

Bottom Ash Data

2021 Week 3

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on January 25, 2021. The data represents bottom ash composite results for week 3 of 2021 (January 10, 2021 to January 16, 2021).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA21A0969**
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 0000050390
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 : +1 604 253 4188
Date Samples Received : 19-Jan-2021 11:55
Date Analysis Commenced : 22-Jan-2021
Issue Date : 25-Jan-2021 10:56

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>
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Woochan Song	Lab Assistant	Metals, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<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 in reports identified as "Preliminary Report" are considered authorized for use.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2103-A-1	BA2103-A-2	BA2103-A-3	BA2103-A-4	BA2103-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-001	VA21A0969-002	VA21A0969-003	VA21A0969-004	VA21A0969-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	25.9	26.0	26.8	25.0	26.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.1	10.2	9.99	10.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	60200	42600	48600	55000	65700	
antimony	7440-36-0	E440	0.10	mg/kg	174	199	160	169	160	
arsenic	7440-38-2	E440	0.10	mg/kg	21.2	21.6	19.0	19.5	16.7	
barium	7440-39-3	E440	0.50	mg/kg	491	504	368	352	413	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	0.40	0.39	0.33	
bismuth	7440-69-9	E440	0.20	mg/kg	12.6	10.8	13.0	13.4	14.5	
boron	7440-42-8	E440	5.0	mg/kg	280	142	190	164	158	
cadmium	7440-43-9	E440	0.020	mg/kg	14.0	12.1	13.9	17.0	13.1	
calcium	7440-70-2	E440	50	mg/kg	136000	140000	146000	147000	127000	
chromium	7440-47-3	E440	0.50	mg/kg	148	124	150	156	145	
cobalt	7440-48-4	E440	0.10	mg/kg	27.9	28.2	56.4	696	23.6	
copper	7440-50-8	E440	0.50	mg/kg	1160	4960	2510	1820	2670	
iron	7439-89-6	E440	50	mg/kg	37800	55600	38000	47900	41500	
lead	7439-92-1	E440	0.50	mg/kg	417	743	407	434	384	
lithium	7439-93-2	E440	2.0	mg/kg	28.4	18.5	20.7	40.9	21.8	
magnesium	7439-95-4	E440	20	mg/kg	12900	11200	10500	11700	9960	
manganese	7439-96-5	E440	1.0	mg/kg	888	780	745	1290	900	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.0592	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	20.9	794	33.3	22.9	54.7	
nickel	7440-02-0	E440	0.50	mg/kg	114	124	146	627	321	
phosphorus	7723-14-0	E440	50	mg/kg	10800	12700	11200	12100	12500	
potassium	7440-09-7	E440	100	mg/kg	6740	5770	6380	6480	6560	
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.32	0.32	0.42	0.39	
silver	7440-22-4	E440	0.10	mg/kg	4.69	7.78	4.30	4.49	3.84	
sodium	7440-23-5	E440	50	mg/kg	18700	15400	16200	16600	15800	
strontium	7440-24-6	E440	0.50	mg/kg	277	286	325	308	258	
sulfur	7704-34-9	E440	1000	mg/kg	16000	14800	19200	18200	15600	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2103-A-1	BA2103-A-2	BA2103-A-3	BA2103-A-4	BA2103-A-5
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-001	VA21A0969-002	VA21A0969-003	VA21A0969-004	VA21A0969-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.079	<0.050	0.071	0.064	0.059	
tin	7440-31-5	E440	2.0	mg/kg	580	119	125	202	172	
titanium	7440-32-6	E440	1.0	mg/kg	928	674	476	358	633	
tungsten	7440-33-7	E440	0.50	mg/kg	7.46	6.80	5.86	5.85	5.17	
uranium	7440-61-1	E440	0.050	mg/kg	4.05	3.64	4.30	4.36	4.08	
vanadium	7440-62-2	E440	0.20	mg/kg	60.2	83.4	59.9	84.5	67.2	
zinc	7440-66-6	E440	2.0	mg/kg	7130	4230	13000	5230	3710	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	1.2	2.7	3.5	3.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.1	11.2	11.1	11.2	11.1	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.89	8.97	8.93	9.01	9.06	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90	
pH, TCLP final	----	EPP444	0.010	pH units	6.32	6.39	6.39	6.44	6.44	
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	2.16	2.21	2.16	2.17	2.14	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.235	0.230	0.263	0.248	0.231	
calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2230	2170	2120	2190	
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	0.735	0.624	0.794	1.35	0.803	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.28	1.10	1.53	1.19	1.24	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	1.36	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	143	133	133	136	136	
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	0.60	0.47	0.46	0.52	0.53	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2103-A-1	BA2103-A-2	BA2103-A-3	BA2103-A-4	BA2103-A-5
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-001	VA21A0969-002	VA21A0969-003	VA21A0969-004	VA21A0969-005	
					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	73.3	58.4	57.8	42.2	48.7	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2103-A-6	BA2103-A-7	BA2103-A-8	BA2103-A-9	BA2103-A-10
(Matrix: Soil/Solid)					Client sampling date / time	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-006	VA21A0969-007	VA21A0969-008	VA21A0969-009	VA21A0969-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	26.9	26.1	25.9	27.1	28.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	9.95	10.0	9.99	10.1	10.1	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	40600	40900	42100	43400	41600	
antimony	7440-36-0	E440	0.10	mg/kg	198	220	223	188	222	
arsenic	7440-38-2	E440	0.10	mg/kg	24.9	27.0	21.0	21.8	21.8	
barium	7440-39-3	E440	0.50	mg/kg	343	324	351	420	350	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.35	0.39	0.36	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	15.4	24.6	16.0	31.9	13.3	
boron	7440-42-8	E440	5.0	mg/kg	167	184	209	178	185	
cadmium	7440-43-9	E440	0.020	mg/kg	18.3	18.3	22.9	20.9	16.4	
calcium	7440-70-2	E440	50	mg/kg	151000	150000	151000	152000	153000	
chromium	7440-47-3	E440	0.50	mg/kg	172	177	554	162	156	
cobalt	7440-48-4	E440	0.10	mg/kg	193	22.6	63.1	31.2	39.1	
copper	7440-50-8	E440	0.50	mg/kg	9550	1960	2290	2120	2740	
iron	7439-89-6	E440	50	mg/kg	59900	44100	51300	63300	40000	
lead	7439-92-1	E440	0.50	mg/kg	494	1020	596	645	456	
lithium	7439-93-2	E440	2.0	mg/kg	23.8	24.8	29.7	25.8	22.8	
magnesium	7439-95-4	E440	20	mg/kg	10700	11000	11000	11400	10400	
manganese	7439-96-5	E440	1.0	mg/kg	832	740	712	1000	726	
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	26.7	27.1	39.2	27.9	23.9	
nickel	7440-02-0	E440	0.50	mg/kg	176	128	532	137	283	
phosphorus	7723-14-0	E440	50	mg/kg	10200	11500	10800	10500	10300	
potassium	7440-09-7	E440	100	mg/kg	7380	7270	7090	6900	6260	
selenium	7782-49-2	E440	0.20	mg/kg	0.49	0.52	0.51	0.47	0.47	
silver	7440-22-4	E440	0.10	mg/kg	6.14	5.39	11.1	6.02	4.75	
sodium	7440-23-5	E440	50	mg/kg	16400	16500	16400	17000	15100	
strontium	7440-24-6	E440	0.50	mg/kg	322	312	318	293	304	
sulfur	7704-34-9	E440	1000	mg/kg	21800	20800	20000	18500	19400	
thallium	7440-28-0	E440	0.050	mg/kg	0.066	0.069	0.069	0.071	0.069	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2103-A-6	BA2103-A-7	BA2103-A-8	BA2103-A-9	BA2103-A-10
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-006	VA21A0969-007	VA21A0969-008	VA21A0969-009	VA21A0969-010
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E440	2.0	mg/kg	161	188	177	540	172
titanium	7440-32-6	E440	1.0	mg/kg	513	394	498	536	536
tungsten	7440-33-7	E440	0.50	mg/kg	7.93	9.68	9.40	7.35	8.20
uranium	7440-61-1	E440	0.050	mg/kg	4.89	5.32	4.94	4.66	4.69
vanadium	7440-62-2	E440	0.20	mg/kg	89.3	72.0	78.6	68.4	69.4
zinc	7440-66-6	E440	2.0	mg/kg	6290	5930	5840	5670	5090
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.0	1.2	1.3	1.7
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.1	11.2	11.1	11.2
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.15	9.01	8.65	8.58	7.34
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units	6.70	6.29	6.43	6.44	6.35
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	2.21	2.06	2.23	2.37	2.25
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.268	0.219	0.258	0.230	0.233
calcium, TCLP	7440-70-2	E444	10	mg/L	2250	2030	2140	2360	2240
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	1.36	1.27	1.60	0.933	1.62
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.00	1.26	0.865	1.09	1.22
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	0.37	0.30	<0.25	1.35	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	132	136	138	135	138
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.43	0.48	0.52	0.46	0.58
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
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2103-A-6	BA2103-A-7	BA2103-A-8	BA2103-A-9	BA2103-A-10
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00	13-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-006	VA21A0969-007	VA21A0969-008	VA21A0969-009	VA21A0969-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	43.1	59.7	47.9	50.2	63.9	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2103-A-11	BA2103-A-12	----	----	----
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-011	VA21A0969-012	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
moisture	----	E144	0.25	%	26.7	25.2	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	10.0	10.1	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	42200	43400	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	205	209	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	22.9	24.4	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	305	310	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.38	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	16.2	16.6	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	197	186	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	18.5	18.9	----	----	----
calcium	7440-70-2	E440	50	mg/kg	153000	160000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	165	149	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	58.3	71.2	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	4490	1990	----	----	----
iron	7439-89-6	E440	50	mg/kg	48700	33600	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	1820	646	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	27.9	22.3	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	10800	11600	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	744	696	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	27.2	30.4	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	157	135	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	12900	11500	----	----	----
potassium	7440-09-7	E440	100	mg/kg	8240	7320	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.54	0.52	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	6.72	6.68	----	----	----
sodium	7440-23-5	E440	50	mg/kg	17800	16800	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	327	390	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	19900	21100	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.066	0.069	----	----	----



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2103-A-11	BA2103-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-011	VA21A0969-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
Metals										
tin	7440-31-5	E440	2.0	mg/kg	241	189	----	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	337	402	----	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	7.36	9.14	----	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	4.80	5.08	----	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	67.2	98.1	----	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	7720	6310	----	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	2.0	----	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.1	11.2	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	4.40	7.83	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	----	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.30	6.02	----	----	----	----
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	2.27	2.11	----	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.225	0.298	----	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	2230	2110	----	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.805	0.528	----	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.25	2.52	----	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.35	<0.25	----	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	138	139	----	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.52	0.46	----	----	----	----
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	----	----	----	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	----



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2103-A-11	BA2103-A-12	----	----	----
Client sampling date / time					13-Jan-2021 09:00	13-Jan-2021 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA21A0969-011	VA21A0969-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	54.2	70.0	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA21A0969	Page	: 1 of 16
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 19-Jan-2021 11:55
PO	: VANCO 0000050390	Issue Date	: 25-Jan-2021 10:56
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	VA21A0969-001	BA2103-A-1	boron	7440-42-8	E440	59.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	chromium	7440-47-3	E440	43.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	cobalt	7440-48-4	E440	102 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	copper	7440-50-8	E440	54.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	lead	7439-92-1	E440	75.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	silver	7440-22-4	E440	83.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	tin	7440-31-5	E440	85.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	titanium	7440-32-6	E440	62.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	zinc	7440-66-6	E440	53.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A0969-001	BA2103-A-1	zirconium	7440-67-7	E440	2.6 % DUP-H, J	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.



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 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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 BA2103-A-1	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-10	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-11	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-12	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-2	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-3	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-4	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✓	23-Jan-2021	18 days	0 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 BA2103-A-5	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✔	23-Jan-2021	18 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-6	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✔	23-Jan-2021	18 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-7	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✔	23-Jan-2021	18 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-8	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✔	23-Jan-2021	18 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2103-A-9	E510	13-Jan-2021	23-Jan-2021	28 days	9 days	✔	23-Jan-2021	18 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2103-A-1	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2103-A-10	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2103-A-11	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2103-A-12	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 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 ICMS											
LDPE bag BA2103-A-2	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-3	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-4	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-5	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-6	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-7	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-8	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2103-A-9	E440	13-Jan-2021	23-Jan-2021	180 days	9 days	✔	23-Jan-2021	170 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2103-A-1	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----		



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 BA2103-A-10	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-11	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-12	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-2	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-3	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-4	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-5	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-6	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-7	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	



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 Actual		Eval	Analysis Date	Holding Times Rec Actual		Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-8	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2103-A-9	E144	13-Jan-2021	----	----	----		22-Jan-2021	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-1	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-10	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-11	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-12	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-2	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-3	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2103-A-4	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✔	24-Jan-2021	20 days	1 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 BA2103-A-5	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✓	24-Jan-2021	20 days	1 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2103-A-6	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✓	24-Jan-2021	20 days	1 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2103-A-7	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✓	24-Jan-2021	20 days	1 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2103-A-8	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✓	24-Jan-2021	20 days	1 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2103-A-9	E108	13-Jan-2021	23-Jan-2021	30 days	9 days	✓	24-Jan-2021	20 days	1 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-1	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-10	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-11	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-12	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-2	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-3	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-4	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-5	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-6	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-7	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-8	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2103-A-9	E512	22-Jan-2021	----	----	----		24-Jan-2021	37 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2103-A-1	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 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 Rec Actual		Eval	Analysis Date	Holding Times Rec Actual		Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-10	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-11	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-12	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-2	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-3	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-4	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-5	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-6	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-7	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-8	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2103-A-9	E444	22-Jan-2021	----	----	----		24-Jan-2021	189 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-1	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-10	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-11	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-12	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-2	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-3	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-4	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----	



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) BA2103-A-5	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-6	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-7	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-8	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2103-A-9	EPP444	13-Jan-2021	22-Jan-2021	----	----		----	----	----		

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)							
Mercury in Soil/Solid by CVAAS	E510	143649	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	143648	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	143651	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	143650	1	14	7.1	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	143649	2	14	14.2	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	143648	2	14	14.2	10.0	✔
Moisture Content by Gravimetry	E144	143651	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	143650	1	14	7.1	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	144387	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	143649	1	14	7.1	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	144386	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	143648	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	143651	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	144387	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	144386	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)	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. 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 HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$) 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 HNO_3 and HCl . This method is intended to liberate metals that may be environmentally available.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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 : VA21A0969

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 0000050390
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 : +1 604 253 4188
Date Samples Received : 19-Jan-2021 11:55
Date Analysis Commenced : 22-Jan-2021
Issue Date : 25-Jan-2021 10:56

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 Cristina Alexandre (Supervisor - Metals ICP Instrumentation), Dee Lee (Analyst), Janice Leung (Supervisor - Organics Extractions), and Woochan Song (Lab Assistant).

Page : 2 of 11
Work Order : VA21A0969
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: 143650)											
VA21A0969-001	BA2103-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.2	10.2	0.685%	5%	----
Physical Tests (QC Lot: 143651)											
VA21A0969-001	BA2103-A-1	moisture	----	E144	0.25	%	25.9	25.9	0.280%	20%	----
Metals (QC Lot: 143648)											
VA21A0969-001	BA2103-A-1	aluminum	7429-90-5	E440	50	mg/kg	60200	60400	0.353%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	174	163	6.25%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	21.2	19.9	5.90%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	491	474	3.67%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.39	0.003	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	12.6	11.2	11.7%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	280	152	59.2%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	14.0	12.3	13.0%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	136000	135000	1.14%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	148	230	43.8%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	27.9	86.0	102%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1160	2040	54.8%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	37800	45100	17.7%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	417	927	75.8%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	28.4	31.5	10.4%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12900	9810	27.1%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	888	971	8.83%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	20.9	25.4	19.3%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	114	130	12.9%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10800	9790	9.94%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6740	6280	7.07%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.40	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.69	11.4	83.1%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	18700	15200	20.5%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	277	325	15.8%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	16000	16200	0.982%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.079	0.066	0.012	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: 143648) - continued											
VA21A0969-001	BA2103-A-1	tin	7440-31-5	E440	2.0	mg/kg	580	233	85.3%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	928	1760	62.0%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	7.46	8.23	9.73%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.05	4.06	0.242%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	60.2	60.2	0.144%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	7130	4110	53.8%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	2.4	# 5.0	2.6	Diff <2x LOR	DUP-H,J
Metals (QC Lot: 143649)											
VA21A0969-001	BA2103-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
J	Duplicate results and limits are expressed in terms of absolute difference.



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: 143651)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 143648)						
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: 143648) - 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: 143649)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 144386)						
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	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
TCLP Metals (QCLot: 144387)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 143650)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.8	95.0	105	---
Physical Tests (QCLot: 143651)									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
Metals (QCLot: 143648)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	96.4	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	94.1	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.2	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.3	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	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	101	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.1	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.7	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.6	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	99.2	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	101	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.6	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	98.0	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.2	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	110	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	103	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	97.2	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.0	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.6	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.4	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	97.5	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: 143648) - 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	104	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.9	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.0	80.0	120	----
Metals (QCLot: 143649)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.8	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 $\geq 1 \times$ 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: 144386)										
VA21A0969-001	BA2103-A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	100.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.8 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.244 mg/L	0.25 mg/L	97.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.83 mg/L	10 mg/L	88.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.249 mg/L	0.25 mg/L	99.6	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.24 mg/L	1.25 mg/L	99.2	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	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	250 mg/L	250 mg/L	100	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.1 mg/L	10 mg/L	101	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.3	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.44 mg/L	2.5 mg/L	97.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.16 mg/L	5 mg/L	103	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.119 mg/L	0.1 mg/L	119	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.8	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	102	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 144387)										
VA21A0969-001	BA2103-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.5	50.0	140	----



Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

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: 143648)									
QC-143648-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	108	70.0	130	----
QC-143648-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	99.1	70.0	130	----
QC-143648-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	92.7	70.0	130	----
QC-143648-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	----
QC-143648-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
QC-143648-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
QC-143648-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	99.7	70.0	130	----
QC-143648-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
QC-143648-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
QC-143648-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	98.5	70.0	130	----
QC-143648-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	99.5	70.0	130	----
QC-143648-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	97.9	70.0	130	----
QC-143648-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-143648-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	107	70.0	130	----
QC-143648-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	99.6	70.0	130	----
QC-143648-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	101	70.0	130	----
QC-143648-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
QC-143648-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	98.4	70.0	130	----
QC-143648-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	103	70.0	130	----
QC-143648-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
QC-143648-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	99.9	70.0	130	----
QC-143648-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
QC-143648-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	102	40.0	160	----
QC-143648-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	93.8	70.0	130	----
QC-143648-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	120	70.0	130	----
QC-143648-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	112	70.0	130	----
QC-143648-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	106	70.0	130	----
QC-143648-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	94.0	70.0	130	----
QC-143648-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	103	70.0	130	----

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 Work Order : VA21A0969
 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: 143649)									
QC-143649-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.9	70.0	130	----

