/kg		634	524	407	557	465
tungsten	7440-33-7	E440	0.50	mg/kg		26.9	32.6	21.5	23.8	25.5
uranium	7440-61-1	E440	0.050	mg/kg		2.75	2.59	2.64	2.52	3.14
vanadium	7440-62-2	E440	0.20	mg/kg		31.4	38.3	27.9	29.0	32.0
zinc	7440-66-6	E440	2.0	mg/kg		6580	2490	4280	2950	4110
zirconium	7440-67-7	E440	1.0	mg/kg		3.1	4.1	4.2	3.4	4.0
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.2	11.3	11.2	11.3	11.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.27	6.01	5.79	5.42	6.12
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444	0.010	pH units		6.43	6.56	6.59	6.21	6.11
antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		1.67	1.65	1.60	1.77	1.76
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.107	0.060	0.065	0.073	0.124
calcium, TCLP	7440-70-2	E444	10	mg/L		1900	1810	1790	1920	2030
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		1.23	0.993	1.21	1.84	2.02
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.791	0.779	0.730	1.35	0.843
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	0.50
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		122	118	116	129	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		1.07	0.37	0.29	0.51	0.43
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/Solid**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2252-A-6	BA2252-A-7	BA2252-A-8	BA2252-A-9	BA2252-A-10
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00	28-Nov-2022 09:00
						VA23A0032-006	VA23A0032-007	VA23A0032-008	VA23A0032-009	VA23A0032-010
						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		24.6	12.9	11.2	23.5	51.9
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/Solid (Matrix: Soil/Solid)					Client sample ID	BA2252-A-11	BA2252-A-12	----	----	----
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A0032-011	VA23A0032-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
Moisture	----	E144	0.25	%		28.5	29.0	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		10.2	10.1	----	----	----
Metals										
aluminum	7429-90-5	E440	50	mg/kg		42500	37600	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg		93.6	101	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg		12.5	13.6	----	----	----
barium	7440-39-3	E440	0.50	mg/kg		628	630	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg		0.41	0.42	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg		8.71	8.16	----	----	----
boron	7440-42-8	E440	5.0	mg/kg		180	204	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg		6.38	8.39	----	----	----
calcium	7440-70-2	E440	50	mg/kg		147000	147000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg		169	199	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg		130	66.8	----	----	----
copper	7440-50-8	E440	0.50	mg/kg		4170	3160	----	----	----
iron	7439-89-6	E440	50	mg/kg		71000	63200	----	----	----
lead	7439-92-1	E440	0.50	mg/kg		658	327	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg		32.8	34.1	----	----	----
magnesium	7439-95-4	E440	20	mg/kg		13900	11200	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg		862	1170	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg		0.137	0.0950	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg		76.1	49.2	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg		994	194	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg		13400	14700	----	----	----
potassium	7440-09-7	E440	100	mg/kg		5360	5390	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg		0.25	0.34	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		13.9	11.0	----	----	----
sodium	7440-23-5	E440	50	mg/kg		17400	16900	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg		327	331	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg		9300	10400	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2252-A-11	BA2252-A-12	----	----	----
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A0032-011	VA23A0032-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	----	----	----
tin	7440-31-5	E440	2.0	mg/kg		146	179	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		440	568	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		18.2	25.3	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		2.97	2.95	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		29.1	29.3	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		3570	3700	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		4.0	3.4	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.2	11.3	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		7.06	6.44	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.87	2.87	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.22	6.45	----	----	----
antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	----	----	----
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	----	----	----
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	----	----	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	----	----	----
boron, TCLP	7440-42-8	E444	0.50	mg/L		2.09	1.90	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.147	0.068	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		1900	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		1.63	3.93	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.823	0.606	----	----	----
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		125	115	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.45	0.48	----	----	----
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	----	----	----
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: Soil/Solid (Matrix: Soil/Solid)					Client sample ID	BA2252-A-11	BA2252-A-12	----	----	----
					Client sampling date / time	28-Nov-2022 09:00	28-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA23A0032-011	VA23A0032-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	----	----	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----
zinc, TCLP	7440-66-6	E444	0.50	mg/L		31.4	28.2	----	----	----
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.

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QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA23A0032**	Page	: 1 of 16
Client	: **Covanta Burnaby Renewable Energy, ULC**	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: ----	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 03-Jan-2023 13:00
PO	: VANCO0000051998	Issue Date	: 09-Jan-2023 19:22
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

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	VA23A0032-001	BA2252-A-1	arsenic	7440-38-2	E440	66.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A0032-001	BA2252-A-1	bismuth	7440-69-9	E440	35.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A0032-001	BA2252-A-1	cadmium	7440-43-9	E440	31.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A0032-001	BA2252-A-1	chromium	7440-47-3	E440	39.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A0032-001	BA2252-A-1	manganese	7439-96-5	E440	38.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A0032-001	BA2252-A-1	tungsten	7440-33-7	E440	45.6 % 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 : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-7	E440.Ag	28-Nov-2022	09-Jan-2023	180 days	42 days	✓	09-Jan-2023	138 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-1	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-10	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-11	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-12	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-2	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-3	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM

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 BA2252-A-4	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-5	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-6	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-7	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-8	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2252-A-9	E510	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	28 days	38 days	× EHTR-FM
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-1	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-10	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-11	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 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 BA2252-A-12	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-2	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-3	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-4	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-5	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-6	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-7	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-8	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2252-A-9	E440	28-Nov-2022	05-Jan-2023	----	----		06-Jan-2023	180 days	39 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 : Moisture Content by Gravimetry										
LDPE bag BA2252-A-1	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-10	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-11	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-12	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-2	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-3	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-4	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-5	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-6	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	

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 BA2252-A-7	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-8	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2252-A-9	E144	28-Nov-2022	----	----	----		04-Jan-2023	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-1	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-10	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-11	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-12	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-2	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-3	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM

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 BA2252-A-4	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-5	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-6	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-7	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-8	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2252-A-9	E108	28-Nov-2022	05-Jan-2023	----	----		05-Jan-2023	30 days	38 days	× EHTR-FM
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-1	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-10	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-11	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 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) BA2252-A-12	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-2	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-3	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-4	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-5	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-6	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-7	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-8	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2252-A-9	E512	03-Jan-2023	06-Jan-2023	----	----		06-Jan-2023	28 days	39 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) BA2252-A-1	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-10	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-11	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-12	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-2	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-3	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-4	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-5	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-6	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 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) BA2252-A-7	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-8	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2252-A-9	E444	03-Jan-2023	06-Jan-2023	----	----		08-Jan-2023	180 days	41 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-1	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-10	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-11	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-12	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-2	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-3	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	

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: 180 Day HT (e.g. metals ex. Hg) BA2252-A-4	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-5	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-6	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-7	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-8	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2252-A-9	EPP444	28-Nov-2022	03-Jan-2023	----	----		----	----	----	

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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	793561	1	13	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	793562	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	793564	1	13	7.6	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	793563	1	13	7.6	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	797311	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	793561	2	13	15.3	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	793562	2	13	15.3	10.0	✓
Moisture Content by Gravimetry	E144	793564	1	13	7.6	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	793563	1	13	7.6	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	797311	1	1	100.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	796258	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	793561	1	13	7.6	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	796259	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	793562	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	793564	1	13	7.6	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	796258	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	796259	1	12	8.3	5.0	✓

Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: **VA23A0032**	Page	: 1 of 12
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Nicole Victor	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 03-Jan-2023 13:00
PO	: VANCO0000051998	Date Analysis Commenced	: 03-Jan-2023
C-O-C number	: ----	Issue Date	: 09-Jan-2023 19:22
Sampler	: ---- ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

Signatories	*Position*	*Laboratory Department*
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

General Comments

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

Key :

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

Workorder Comments

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

Laboratory Duplicate (DUP) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 793563)											
VA23A0032-001	BA2252-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.1	10.1	0.5%	5%	----
Physical Tests (QC Lot: 793564)											
VA23A0021-001	Anonymous	Moisture	----	E144	0.25	%	75.5	79.6	5.26%	20%	----
Metals (QC Lot: 793561)											
VA23A0032-001	BA2252-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0945	0.0620	0.0325	Diff <2x LOR	----
Metals (QC Lot: 793562)											
VA23A0032-001	BA2252-A-1	aluminum	7429-90-5	E440	50	mg/kg	35500	40300	12.6%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	106	83.9	23.2%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	24.1	12.1	66.2%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	669	666	0.507%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.46	0.04	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.42	5.16	35.9%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	159	125	23.7%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	8.24	6.03	31.0%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	152000	133000	13.3%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	246	166	39.0%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	139	106	26.6%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	2600	1970	27.5%	30%	----
		iron	7439-89-6	E440	50	mg/kg	64700	61800	4.55%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	422	480	13.1%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	33.7	30.8	9.04%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12200	10900	10.9%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1440	980	38.3%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	57.0	43.3	27.3%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	143	143	0.409%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	14400	14300	1.04%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5450	5660	3.82%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.30	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.34	3.60	38.8%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	17800	18200	2.48%	40%	----

Sub-Matrix: **Soil/Solid**

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	*Client sample ID*	*Analyte*	*CAS Number*	*Method*	*LOR*	*Unit*	*Original Result*	*Duplicate Result*	*RPD(%) or Difference*	*Duplicate Limits*	*Qualifier*
Metals (QC Lot: 793562) - continued											
VA23A0032-001	BA2252-A-1	strontium	7440-24-6	E440	0.50	mg/kg	350	324	7.72%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	10600	9400	12.5%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.053	<0.050	0.003	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	114	120	4.90%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	326	375	14.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	25.5	16.0	45.6%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	3.13	2.51	21.8%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	29.7	30.6	2.95%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3340	3950	16.8%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	3.9	3.5	0.4	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: 793564)						
Moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 793561)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 793562)						
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	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 793562) - continued						
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	----
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: 797311)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 796258)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 796259)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 793563)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 793564)									
Moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 793561)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	93.5	80.0	120	----
Metals (QCLot: 793562)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.2	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.2	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	107	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	103	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	102	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	100	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	109	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	98.4	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.8	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.1	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.7	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	102	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.3	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	98.6	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	98.3	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.8	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.8	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: 793562) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	106	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.6	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	106	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	115	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.9	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	104	80.0	120	----
Metals (QCLot: 797311)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	89.7	80.0	120	----

Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 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: 796258)										
VA23A0032-001	BA2252-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	96.1	50.0	140	----
TCLP Metals (QCLot: 796259)										
VA23A0032-001	BA2252-A-1	antimony, TCLP	7440-36-0	E444	5.33 mg/L	5 mg/L	106	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	108	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.0 mg/L	12.5 mg/L	112	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.263 mg/L	0.25 mg/L	105	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.76 mg/L	10 mg/L	97.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.265 mg/L	0.25 mg/L	106	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	1.32 mg/L	1.25 mg/L	106	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	2.49 mg/L	2.5 mg/L	99.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	258 mg/L	250 mg/L	103	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.62 mg/L	10 mg/L	96.2	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	256 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.58 mg/L	2.5 mg/L	103	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.39 mg/L	5 mg/L	108	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.117 mg/L	0.1 mg/L	117	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	99.0	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.04 mg/L	5 mg/L	101	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.81 mg/L	0.75 mg/L	108	50.0	140	----
		zinc, TCLP	7440-66-6	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	97.9	50.0	150	----

Reference Material (RM) Report

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

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 793561)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	99.5	70.0	130	----
Metals (QCLot: 793562)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	95.3	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	130	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	96.5	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	94.4	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	98.7	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	100	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	104	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	103	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	113	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	105	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	99.7	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	96.8	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	117	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	110	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	101	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	122	70.0	130	----

Sub-Matrix:

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 793562) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	118	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	97.5	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	115	70.0	130	----

ALS Environmental

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www.alsglobal.com

COC

Environmental Division
Vancouver
Work Order Reference
VA23A0032

Telephone : +1 604 253 4188

Report To				Report Format / Distribution				Service Requested (Rush for routine an
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business
Contact:	Nicole Victor / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - C
Address:	5150 Riverbend Drive			Email 1:	nvictor@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - (
	Burnaby BC			Email 2:	rjohnson4@covanta.com			○ Same Day or Weekend Emergency - Contact ALS
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Req
		☐ 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# ____ Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
Lab Work Order # (lab use only)	0032			**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
	BA2252-A-1	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-2	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-3	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-4	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-5	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-6	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-7	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-8	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-9	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-10	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-11	28-Dec-22	9:00	Soil	X	X				X						1
	BA2252-A-12	28-Dec-22	9:00	Soil	X	X				X						1

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ?
Karen Inglis	1-Mar-23	8:38	DS	JAN 03 2023	13:00	19 °C				If Yes add SIF