metrovancouver

Bottom Ash Data

2022 Week 48

The following analytical report represents bottom ash composite results for week 48 of 2022 (November 27, 2022 to December 3, 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	: **VA22C9609**	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	: 06-Dec-2022 13:35
PO	: VANCO 0000051213	Date Analysis Commenced	: 08-Dec-2022
C-O-C number	: ----	Issue Date	: 15-Dec-2022 12:36
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
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		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	BA2248-A-1	BA2248-A-2	BA2248-A-3	BA2248-A-4	BA2248-A-5
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
						VA22C9609-001	VA22C9609-002	VA22C9609-003	VA22C9609-004	VA22C9609-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		25.5	24.6	24.3	26.4	26.6
pH (1:2 soil:water)	----	E108	0.10	pH units		10.5	10.5	10.5	10.4	10.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		43600	42300	35400	43300	42500
antimony	7440-36-0	E440	0.10	mg/kg		146	210	195	212	191
arsenic	7440-38-2	E440	0.10	mg/kg		25.6	37.0	38.2	37.8	30.4
barium	7440-39-3	E440	0.50	mg/kg		535	405	260	392	452
beryllium	7440-41-7	E440	0.10	mg/kg		0.69	0.69	0.45	0.44	0.44
bismuth	7440-69-9	E440	0.20	mg/kg		9.18	14.8	18.6	14.7	15.8
boron	7440-42-8	E440	5.0	mg/kg		233	196	214	363	229
cadmium	7440-43-9	E440	0.020	mg/kg		15.7	38.7	28.6	18.5	14.3
calcium	7440-70-2	E440	50	mg/kg		136000	163000	150000	160000	158000
chromium	7440-47-3	E440	0.50	mg/kg		207	189	210	186	177
cobalt	7440-48-4	E440	0.10	mg/kg		195	62.2	294	67.6	590
copper	7440-50-8	E440	0.50	mg/kg		2920	2390	2790	1650	2000
iron	7439-89-6	E440	50	mg/kg		73600	61300	45500	46000	60200
lead	7439-92-1	E440	0.50	mg/kg		488	1020	758	943	1460
lithium	7439-93-2	E440	2.0	mg/kg		26.0	33.6	37.5	36.7	49.3
magnesium	7439-95-4	E440	20	mg/kg		12200	13300	12700	13100	12100
manganese	7439-96-5	E440	1.0	mg/kg		964	1100	951	1090	1410
mercury	7439-97-6	E510	0.0500	mg/kg		0.0972	0.178	0.145	0.134	0.132
molybdenum	7439-98-7	E440	0.10	mg/kg		22.5	33.0	25.0	32.5	27.2
nickel	7440-02-0	E440	0.50	mg/kg		146	276	194	169	166
phosphorus	7723-14-0	E440	50	mg/kg		12500	14000	14400	14800	13500
potassium	7440-09-7	E440	100	mg/kg		6990	8090	7780	9410	8250
selenium	7782-49-2	E440	0.20	mg/kg		0.56	0.60	0.51	0.65	0.44
silver	7440-22-4	E440.Ag	0.10	mg/kg		8.55	----	11.5	----	----
silver	7440-22-4	E440	0.10	mg/kg		----	10.0	----	22.9	9.47
sodium	7440-23-5	E440	50	mg/kg		18900	18800	18200	20900	20900

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2248-A-1	BA2248-A-2	BA2248-A-3	BA2248-A-4	BA2248-A-5
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
						VA22C9609-001	VA22C9609-002	VA22C9609-003	VA22C9609-004	VA22C9609-005
						Result	Result	Result	Result	Result
Metals										
strontium	7440-24-6	E440	0.50	mg/kg		341	530	378	451	429
sulfur	7704-34-9	E440	1000	mg/kg		14700	19400	19700	20000	18700
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	0.076	0.066	0.133	0.062
tin	7440-31-5	E440	2.0	mg/kg		2790	147	147	205	140
titanium	7440-32-6	E440	1.0	mg/kg		480	439	212	396	376
tungsten	7440-33-7	E440	0.50	mg/kg		48.8	70.9	79.1	67.7	65.8
uranium	7440-61-1	E440	0.050	mg/kg		2.50	3.11	3.02	3.13	3.11
vanadium	7440-62-2	E440	0.20	mg/kg		37.5	36.1	34.8	37.7	34.2
zinc	7440-66-6	E440	2.0	mg/kg		4030	5810	5230	6200	5220
zirconium	7440-67-7	E440	1.0	mg/kg		1.6	1.5	3.2	2.0	2.6
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg		<0.10	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.3	11.4	11.4	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.02	5.71	6.18	6.20	5.72
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.91	2.91	2.91	2.91	2.91
pH, TCLP final	----	EPP444	0.010	pH units		6.33	6.27	6.22	6.34	6.19
antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		2.04	2.13	1.99	2.34	2.03
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.287	0.801	0.523	0.179	0.167
calcium, TCLP	7440-70-2	E444	10	mg/L		2120	2120	2090	2140	1970
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		1.66	1.23	1.06	1.37	1.31
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.804	1.03	0.548	0.529	0.969
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		129	127	127	132	127

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2248-A-1	BA2248-A-2	BA2248-A-3	BA2248-A-4	BA2248-A-5
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
						VA22C9609-001	VA22C9609-002	VA22C9609-003	VA22C9609-004	VA22C9609-005
						Result	Result	Result	Result	Result
TCLP Metals										
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		0.56	0.66	0.51	0.57	0.60
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
uranium, TCLP	7440-61-1	E444	0.20	mg/L		<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L		49.5	35.1	28.9	34.6	32.4
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	BA2248-A-6	BA2248-A-7	BA2248-A-8	BA2248-A-9	BA2248-A-10
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
						VA22C9609-006	VA22C9609-007	VA22C9609-008	VA22C9609-009	VA22C9609-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		25.7	25.6	25.5	26.9	24.3
pH (1:2 soil:water)	----	E108	0.10	pH units		10.5	10.5	10.4	10.5	10.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		33400	46600	35700	46200	48200
antimony	7440-36-0	E440	0.10	mg/kg		207	179	326	190	176
arsenic	7440-38-2	E440	0.10	mg/kg		38.5	30.0	42.1	32.6	31.9
barium	7440-39-3	E440	0.50	mg/kg		323	511	375	462	403
beryllium	7440-41-7	E440	0.10	mg/kg		0.39	0.43	0.42	0.40	0.38
bismuth	7440-69-9	E440	0.20	mg/kg		13.7	11.0	21.0	12.0	12.6
boron	7440-42-8	E440	5.0	mg/kg		174	208	201	252	237
cadmium	7440-43-9	E440	0.020	mg/kg		18.4	12.5	18.9	15.7	13.5
calcium	7440-70-2	E440	50	mg/kg		148000	138000	156000	148000	134000
chromium	7440-47-3	E440	0.50	mg/kg		227	181	230	283	347
cobalt	7440-48-4	E440	0.10	mg/kg		48.8	56.2	140	63.6	761
copper	7440-50-8	E440	0.50	mg/kg		2960	3060	3570	2470	2770
iron	7439-89-6	E440	50	mg/kg		57100	45500	58600	52500	69300
lead	7439-92-1	E440	0.50	mg/kg		660	554	3490	652	1380
lithium	7439-93-2	E440	2.0	mg/kg		26.4	25.1	38.3	33.0	98.6
magnesium	7439-95-4	E440	20	mg/kg		12600	11400	13500	12700	11300
manganese	7439-96-5	E440	1.0	mg/kg		996	891	2130	901	991
mercury	7439-97-6	E510	0.0500	mg/kg		0.127	0.262	0.229	0.131	0.100
molybdenum	7439-98-7	E440	0.10	mg/kg		28.0	20.7	25.7	178	33.5
nickel	7440-02-0	E440	0.50	mg/kg		198	130	267	269	348
phosphorus	7723-14-0	E440	50	mg/kg		14100	11900	14800	16100	12500
potassium	7440-09-7	E440	100	mg/kg		7050	7670	7820	7940	6790
selenium	7782-49-2	E440	0.20	mg/kg		0.56	0.39	0.66	0.50	0.42
silver	7440-22-4	E440.Ag	0.10	mg/kg		----	----	----	30.7	----
silver	7440-22-4	E440	0.10	mg/kg		10.7	10.1	14.8	----	8.76
sodium	7440-23-5	E440	50	mg/kg		18100	19400	18100	20800	17800
strontium	7440-24-6	E440	0.50	mg/kg		395	340	413	394	358

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2248-A-6	BA2248-A-7	BA2248-A-8	BA2248-A-9	BA2248-A-10
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
						VA22C9609-006	VA22C9609-007	VA22C9609-008	VA22C9609-009	VA22C9609-010
						Result	Result	Result	Result	Result
Metals										
sulfur	7704-34-9	E440	1000	mg/kg		18200	15200	20100	17600	16600
thallium	7440-28-0	E440	0.050	mg/kg		0.057	0.074	0.099	0.080	0.054
tin	7440-31-5	E440	2.0	mg/kg		215	134	257	4800	122
titanium	7440-32-6	E440	1.0	mg/kg		238	432	330	369	408
tungsten	7440-33-7	E440	0.50	mg/kg		56.3	56.6	83.5	70.4	53.1
uranium	7440-61-1	E440	0.050	mg/kg		3.16	2.83	3.19	2.94	2.60
vanadium	7440-62-2	E440	0.20	mg/kg		33.1	35.1	36.7	34.9	34.6
zinc	7440-66-6	E440	2.0	mg/kg		5770	4650	8450	5000	4900
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	2.2	1.6	2.1	2.6
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	11.4	11.4	11.4
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.05	6.17	5.70	5.41	5.82
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.91	2.91	2.91	2.91	2.91
pH, TCLP final	----	EPP444	0.010	pH units		6.28	6.27	6.35	6.36	6.21
antimony, TCLP	7440-36-0	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
arsenic, TCLP	7440-38-2	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L		<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L		<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L		2.18	2.02	2.11	1.92	2.03
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.209	0.187	0.190	0.187	0.179
calcium, TCLP	7440-70-2	E444	10	mg/L		2130	2000	2190	2020	2020
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		1.31	0.959	1.21	1.30	1.28
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.656	0.729	0.807	0.756	0.698
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		137	134	132	129	130
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		0.97	0.62	0.58	1.56	0.54
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2248-A-6	BA2248-A-7	BA2248-A-8	BA2248-A-9	BA2248-A-10
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00	30-Nov-2022 09:00
Analyte	CAS Number	Method	LOR	Unit		VA22C9609-006	VA22C9609-007	VA22C9609-008	VA22C9609-009	VA22C9609-010
						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		37.1	32.6	32.0	41.2	35.9
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 (Matrix: Soil/Solid)				Client sample ID	BA2248-A-11	BA2248-A-12	----	----	----
				Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C9609-011	VA22C9609-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
moisture	----	E144	0.25	%	25.9	26.8	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	41400	41800	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	198	222	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	34.9	39.5	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	413	347	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.41	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	12.3	25.6	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	260	227	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	17.2	19.4	----	----	----
calcium	7440-70-2	E440	50	mg/kg	152000	168000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	427	189	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	86.6	241	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	1850	2090	----	----	----
iron	7439-89-6	E440	50	mg/kg	91800	42600	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	538	885	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	32.4	39.2	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	12400	13500	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	1120	887	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.167	0.159	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	32.9	42.1	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	305	187	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	14500	16600	----	----	----
potassium	7440-09-7	E440	100	mg/kg	7980	8010	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.56	0.59	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	11.8	10.1	----	----	----
sodium	7440-23-5	E440	50	mg/kg	20500	19100	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	527	416	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	18800	20600	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2248-A-11	BA2248-A-12	----	----	----
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C9609-011	VA22C9609-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.060	0.058	----	----	----
tin	7440-31-5	E440	2.0	mg/kg		153	152	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		332	315	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		57.6	61.5	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		3.05	3.25	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		42.5	40.7	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		4690	5480	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		3.7	1.5	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.4	11.4	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		6.20	6.53	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.91	2.91	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		6.26	6.30	----	----	----
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		2.07	2.17	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.203	0.213	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		2100	2120	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		2.25	1.72	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		2.18	0.772	----	----	----
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		135	128	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.70	0.71	----	----	----
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 (Matrix: Soil/Solid)					Client sample ID	BA2248-A-11	BA2248-A-12	----	----	----
					Client sampling date / time	30-Nov-2022 09:00	30-Nov-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA22C9609-011	VA22C9609-012	--------	--------	--------
						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		48.2	28.8	----	----	----
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	: **VA22C9609**	Page	: 1 of 17
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	: 06-Dec-2022 13:35
PO	: VANCO 0000051213	Issue Date	: 15-Dec-2022 12:36
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA22C9609-001	BA2248-A-1	antimony	7440-36-0	E440	37.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	arsenic	7440-38-2	E440	47.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	barium	7440-39-3	E440	42.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	beryllium	7440-41-7	E440	0.29 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22C9609-001	BA2248-A-1	bismuth	7440-69-9	E440	55.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	cadmium	7440-43-9	E440	32.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	cobalt	7440-48-4	E440	116 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	nickel	7440-02-0	E440	106 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	phosphorus	7723-14-0	E440	32.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	sulfur	7704-34-9	E440	36.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	tin	7440-31-5	E440	178 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	titanium	7440-32-6	E440	69.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	tungsten	7440-33-7	E440	38.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C9609-001	BA2248-A-1	zinc	7440-66-6	E440	30.2 % 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 BA2248-A-1	E440.Ag	30-Nov-2022	14-Dec-2022	180 days	14 days	✓	15-Dec-2022	166 days	1 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-3	E440.Ag	30-Nov-2022	14-Dec-2022	180 days	14 days	✓	15-Dec-2022	166 days	1 days	✓
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-9	E440.Ag	30-Nov-2022	14-Dec-2022	180 days	14 days	✓	15-Dec-2022	166 days	1 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-1	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-10	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-11	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-12	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 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 BA2248-A-2	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-3	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-4	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-5	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-6	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-7	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-8	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2248-A-9	E510	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	28 days	13 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-1	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-10	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-11	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-12	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-2	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-3	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-4	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-5	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-6	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-7	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-8	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2248-A-9	E440	30-Nov-2022	13-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-1	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-10	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-11	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-12	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-2	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-3	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-4	E144	30-Nov-2022	----	----	----		10-Dec-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 BA2248-A-5	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-6	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-7	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-8	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2248-A-9	E144	30-Nov-2022	----	----	----		10-Dec-2022	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-1	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-10	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-11	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-12	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 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 BA2248-A-2	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-3	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-4	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-5	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-6	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-7	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-8	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2248-A-9	E108	30-Nov-2022	13-Dec-2022	----	----		13-Dec-2022	30 days	13 days	✓
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap BA2248-A-1	E532	30-Nov-2022	08-Dec-2022	30 days	8 days	✓	12-Dec-2022	7 days	4 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) BA2248-A-1	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-10	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-11	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-12	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-2	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-3	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-4	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-5	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-6	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2248-A-7	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-8	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2248-A-9	E512	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	28 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-1	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-10	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-11	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-12	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-2	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-3	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓

Matrix: **Soil/Solid**

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

Analyte Group / Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times 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) BA2248-A-4	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-5	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-6	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-7	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-8	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2248-A-9	E444	08-Dec-2022	14-Dec-2022	----	----		14-Dec-2022	180 days	14 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2248-A-1	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2248-A-10	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2248-A-11	EPP444	30-Nov-2022	08-Dec-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, PFAS)										
BA2248-A-12	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-2	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-3	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-4	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-5	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-6	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-7	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-8	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS)										
BA2248-A-9	EPP444	30-Nov-2022	08-Dec-2022	----	----		----	----	----	

Legend & Qualifier Definitions

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

Quality Control Parameter Frequency Compliance

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

Matrix: **Soil/Solid**

Evaluation: × = *QC frequency outside specification*; ✓ = *QC frequency within specification.*

Quality Control Sample Type			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Hexavalent Chromium (Cr VI) by IC	E532	772584	1	18	5.5	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	774604	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	774605	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	774607	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	774606	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	772584	2	18	11.1	10.0	✓
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	778806	1	3	33.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	774604	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	774605	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	774607	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	774606	1	12	8.3	5.0	✓
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	772584	1	18	5.5	5.0	✓
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	778806	1	3	33.3	5.0	✓
Mercury by CVAAS (TCLP)	E512	777505	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	774604	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	777506	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	774605	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	774607	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	777505	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	777506	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.

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
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.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

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QUALITY CONTROL REPORT

Work Order	: **VA22C9609**	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	: 06-Dec-2022 13:35
PO	: VANCO 0000051213	Date Analysis Commenced	: 08-Dec-2022
C-O-C number	: ----	Issue Date	: 15-Dec-2022 12:36
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
Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Owen Cheng		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: 774606)											
VA22C9609-001	BA2248-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	0.2%	5%	----
Physical Tests (QC Lot: 774607)											
VA22C9609-001	BA2248-A-1	moisture	----	E144	0.25	%	25.5	25.9	1.53%	20%	----
Metals (QC Lot: 774604)											
VA22C9609-001	BA2248-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0972	0.141	0.0436	Diff <2x LOR	----
Metals (QC Lot: 774605)											
VA22C9609-001	BA2248-A-1	aluminum	7429-90-5	E440	50	mg/kg	43600	38500	12.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	146	214	37.5%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	25.6	41.7	47.9%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	535	348	42.5%	40%	DUP-H
		beryllium	7440-41-7	E440	0.10	mg/kg	0.69	# 0.40	0.29	Diff <2x LOR	DUP-H
		bismuth	7440-69-9	E440	0.20	mg/kg	9.18	16.2	55.5%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	233	183	23.7%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	15.7	21.8	32.4%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	136000	162000	17.7%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	207	253	20.1%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	195	51.7	116%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2920	3440	16.5%	30%	----
		iron	7439-89-6	E440	50	mg/kg	73600	56800	25.7%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	488	693	34.6%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	26.0	32.1	21.1%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12200	13900	12.8%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	964	1180	20.0%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	22.5	32.0	34.7%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	146	475	106%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	12500	17200	32.0%	30%	DUP-H
		potassium	7440-09-7	E440	100	mg/kg	6990	7960	13.0%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.56	0.61	0.05	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	18900	19500	3.04%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	341	423	21.5%	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: 774605) - continued											
VA22C9609-001	BA2248-A-1	sulfur	7704-34-9	E440	1000	mg/kg	14700	21200	36.4%	30%	DUP-H
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.070	0.020	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	2790	166	178%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	480	231	69.9%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	48.8	71.7	38.2%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	2.50	3.24	25.7%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	37.5	38.7	3.01%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4030	5460	30.2%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.4	0.7	Diff <2x LOR	----
Speciated Metals (QC Lot: 772584)											
VA22C9609-001	BA2248-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	<0.10	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: 774607)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 774604)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 774605)						
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: 774605) - 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: 778806)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
Speciated Metals (QCLot: 772584)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 777505)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 777506)						
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: 774606)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 774607)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 774604)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 774605)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	112	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	118	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.6	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	101	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	105	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	112	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	105	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	112	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	114	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	109	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	96.3	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	108	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	120	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	106	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: 774605) - continued									
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	109	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.9	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	110	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	114	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	110	80.0	120	----
Metals (QCLot: 778806)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	93.9	80.0	120	----
Speciated Metals (QCLot: 772584)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	87.4	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: 777505)										
VA22C9609-001	BA2248-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.4	50.0	140	----
TCLP Metals (QCLot: 777506)										
VA22C9609-001	BA2248-A-1	antimony, TCLP	7440-36-0	E444	4.94 mg/L	5 mg/L	98.8	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.3 mg/L	5 mg/L	86.7	50.0	140	----
		barium, TCLP	7440-39-3	E444	10.7 mg/L	12.5 mg/L	86.0	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.213 mg/L	0.25 mg/L	85.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	7.94 mg/L	10 mg/L	79.4	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.06 mg/L	1.25 mg/L	84.4	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	2.02 mg/L	2.5 mg/L	80.7	50.0	140	----
		iron, TCLP	7439-89-6	E444	200 mg/L	250 mg/L	79.9	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.53 mg/L	10 mg/L	85.3	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.06 mg/L	2.5 mg/L	82.2	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.43 mg/L	5 mg/L	88.5	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.089 mg/L	0.1 mg/L	88.6	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.3 mg/L	5 mg/L	85.8	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.55 mg/L	5 mg/L	91.0	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.64 mg/L	0.75 mg/L	85.5	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	8 mg/L	10 mg/L	79.7	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: 774604)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----
Metals (QCLot: 774605)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	112	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	130	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	126	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	111	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	127	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	148	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	112	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	128	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	121	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	115	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	120	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	114	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	124	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	123	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	126	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	125	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	116	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	114	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	126	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	128	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	115	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	119	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	114	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	123	70.0	130	----

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report: RM Target Concentration	Reference Material (RM) Report: Recovery (%) RM	Reference Material (RM) Report: Recovery Limits (%) Low	Reference Material (RM) Report: Recovery Limits (%) High	Reference Material (RM) Report: Qualifier
Metals (QCLot: 774605) - continued									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	128	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	126	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	122	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	128	70.0	130	----
Speciated Metals (QCLot: 772584)									
	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	97.8	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)		9609		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
	BA2248-A-1	30-Nov-22	9:00	Soil	X	X		X		X						1
	BA2248-A-2	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-3	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-4	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-5	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-6	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-7	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-8	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-9	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-10	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-11	30-Nov-22	9:00	Soil	X	X				X						1
	BA2248-A-12	30-Nov-22	9:00	Soil	X	X				X						1

Environmental Division
Vancouver
Work Order Reference
VA22C9609

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
	6 Dec-22	0800	CW	Dec 6	1335	17 °C				