

Bottom Ash Data

2022 Week 4

The following analytical report represents bottom ash composite results for week 4 of 2022 (January 23, 2022 to January 29, 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 : **VA22A1913**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000051213
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 11
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 01-Feb-2022 12:00
Date Analysis Commenced : 03-Feb-2022
Issue Date : 10-Feb-2022 09:46

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Greg Pokocky	Team Leader - Inorganics	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, 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).

<i>Unit</i>	<i>Description</i>
%	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					Client sample ID	BA2204-A-1	BA2204-A-2	BA2204-A-3	BA2204-A-4	BA2204-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-001	VA22A1913-002	VA22A1913-003	VA22A1913-004	VA22A1913-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.7	25.6	24.6	25.6	24.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.3	10.4	10.4	10.3	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	45800	41700	43100	38800	33800	
antimony	7440-36-0	E440	0.10	mg/kg	105	150	113	109	118	
arsenic	7440-38-2	E440	0.10	mg/kg	13.3	15.8	17.3	19.4	17.4	
barium	7440-39-3	E440	0.50	mg/kg	616	622	526	623	625	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.34	0.38	0.36	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	5.24	6.30	7.14	6.78	10.8	
boron	7440-42-8	E440	5.0	mg/kg	187	163	154	188	269	
cadmium	7440-43-9	E440	0.020	mg/kg	8.43	9.40	9.38	8.27	11.1	
calcium	7440-70-2	E440	50	mg/kg	117000	129000	129000	127000	132000	
chromium	7440-47-3	E440	0.50	mg/kg	186	127	147	211	172	
cobalt	7440-48-4	E440	0.10	mg/kg	44.3	106	93.0	60.3	72.1	
copper	7440-50-8	E440	0.50	mg/kg	3960	1510	2040	6000	1810	
iron	7439-89-6	E440	50	mg/kg	54700	54200	74600	72700	58000	
lead	7439-92-1	E440	0.50	mg/kg	458	459	390	427	516	
lithium	7439-93-2	E440	2.0	mg/kg	21.6	25.0	25.0	28.0	20.7	
magnesium	7439-95-4	E440	20	mg/kg	13500	11800	12800	12800	13000	
manganese	7439-96-5	E440	1.0	mg/kg	1210	732	1060	1080	1190	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	57.4	67.2	88.3	48.5	64.1	
nickel	7440-02-0	E440	0.50	mg/kg	93.9	100	152	190	188	
phosphorus	7723-14-0	E440	50	mg/kg	10900	13500	13800	13000	12400	
potassium	7440-09-7	E440	100	mg/kg	4450	4700	4670	4460	4940	
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.34	0.43	0.38	0.33	
silver	7440-22-4	E440	0.10	mg/kg	4.65	9.60	6.04	4.16	5.28	
sodium	7440-23-5	E440	50	mg/kg	16300	16800	15600	15200	16200	
strontium	7440-24-6	E440	0.50	mg/kg	300	328	329	396	363	
sulfur	7704-34-9	E440	1000	mg/kg	10400	12000	13700	11200	13000	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2204-A-1	BA2204-A-2	BA2204-A-3	BA2204-A-4	BA2204-A-5
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-001	VA22A1913-002	VA22A1913-003	VA22A1913-004	VA22A1913-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.060	0.058	0.062	0.065	
tin	7440-31-5	E440	2.0	mg/kg	86.0	104	119	171	114	
titanium	7440-32-6	E440	1.0	mg/kg	989	645	636	500	408	
tungsten	7440-33-7	E440	0.50	mg/kg	7.86	11.9	13.8	11.0	12.0	
uranium	7440-61-1	E440	0.050	mg/kg	4.74	5.67	5.84	6.08	6.22	
vanadium	7440-62-2	E440	0.20	mg/kg	45.8	46.9	52.4	46.5	46.1	
zinc	7440-66-6	E440	2.0	mg/kg	2670	3760	4490	3370	4220	
zirconium	7440-67-7	E440	1.0	mg/kg	3.0	2.2	2.5	2.0	1.9	
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	11.4	11.4	11.5	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.03	7.95	6.99	7.04	6.82	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.48	6.49	6.46	6.63	6.47	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.78	1.90	1.93	1.93	1.95	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.121	0.147	0.113	0.115	0.155	
calcium, TCLP	7440-70-2	E444	10	mg/L	2000	2040	2010	2060	2120	
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	1.06	1.45	1.03	0.703	1.01	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.02	0.662	0.889	0.770	0.789	
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	126	126	132	124	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	0.54	0.46	0.44	0.43	0.44	
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	BA2204-A-1	BA2204-A-2	BA2204-A-3	BA2204-A-4	BA2204-A-5
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-001	VA22A1913-002	VA22A1913-003	VA22A1913-004	VA22A1913-005	
					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	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<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	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	63.5	45.6	32.7	26.0	34.7	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<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	BA2204-A-6	BA2204-A-7	BA2204-A-8	BA2204-A-9	BA2204-A-10
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-006	VA22A1913-007	VA22A1913-008	VA22A1913-009	VA22A1913-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	25.5	26.3	25.9	27.1	25.7	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.2	10.6	10.5	10.6	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	43600	47200	34100	35800	32600	
antimony	7440-36-0	E440	0.10	mg/kg	93.9	105	118	112	154	
arsenic	7440-38-2	E440	0.10	mg/kg	13.8	17.4	20.8	18.6	24.8	
barium	7440-39-3	E440	0.50	mg/kg	746	746	736	658	543	
beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.39	0.39	0.34	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	4.41	5.61	5.41	5.90	7.88	
boron	7440-42-8	E440	5.0	mg/kg	174	148	156	152	206	
cadmium	7440-43-9	E440	0.020	mg/kg	6.37	8.52	9.03	14.1	17.3	
calcium	7440-70-2	E440	50	mg/kg	119000	117000	125000	123000	136000	
chromium	7440-47-3	E440	0.50	mg/kg	164	218	278	202	193	
cobalt	7440-48-4	E440	0.10	mg/kg	42.3	415	120	69.2	62.6	
copper	7440-50-8	E440	0.50	mg/kg	1070	4050	2310	1340	11000	
iron	7439-89-6	E440	50	mg/kg	79300	74200	83900	66200	59000	
lead	7439-92-1	E440	0.50	mg/kg	352	364	440	752	639	
lithium	7439-93-2	E440	2.0	mg/kg	18.3	57.4	24.6	28.4	21.8	
magnesium	7439-95-4	E440	20	mg/kg	13700	13100	12800	12400	12300	
manganese	7439-96-5	E440	1.0	mg/kg	777	1160	1400	830	1820	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	58.0	66.7	60.0	63.6	102	
nickel	7440-02-0	E440	0.50	mg/kg	134	260	152	192	184	
phosphorus	7723-14-0	E440	50	mg/kg	10900	11900	10900	11100	13700	
potassium	7440-09-7	E440	100	mg/kg	4200	4860	5680	4830	4950	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.41	0.27	0.28	0.29	
silver	7440-22-4	E440	0.10	mg/kg	5.58	7.70	5.28	6.79	5.46	
sodium	7440-23-5	E440	50	mg/kg	15300	16200	18700	16300	16500	
strontium	7440-24-6	E440	0.50	mg/kg	310	355	360	340	354	
sulfur	7704-34-9	E440	1000	mg/kg	9600	12000	11300	11200	13400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.066	0.058	0.057	0.062	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2204-A-6	BA2204-A-7	BA2204-A-8	BA2204-A-9	BA2204-A-10
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-006	VA22A1913-007	VA22A1913-008	VA22A1913-009	VA22A1913-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	92.6	164	118	157	256	
titanium	7440-32-6	E440	1.0	mg/kg	574	777	572	650	463	
tungsten	7440-33-7	E440	0.50	mg/kg	12.3	17.0	8.50	9.98	14.5	
uranium	7440-61-1	E440	0.050	mg/kg	4.64	5.78	5.73	5.28	6.30	
vanadium	7440-62-2	E440	0.20	mg/kg	49.0	53.3	55.5	50.9	56.0	
zinc	7440-66-6	E440	2.0	mg/kg	4350	4130	3540	3250	3730	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	2.1	1.3	1.4	2.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	11.4	11.4	11.3	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.51	7.51	8.02	6.81	7.20	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.49	6.56	6.22	6.86	6.24	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.08	1.82	1.79	1.94	2.14	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.171	0.240	0.113	0.131	0.062	
calcium, TCLP	7440-70-2	E444	10	mg/L	1990	2050	1950	2130	2060	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.745	1.35	1.09	1.55	1.08	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.194	0.822	0.568	0.608	<0.050	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	6.2	
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	128	126	133	141	126	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.47	0.43	0.41	0.47	0.63	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2204-A-6	BA2204-A-7	BA2204-A-8	BA2204-A-9	BA2204-A-10
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00	26-Jan-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-006	VA22A1913-007	VA22A1913-008	VA22A1913-009	VA22A1913-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	23.9	30.3	55.9	24.0	23.5	23.5
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2204-A-11	BA2204-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	26-Jan-2022 09:00	26-Jan-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-011	VA22A1913-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	26.8	25.3	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.3	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	30200	33800	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	134	179	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	19.8	32.1	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	492	605	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.37	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	6.92	6.64	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	144	172	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	11.9	9.56	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	125000	126000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	154	164	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	52.7	197	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	3040	2490	----	----	----	
iron	7439-89-6	E440	50	mg/kg	70400	66300	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	632	2160	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	19.8	22.5	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12400	13600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	856	2110	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	67.8	68.6	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	150	247	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	13300	11900	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4850	4940	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.28	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.78	6.66	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15500	17400	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	361	336	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13200	12400	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.061	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2204-A-11	BA2204-A-12	----	----	----
Client sampling date / time					26-Jan-2022 09:00	26-Jan-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-011	VA22A1913-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	175	135	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	404	517	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	15.1	11.4	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	6.39	6.30	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	50.1	51.3	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	5010	3570	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.2	1.7	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.75	7.42	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.16	6.35	----	----	----	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	----	----	----	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	----	----	----	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.92	1.85	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.172	0.111	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2020	2040	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	3.53	1.43	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.872	0.654	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	1.57	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	131	120	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.45	0.43	----	----	----	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	----	----	----	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2204-A-11	BA2204-A-12	----	----	----
					Client sampling date / time	26-Jan-2022 09:00	26-Jan-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22A1913-011	VA22A1913-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	43.8	28.6	----	----	----	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA22A1913	Page	: 1 of 15
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 01-Feb-2022 12:00
PO	: VANCO 0000051213	Issue Date	: 10-Feb-2022 09:46
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

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	VA22A1913-001	BA2204-A-1	antimony	7440-36-0	E440	55.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	arsenic	7440-38-2	E440	32.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	bismuth	7440-69-9	E440	68.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	cadmium	7440-43-9	E440	39.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	copper	7440-50-8	E440	34.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	lead	7439-92-1	E440	145 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	manganese	7439-96-5	E440	31.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	nickel	7440-02-0	E440	67.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	silver	7440-22-4	E440	64.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	sulfur	7704-34-9	E440	33.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	tin	7440-31-5	E440	176 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	titanium	7440-32-6	E440	93.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	tungsten	7440-33-7	E440	61.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	uranium	7440-61-1	E440	30.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22A1913-001	BA2204-A-1	zinc	7440-66-6	E440	40.2 % 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-1	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-10	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-11	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-12	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-2	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-3	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-4	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-5	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-6	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-7	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-8	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2204-A-9	E510	26-Jan-2022	05-Feb-2022	----	----		08-Feb-2022	28 days	13 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2204-A-1	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2204-A-10	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2204-A-11	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2204-A-12	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-2	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-3	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-4	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-5	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-6	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-7	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-8	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2204-A-9	E440	26-Jan-2022	05-Feb-2022	----	----		07-Feb-2022	180 days	12 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2204-A-1	E144	26-Jan-2022	----	----	----		04-Feb-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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-10	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-11	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-12	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-2	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-3	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-4	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-5	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-6	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2204-A-7	E144	26-Jan-2022	----	----	----		04-Feb-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2204-A-8	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2204-A-9	E144	26-Jan-2022	----	----	----		04-Feb-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-1	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-10	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-11	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-12	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-2	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-3	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-4	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-5	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-6	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-7	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-8	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2204-A-9	E108	26-Jan-2022	05-Feb-2022	----	----		06-Feb-2022	30 days	11 days	✔	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC											
Glass soil jar/Teflon lined cap BA2204-A-1	E532	26-Jan-2022	03-Feb-2022	30 days	8 days	✔	07-Feb-2022	7 days	4 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2204-A-1	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2204-A-10	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2204-A-11	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	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		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-12	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-2	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-3	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-4	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-5	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-6	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-7	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-8	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	14 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2204-A-9	E512	06-Feb-2022	----	----	----		09-Feb-2022	----	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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-1	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-10	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-11	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-12	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-2	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-3	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-4	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-5	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-6	E444	06-Feb-2022	----	----	----		09-Feb-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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-7	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-8	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2204-A-9	E444	06-Feb-2022	----	----	----		09-Feb-2022	180 days	14 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-1	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-10	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-11	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-12	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-2	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-3	EPP444	26-Jan-2022	06-Feb-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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-4	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-5	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-6	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-7	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-8	EPP444	26-Jan-2022	06-Feb-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2204-A-9	EPP444	26-Jan-2022	06-Feb-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	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Hexavalent Chromium (Cr VI) by IC	E532	401541	1	5	20.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	402669	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	402668	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	402671	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	402670	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	401541	2	5	40.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	402669	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	402668	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	402671	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	402670	1	20	5.0	5.0	✔
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	401541	1	5	20.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	405755	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	402669	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	405756	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	402668	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	402671	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	405755	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	405756	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 $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) 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 HNO_3 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. Elemental Sulfur may be poorly recovered by this method. 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 HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAAS ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Hexavalent Chromium (Cr VI) by IC	E532 Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 HNO ₃ 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.



QUALITY CONTROL REPORT

Work Order : VA22A1913

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000051213
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 01-Feb-2022 12:00
Date Analysis Commenced : 03-Feb-2022
Issue Date : 10-Feb-2022 09:46

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

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
● Matrix Spike (MS) Report; Recovery and Acceptance Limits
● Reference Material (RM) Report; Recovery and Acceptance Limits
● Method Blank (MB) Report; Recovery and Acceptance Limits
● Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Dee Lee (Analyst), Greg Pokocky (Team Leader - Inorganics), Kevin Duarte (Supervisor - Metals ICP Instrumentation), Kim Jensen (Department Manager - Metals), Ophelia Chiu (Department Manager - Organics), and Owen Cheng (Metals).

Page : 2 of 11
Work Order : VA22A1913
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



General Comments

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

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



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: 402670)											
VA22A1913-001	BA2204-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.4	0.6%	5%	----
Physical Tests (QC Lot: 402671)											
VA22A1913-001	BA2204-A-1	moisture	----	E144	0.25	%	24.7	26.1	5.64%	20%	----
Metals (QC Lot: 402668)											
VA22A1913-001	BA2204-A-1	aluminum	7429-90-5	E440	50	mg/kg	45800	30600	39.6%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	105	186	55.8%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	13.3	18.4	32.1%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	616	494	22.0%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.36	0.04	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	5.24	10.7	68.7%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	187	156	18.0%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	8.43	12.5	39.1%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	117000	135000	14.7%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	186	175	5.97%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	44.3	42.1	5.09%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	3960	5620	34.6%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	54700	66000	18.9%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	458	2900	145%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	21.6	24.4	12.1%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	13500	12900	4.12%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1210	888	31.0%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	57.4	77.1	29.3%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	93.9	190	67.5%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	10900	14600	29.3%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4450	4970	11.0%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.42	0.14	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.65	9.09	64.6%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	16300	16000	2.18%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	300	345	14.2%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	10400	14600	33.4%	30%	DUP-H
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.072	0.022	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 402668) - continued											
VA22A1913-001	BA2204-A-1	tin	7440-31-5	E440	2.0	mg/kg	86.0	1380	176%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	989	361	93.1%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	7.86	14.9	61.9%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	4.74	6.42	30.2%	30%	DUP-H
		vanadium	7440-62-2	E440	0.20	mg/kg	45.8	49.2	7.33%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	2670	4020	40.2%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	3.0	2.1	1.0	Diff <2x LOR	----
Metals (QC Lot: 402669)											
VA22A1913-001	BA2204-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 401541)											
RG2200074-008	Anonymous	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: 402671)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 402668)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 402668) - continued						
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 402669)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Speciated Metals (QCLot: 401541)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 405755)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 405756)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 402670)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.8	95.0	105	---
Physical Tests (QCLot: 402671)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 402668)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	100	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.9	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.6	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.0	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	105	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	95.6	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	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	102	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	93.2	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	106	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	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	99.2	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: 402668) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	106	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	103	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	94.1	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	80.0	120	----
Metals (QCLot: 402669)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	97.2	80.0	120	----
Speciated Metals (QCLot: 401541)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	89.5	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 405755)										
VA22A1913-001	BA2204-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	106	50.0	140	----
TCLP Metals (QCLot: 405756)										
VA22A1913-001	BA2204-A-1	antimony, TCLP	7440-36-0	E444	5.9 mg/L	5 mg/L	119	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	107	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.6 mg/L	12.5 mg/L	108	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.6 mg/L	10 mg/L	106	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.266 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	105	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	2.58 mg/L	2.5 mg/L	103	50.0	140	----
		iron, TCLP	7439-89-6	E444	257 mg/L	250 mg/L	103	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.7 mg/L	10 mg/L	107	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	257 mg/L	250 mg/L	103	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.54 mg/L	2.5 mg/L	102	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.31 mg/L	5 mg/L	106	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.120 mg/L	0.1 mg/L	120	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.3 mg/L	5 mg/L	107	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.23 mg/L	5 mg/L	105	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	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	10 mg/L	10 mg/L	103	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 402668)									
QC-402668-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	113	70.0	130	----
QC-402668-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
QC-402668-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
QC-402668-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	107	70.0	130	----
QC-402668-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
QC-402668-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
QC-402668-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-402668-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
QC-402668-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	118	70.0	130	----
QC-402668-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-402668-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-402668-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	108	70.0	130	----
QC-402668-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
QC-402668-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	98.9	70.0	130	----
QC-402668-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	111	70.0	130	----
QC-402668-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	110	70.0	130	----
QC-402668-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
QC-402668-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
QC-402668-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	113	70.0	130	----
QC-402668-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	120	70.0	130	----
QC-402668-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	112	70.0	130	----
QC-402668-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	109	70.0	130	----
QC-402668-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	95.8	40.0	160	----
QC-402668-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	93.7	70.0	130	----
QC-402668-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	128	70.0	130	----
QC-402668-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	113	70.0	130	----
QC-402668-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
QC-402668-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	95.2	70.0	130	----
QC-402668-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	98.9	70.0	130	----

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 Work Order : VA22A1913
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 402669)									
QC-402669-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.4	70.0	130	----
Speciated Metals (QCLot: 401541)									
QC-401541-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	203 mg/kg	81.3	70.0	130	----



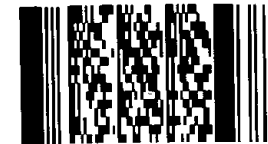
Chain of Custody / Analytical Request Form
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COC # _____

Page _____ of _____

Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard <input type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge <input type="radio"/> Same Day or Weekend Emergency - Contact:	
Contact:	Steve McKinney / Dan Skrypnik	Email 1:	smckinney@covanta.com		
Address:	5150 Riverbend Drive Burnaby BC	Email 2:	rjohnson4@covanta.com		
Phone:	604-521-1025	Fax:			
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		
			brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

**Environmental Division
 Vancouver**
 Work Order Reference
VA22A1913



Telephone : +1 604 253 4188

Invoice To		Client / Project Information		Please indicate below Filtered, Pre	
Same as Report?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Job #:			
Hardcopy of Invoice with Report?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite		
Company:		LSD:	(includes 2:1 pH)		
Contact:					
Address:					
Phone:		Fax:			
		Quote #:			

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis I				Number of Col
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	
BA2204-A-1		26-Jan-22	9:00	Soil	X	X	X	X	1
BA2204-A-2		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-3		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-4		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-5		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-6		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-7		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-8		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-9		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-10		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-11		26-Jan-22	9:00	Soil	X	X		X	1
BA2204-A-12		26-Jan-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)			Observations: Yes / No ? If Yes add SIF
Released by:	Date (dd-mmm-yy):	Time (hh-mm):	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	
<i>[Signature]</i>	1 Feb 22	0900	<i>[Signature]</i>	1 Feb 2022	12 pm	18 °C			