

Bottom Ash Data

2020 Week 38

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on October 15, 2020. The data represents bottom ash composite results for week 38 of 2020 (September 13, 2020 to September 19, 2020).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA20B6049**
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 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 14
No. of samples analysed : 14

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 : 23-Sep-2020 12:20
Date Analysis Commenced : 01-Oct-2020
Issue Date : 15-Oct-2020 09:45

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>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

<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	BA2038-A-1	BA2038-A-2	BA2038-A-3	BA2038-A-4	BA2038-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-001	VA20B6049-002	VA20B6049-003	VA20B6049-004	VA20B6049-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.5	21.3	23.1	21.0	22.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.8	10.7	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38100	38100	31900	30700	35500	
antimony	7440-36-0	E440	0.10	mg/kg	160	145	163	150	166	
arsenic	7440-38-2	E440	0.10	mg/kg	35.5	37.0	39.8	36.0	38.3	
barium	7440-39-3	E440	0.50	mg/kg	506	387	445	452	494	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	0.37	0.43	0.51	
bismuth	7440-69-9	E440	0.20	mg/kg	15.2	12.3	33.2	14.4	13.4	
boron	7440-42-8	E440	5.0	mg/kg	201	200	208	272	205	
cadmium	7440-43-9	E440	0.020	mg/kg	16.0	15.4	13.6	14.0	12.8	
calcium	7440-70-2	E440	50	mg/kg	124000	136000	131000	135000	130000	
chromium	7440-47-3	E440	0.50	mg/kg	273	190	154	195	192	
cobalt	7440-48-4	E440	0.10	mg/kg	27.6	678	196	36.0	30.7	
copper	7440-50-8	E440	0.50	mg/kg	17600	3240	8480	1860	23900	
iron	7439-89-6	E440	50	mg/kg	76600	59000	59100	56500	59700	
lead	7439-92-1	E440	0.50	mg/kg	867	1160	326	2140	726	
lithium	7439-93-2	E440	2.0	mg/kg	21.6	24.1	19.9	18.5	16.7	
magnesium	7439-95-4	E440	20	mg/kg	10100	10600	12200	10800	11200	
manganese	7439-96-5	E440	1.0	mg/kg	892	797	760	768	734	
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	77.6	17.0	20.7	21.1	19.3	
nickel	7440-02-0	E440	0.50	mg/kg	382	130	108	138	161	
phosphorus	7723-14-0	E440	50	mg/kg	8960	10000	9750	9500	9220	
potassium	7440-09-7	E440	100	mg/kg	5550	6160	5730	6370	6220	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.44	0.62	0.43	0.59	
silver	7440-22-4	E440	0.10	mg/kg	15.2	12.0	10.5	7.99	8.38	
sodium	7440-23-5	E440	50	mg/kg	12600	14800	13600	14700	15600	
strontium	7440-24-6	E440	0.50	mg/kg	258	275	278	284	287	
sulfur	7704-34-9	E440	1000	mg/kg	15700	16200	15900	16300	16200	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2038-A-1	BA2038-A-2	BA2038-A-3	BA2038-A-4	BA2038-A-5
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-001	VA20B6049-002	VA20B6049-003	VA20B6049-004	VA20B6049-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.076	0.062	0.057	0.072	0.067	
tin	7440-31-5	E440	2.0	mg/kg	222	160	140	141	122	
titanium	7440-32-6	E440	1.0	mg/kg	898	287	491	462	630	
tungsten	7440-33-7	E440	0.50	mg/kg	5.73	3.80	6.79	5.29	4.39	
uranium	7440-61-1	E440	0.050	mg/kg	4.75	5.12	5.44	5.17	5.51	
vanadium	7440-62-2	E440	0.20	mg/kg	62.3	68.6	57.8	57.2	68.9	
zinc	7440-66-6	E440	2.0	mg/kg	14700	5000	5060	4600	9430	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	2.3	1.1	1.2	1.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.5	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	6.63	8.94	9.66	7.74	6.88	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.21	6.35	6.26	6.25	6.40	
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	2.30	2.28	2.42	2.43	2.26	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.161	0.610	0.199	0.199	0.168	
calcium, TCLP	7440-70-2	E444	10	mg/L	1910	1940	1970	2060	1940	
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	0.656	0.434	0.348	0.424	0.639	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.075	0.940	0.747	0.824	0.694	
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	0.34	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	124	130	131	134	134	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.54	0.50	0.45	0.55	0.48	
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	BA2038-A-1	BA2038-A-2	BA2038-A-3	BA2038-A-4	BA2038-A-5
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-001	VA20B6049-002	VA20B6049-003	VA20B6049-004	VA20B6049-005	
					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	32.9	52.2	34.7	39.5	34.0	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2038-A-6	BA2038-A-7	BA2038-A-8	BA2038-A-9	BA2038-A-10
(Matrix: Soil/Solid)										
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-006	VA20B6049-007	VA20B6049-008	VA20B6049-009	VA20B6049-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	22.3	24.1	22.7	22.6	20.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	10.8	10.8	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31000	38000	36600	35600	39200	
antimony	7440-36-0	E440	0.10	mg/kg	150	165	266	169	156	
arsenic	7440-38-2	E440	0.10	mg/kg	35.7	45.0	38.5	38.3	39.2	
barium	7440-39-3	E440	0.50	mg/kg	483	528	527	461	406	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.37	0.37	0.35	0.42	
bismuth	7440-69-9	E440	0.20	mg/kg	12.5	13.3	152	11.2	12.2	
boron	7440-42-8	E440	5.0	mg/kg	202	416	193	203	262	
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	13.0	12.4	13.5	13.2	
calcium	7440-70-2	E440	50	mg/kg	127000	134000	124000	125000	140000	
chromium	7440-47-3	E440	0.50	mg/kg	165	521	276	208	152	
cobalt	7440-48-4	E440	0.10	mg/kg	86.1	26.2	43.7	89.7	36.0	
copper	7440-50-8	E440	0.50	mg/kg	4130	2720	3720	2340	1400	
iron	7439-89-6	E440	50	mg/kg	68100	51300	60000	64100	54200	
lead	7439-92-1	E440	0.50	mg/kg	592	362	9100	1960	826	
lithium	7439-93-2	E440	2.0	mg/kg	16.0	18.9	18.1	15.4	19.2	
magnesium	7439-95-4	E440	20	mg/kg	12000	11700	10500	10200	11300	
manganese	7439-96-5	E440	1.0	mg/kg	808	1310	723	682	746	
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	22.6	19.3	27.8	30.2	26.1	
nickel	7440-02-0	E440	0.50	mg/kg	111	126	215	241	175	
phosphorus	7723-14-0	E440	50	mg/kg	9100	11100	9500	9300	9610	
potassium	7440-09-7	E440	100	mg/kg	5770	6350	5760	5750	6100	
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.50	0.44	0.42	0.63	
silver	7440-22-4	E440	0.10	mg/kg	9.82	8.27	8.74	8.14	10.7	
sodium	7440-23-5	E440	50	mg/kg	14400	15300	14400	13700	15200	
strontium	7440-24-6	E440	0.50	mg/kg	397	298	290	260	306	
sulfur	7704-34-9	E440	1000	mg/kg	14700	16400	15400	15100	16700	
thallium	7440-28-0	E440	0.050	mg/kg	0.065	0.060	0.105	0.069	0.061	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2038-A-6	BA2038-A-7	BA2038-A-8	BA2038-A-9	BA2038-A-10
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-006	VA20B6049-007	VA20B6049-008	VA20B6049-009	VA20B6049-010
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E440	2.0	mg/kg	114	131	177	138	634
titanium	7440-32-6	E440	1.0	mg/kg	387	526	922	627	370
tungsten	7440-33-7	E440	0.50	mg/kg	4.47	4.52	5.26	6.45	4.17
uranium	7440-61-1	E440	0.050	mg/kg	4.71	5.48	5.13	4.89	5.59
vanadium	7440-62-2	E440	0.20	mg/kg	58.4	58.5	59.5	56.0	68.4
zinc	7440-66-6	E440	2.0	mg/kg	4800	4240	5750	4520	4230
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.8	1.2	1.3	1.8
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.4	11.4	11.5
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.06	8.22	8.50	8.93	8.59
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444	0.010	pH units	6.04	6.00	5.98	6.07	6.06
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	2.47	2.55	2.42	2.31	2.46
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.537	0.465	0.226	0.217	0.240
calcium, TCLP	7440-70-2	E444	10	mg/L	2100	2140	2090	2050	2150
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	1.49	0.720	0.769	0.501	0.951
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.31	1.08	1.43	0.635	1.14
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	0.29	<0.25	<0.25	0.27
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	148	147	142	137	138
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.53	0.61	0.71	0.71	0.58
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
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	BA2038-A-6	BA2038-A-7	BA2038-A-8	BA2038-A-9	BA2038-A-10
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-006	VA20B6049-007	VA20B6049-008	VA20B6049-009	VA20B6049-010	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	52.0	72.8	52.2	49.4	74.0	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2038-A-11	BA2038-A-12	BA2038-A-2 REP1	BA2038-A-2 REP2	----
(Matrix: Soil/Solid)					Client sampling date / time	16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020	16-Sep-2020	----
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-011	VA20B6049-012	VA20B6049-013	VA20B6049-014	-----	
					Result	Result	Result	Result	---	
Physical Tests										
moisture	----	E144	0.25	%	23.5	22.8	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.9	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	33500	33400	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	159	176	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	37.8	39.6	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	414	426	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.38	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	13.2	11.9	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	312	305	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	16.9	13.9	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	129000	133000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	156	342	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	34.0	33.9	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	3340	8660	----	----	----	
iron	7439-89-6	E440	50	mg/kg	44200	62200	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	524	412	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	16.0	19.7	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10600	12600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	678	1230	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.9	22.3	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	166	208	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	8910	11100	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	6200	6170	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	3.11	0.81	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	8.21	7.71	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14700	15100	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	285	280	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	16200	15500	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.058	0.058	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2038-A-11	BA2038-A-12	BA2038-A-2 REP1	BA2038-A-2 REP2	----
Client sampling date / time						16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020	16-Sep-2020	----
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-011	VA20B6049-012	VA20B6049-013	VA20B6049-014	-----	
					Result	Result	Result	Result	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	226	275	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	591	416	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	4.38	5.83	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.38	5.20	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	54.5	63.0	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	5210	4590	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.5	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	11.5	11.5	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.00	8.80	9.66	9.66	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.91	2.91	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.32	5.90	6.10	6.15	----	
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	2.37	2.61	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.211	0.258	0.213	0.231	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1920	2270	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.349	0.788	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.987	0.902	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	124	147	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.49	0.77	----	----	----	
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	----	----	----	
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	BA2038-A-11	BA2038-A-12	BA2038-A-2 REP1	BA2038-A-2 REP2	----
Client sampling date / time					16-Sep-2020 09:00	16-Sep-2020 09:00	16-Sep-2020	16-Sep-2020	----	
Analyte	CAS Number	Method	LOR	Unit	VA20B6049-011	VA20B6049-012	VA20B6049-013	VA20B6049-014	-----	
TCLP Metals					Result	Result	Result	Result	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	41.4	69.9	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B6049	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	: 23-Sep-2020 12:20
PO	: VANCO 0000049378	Issue Date	: 15-Oct-2020 09:45
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 14		
No. of samples analysed	: 14		

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	VA20B6049-001	BA2038-A-1	bismuth	7440-69-9	E440	109 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B6049-001	BA2038-A-1	cobalt	7440-48-4	E440	148 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B6049-001	BA2038-A-1	copper	7440-50-8	E440	147 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B6049-001	BA2038-A-1	molybdenum	7439-98-7	E440	107 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B6049-001	BA2038-A-1	selenium	7782-49-2	E440	0.65 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA20B6049-001	BA2038-A-1	silver	7440-22-4	E440	63.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B6049-001	BA2038-A-1	zinc	7440-66-6	E440	96.4 % 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 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 BA2038-A-1	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-10	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-11	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-12	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-2	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-3	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-4	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✓	03-Oct-2020	11 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 BA2038-A-5	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✔	03-Oct-2020	11 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-6	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✔	03-Oct-2020	11 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-7	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✔	03-Oct-2020	11 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-8	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✔	03-Oct-2020	11 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2038-A-9	E510	16-Sep-2020	03-Oct-2020	28 days	16 days	✔	03-Oct-2020	11 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2038-A-1	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2038-A-10	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2038-A-11	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2038-A-12	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 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 BA2038-A-2	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-3	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-4	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-5	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-6	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-7	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-8	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2038-A-9	E440	16-Sep-2020	03-Oct-2020	180 days	16 days	✔	03-Oct-2020	163 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2038-A-1	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----		



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 BA2038-A-10	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-11	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-12	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-2	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-3	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-4	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-5	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-6	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2038-A-7	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----	



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 BA2038-A-8	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2038-A-9	E144	16-Sep-2020	----	----	----		02-Oct-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-1	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-10	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-11	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-12	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-2	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-3	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-4	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-5	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-6	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-7	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-8	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2038-A-9	E108	16-Sep-2020	03-Oct-2020	30 days	16 days	✔	03-Oct-2020	13 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-1	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-10	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-11	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-12	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-2	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-3	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-4	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-5	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-6	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-7	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-8	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2038-A-9	E512	01-Oct-2020	----	----	----		03-Oct-2020	0 days	0 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-1	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 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 (lab preserved) BA2038-A-10	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-11	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-12	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-2	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-3	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-4	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-5	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-6	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2038-A-7	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 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 (lab preserved) BA2038-A-8	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2038-A-9	E444	01-Oct-2020	----	----	----		03-Oct-2020	195 days	17 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2038-A-2 REP1	E444	10-Oct-2020	----	----	----		14-Oct-2020	203 days	28 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2038-A-2 REP2	E444	10-Oct-2020	----	----	----		14-Oct-2020	203 days	28 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-1	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-10	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-11	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-12	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-2	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	



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: 14 day HT (e.g. CN, SVOC, NOx) BA2038-A-2 REP1	EPP444	16-Sep-2020	10-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 14 day HT (e.g. CN, SVOC, NOx) BA2038-A-2 REP2	EPP444	16-Sep-2020	10-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-3	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-4	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-5	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-6	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-7	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-8	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2038-A-9	EPP444	16-Sep-2020	01-Oct-2020	----	----		----	----	----	

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	96061	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	96062	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	96064	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	96063	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	96061	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	96062	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	96064	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	96063	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	96673	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	96061	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	102234	2	14	14.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	96062	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	96064	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	96673	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	102234	2	14	14.2	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	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 : VA20B6049

Page : 1 of 13

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 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 14
No. of samples analysed : 14

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 : 23-Sep-2020 12:20
Date Analysis Commenced : 01-Oct-2020
Issue Date : 15-Oct-2020 09:45

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 Angela Ren (Team Leader - Metals), Brianna Allen (Department Manager - Organics), Dee Lee (Analyst), Robin Weeks (Team Leader - Metals), and Shaneel Dayal (Analyst).

Page : 2 of 13
Work Order : VA20B6049
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: 96063)											
VA20B6049-001	BA2038-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.278%	5%	----
Physical Tests (QC Lot: 96064)											
VA20B6049-001	BA2038-A-1	moisture	----	E144	0.25	%	20.5	23.2	12.3%	20%	----
Metals (QC Lot: 96061)											
VA20B6049-001	BA2038-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 96062)											
VA20B6049-001	BA2038-A-1	aluminum	7429-90-5	E440	50	mg/kg	38100	32800	14.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	160	147	8.50%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	35.5	38.7	8.57%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	506	426	17.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.41	0.04	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	15.2	51.8	109%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	201	216	7.45%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	16.0	13.3	18.5%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	124000	130000	4.97%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	273	254	7.38%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	27.6	187	148%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	17600	2690	147%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	76600	59400	25.3%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	867	1010	15.3%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	21.6	17.7	20.2%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	10100	12100	17.8%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	892	732	19.7%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	77.6	23.6	107%	40%	DUP-H
		nickel	7440-02-0	E440	0.50	mg/kg	382	446	15.3%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	8960	9740	8.27%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5550	5910	6.37%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.43	# 1.08	0.65	Diff <2x LOR	DUP-H
		silver	7440-22-4	E440	0.10	mg/kg	15.2	7.89	63.2%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	12600	14500	13.7%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	258	271	5.04%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	15700	17000	8.02%	30%	----



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: 96062) - continued											
VA20B6049-001	BA2038-A-1	thallium	7440-28-0	E440	0.050	mg/kg	0.076	0.065	0.011	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	222	185	18.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	898	610	38.3%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	5.73	6.48	12.3%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.75	5.45	13.6%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	62.3	59.5	4.57%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	14700	5150	96.4%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	<1.0	0.2	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: 96064)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 96061)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 96062)						
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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 96062) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 102234)						
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: 96672)						
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	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 96672) - continued						
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: 96673)						
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: 96063)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	101	95.0	105	----
Physical Tests (QCLot: 96064)									
moisture	----	E144	0.25	%	50 %	97.1	90.0	110	----
Metals (QCLot: 96061)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.0	80.0	120	----
Metals (QCLot: 96062)									
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	104	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.8	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.2	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.2	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	102	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.9	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.7	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.8	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	95.0	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	97.2	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.9	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	97.9	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	101	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	99.8	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.4	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	108	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Metals (QCLot: 96062) - continued									
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	95.9	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	105	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	107	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	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	91.7	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ 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: 102234)										
VA20B6049-013	BA2038-A-2 REP1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	98.9	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.5 mg/L	5 mg/L	89.9	50.0	140	----
		barium, TCLP	7440-39-3	E444	10.7 mg/L	12.5 mg/L	85.6	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.219 mg/L	0.25 mg/L	87.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.35 mg/L	10 mg/L	83.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.233 mg/L	0.25 mg/L	93.3	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	1.20 mg/L	1.25 mg/L	96.2	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	2.24 mg/L	2.5 mg/L	89.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	224 mg/L	250 mg/L	89.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.90 mg/L	10 mg/L	89.0	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	258 mg/L	250 mg/L	103	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.31 mg/L	2.5 mg/L	92.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.49 mg/L	5 mg/L	89.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	90.8	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.6	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 96672)										
VA20B6049-001	BA2038-A-1	antimony, TCLP	7440-36-0	E444	4.7 mg/L	5 mg/L	93.3	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.1 mg/L	12.5 mg/L	96.6	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.5	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.89 mg/L	10 mg/L	98.9	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.212 mg/L	0.25 mg/L	84.8	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	1.19 mg/L	1.25 mg/L	95.4	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.22 mg/L	2.5 mg/L	88.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	92.0	50.0	140	----

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 Work Order : VA20B6049
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
TCLP Metals (QCLot: 96672) - continued										
VA20B6049-001	BA2038-A-1	lead, TCLP	7439-92-1	E444	8.96 mg/L	10 mg/L	89.6	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	236 mg/L	250 mg/L	94.3	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.26 mg/L	2.5 mg/L	90.5	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.72 mg/L	5 mg/L	94.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.102 mg/L	0.1 mg/L	102	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.2	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.6	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 96673)										
VA20B6049-001	BA2038-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.6	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: 96061)									
QC-96061-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	99.5	70.0	130	----
Metals (QCLot: 96062)									
QC-96062-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
QC-96062-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
QC-96062-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
QC-96062-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	99.3	70.0	130	----
QC-96062-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
QC-96062-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	129	40.0	160	----
QC-96062-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	103	70.0	130	----
QC-96062-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
QC-96062-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	112	70.0	130	----
QC-96062-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
QC-96062-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	98.9	70.0	130	----
QC-96062-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
QC-96062-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	99.4	70.0	130	----
QC-96062-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	102	70.0	130	----
QC-96062-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-96062-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
QC-96062-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	117	70.0	130	----
QC-96062-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-96062-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	107	70.0	130	----
QC-96062-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
QC-96062-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
QC-96062-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
QC-96062-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	96.2	40.0	160	----
QC-96062-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	103	70.0	130	----
QC-96062-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
QC-96062-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	115	70.0	130	----
QC-96062-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----

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 Work Order : VA20B6049
 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: 96062) - continued									
QC-96062-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
QC-96062-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	98.6	70.0	130	----



ALS Environmental

Chain of Custody Analytical Request Form

Canada Toll Free: 1 800 668 9878

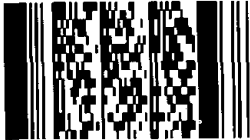
www.alsglobal.com

COC #

Page of

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

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

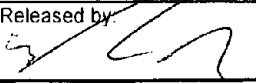
Lab Work Order # (lab use only)		ALS Contact:	Sampler:												Number of Containers			
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FUL-VA (all metals)									
	Environmental Division Vancouver Work Order Reference VA20B6049  Telephone : +1 604 253 4188		16-Sep-20	9:00	Soil	X	X		X								1	
		BA2038-A-2		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-3		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-4		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-5		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-6		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-7		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-8		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-9		16-Sep-20	9:00	Soil	X	X		X								1
		BA2038-A-10		16-Sep-20	9:00	Soil	X	X		X								1
	BA2038-A-11		16-Sep-20	9:00	Soil	X	X		X								1	
	BA2038-A-12		16-Sep-20	9:00	Soil	X	X		X								1	

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by: 	Date (dd-mmm-yy): 22-Sep-20	Time (hh-mm): 0800	Received by: cm	Date: 23/09/20	Time: 12:20pm	Temperature: 17.8 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF