

## Bottom Ash Data

2020 Week 42

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on October 30, 2020. The data represents bottom ash composite results for week 42 of 2020 (October 11, 2020 to October 17, 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 : **VA20B8723**  
Client : **Covanta Burnaby Renewable Energy, ULC**  
Contact : Steve McKinney  
Address : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
Telephone : 604 521 1025  
Project : PO#46693 Weekly Bottom Ash-Suite  
PO : VANCO 0000049378  
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 : 21-Oct-2020 11:45  
Date Analysis Commenced : 22-Oct-2020  
Issue Date : 30-Oct-2020 09:43

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>
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - 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	BA2042-A-1	BA2042-A-2	BA2042-A-3	BA2042-A-4	BA2042-A-5
(Matrix: Soil/Solid)					Client sampling date / time	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-001	VA20B8723-002	VA20B8723-003	VA20B8723-004	VA20B8723-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.6	19.8	22.9	21.6	22.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.2	11.6	11.5	11.6	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	----	29100	31200	28400	38800	
antimony	7440-36-0	E440	0.10	mg/kg	219	193	216	180	159	
arsenic	7440-38-2	E440	0.10	mg/kg	47.2	46.5	46.5	43.5	39.6	
barium	7440-39-3	E440	0.50	mg/kg	505	498	507	563	609	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.37	0.43	0.38	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	12.7	13.8	20.5	9.25	9.76	
boron	7440-42-8	E440	5.0	mg/kg	186	190	169	203	225	
cadmium	7440-43-9	E440	0.020	mg/kg	44.8	20.6	24.8	16.7	17.0	
calcium	7440-70-2	E440	50	mg/kg	162000	152000	152000	148000	150000	
chromium	7440-47-3	E440	0.50	mg/kg	221	176	173	140	150	
cobalt	7440-48-4	E440	0.10	mg/kg	188	109	31.8	36.7	971	
copper	7440-50-8	E440	0.50	mg/kg	3810	1520	3100	1160	1380	
iron	7439-89-6	E440	50	mg/kg	44300	55200	55900	51700	39900	
lead	7439-92-1	E440	0.50	mg/kg	418	465	397	406	511	
lithium	7439-93-2	E440	2.0	mg/kg	24.1	19.4	15.8	14.2	63.4	
magnesium	7439-95-4	E440	20	mg/kg	11400	11200	11000	11400	11000	
manganese	7439-96-5	E440	1.0	mg/kg	926	688	808	1280	607	
mercury	7439-97-6	E510	0.0500	mg/kg	0.128	0.103	0.0932	0.0699	0.801	
molybdenum	7439-98-7	E440	0.10	mg/kg	23.2	20.3	15.6	13.6	18.9	
nickel	7440-02-0	E440	0.50	mg/kg	320	132	119	91.2	352	
phosphorus	7723-14-0	E440	50	mg/kg	15300	15800	16100	13600	15100	
potassium	7440-09-7	E440	100	mg/kg	6610	5860	6010	4850	5470	
selenium	7782-49-2	E440	0.20	mg/kg	0.67	0.63	0.68	0.52	0.48	
silver	7440-22-4	E440.Ag	0.10	mg/kg	7.38	----	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	6.20	5.80	4.28	5.08	
sodium	7440-23-5	E440	50	mg/kg	15300	15000	14800	12800	14200	
strontium	7440-24-6	E440	0.50	mg/kg	409	385	488	328	384	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2042-A-1	BA2042-A-2	BA2042-A-3	BA2042-A-4	BA2042-A-5
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-001	VA20B8723-002	VA20B8723-003	VA20B8723-004	VA20B8723-005
					Result	Result	Result	Result	Result
<b>Metals</b>									
sulfur	7704-34-9	E440	1000	mg/kg	17000	14800	13800	11900	11800
thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.081	0.068	0.076	0.056
tin	7440-31-5	E440	2.0	mg/kg	1860	163	181	139	190
titanium	7440-32-6	E440	1.0	mg/kg	496	390	349	382	688
tungsten	7440-33-7	E440	0.50	mg/kg	9.57	8.82	6.98	4.20	4.66
uranium	7440-61-1	E440	0.050	mg/kg	9.22	9.32	8.97	8.62	7.40
vanadium	7440-62-2	E440	0.20	mg/kg	78.6	69.3	73.8	69.7	66.0
zinc	7440-66-6	E440	2.0	mg/kg	5400	4980	6610	11500	4760
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.6	1.6	1.6	2.0
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.9	12.0	12.0
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.69	9.48	9.73	10.0	10.2
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444	0.010	pH units	6.27	5.89	6.61	6.50	6.53
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	2.14	2.22	2.25	2.14
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.215	0.245	0.375	0.196	0.214
calcium, TCLP	7440-70-2	E444	10	mg/L	2170	2090	2160	2200	2180
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	0.534	0.456	0.562	0.337	0.270
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.21	1.08	0.484	0.445	0.828
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	0.99	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	126	140	132	137
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	1.13	0.64	0.58	0.51
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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2042-A-1	BA2042-A-2	BA2042-A-3	BA2042-A-4	BA2042-A-5
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-001	VA20B8723-002	VA20B8723-003	VA20B8723-004	VA20B8723-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	40.3	62.8	27.8	33.1	44.6	

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)					BA2042-A-6	BA2042-A-7	BA2042-A-8	BA2042-A-9	BA2042-A-10
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-006	VA20B8723-007	VA20B8723-008	VA20B8723-009	VA20B8723-010
					Result	Result	Result	Result	Result
<b>Physical Tests</b>									
moisture	----	E144	0.25	%	21.2	22.7	22.8	21.2	23.3
pH (1:2 soil:water)	----	E108	0.10	pH units	11.8	11.5	11.4	11.9	11.7
<b>Metals</b>									
aluminum	7429-90-5	E440	50	mg/kg	35800	30000	34000	33700	30200
antimony	7440-36-0	E440	0.10	mg/kg	191	144	149	183	164
arsenic	7440-38-2	E440	0.10	mg/kg	40.2	35.0	36.1	35.5	36.0
barium	7440-39-3	E440	0.50	mg/kg	599	545	640	618	681
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.37	0.40	0.43
bismuth	7440-69-9	E440	0.20	mg/kg	12.4	7.96	8.66	10.2	13.7
boron	7440-42-8	E440	5.0	mg/kg	279	163	140	143	253
cadmium	7440-43-9	E440	0.020	mg/kg	18.5	15.0	28.0	18.9	14.6
calcium	7440-70-2	E440	50	mg/kg	138000	118000	133000	137000	140000
chromium	7440-47-3	E440	0.50	mg/kg	186	224	137	144	154
cobalt	7440-48-4	E440	0.10	mg/kg	136	19.2	20.3	114	66.1
copper	7440-50-8	E440	0.50	mg/kg	2010	1400	1140	8340	3080
iron	7439-89-6	E440	50	mg/kg	60600	57700	68000	55300	49300
lead	7439-92-1	E440	0.50	mg/kg	450	268	806	386	301
lithium	7439-93-2	E440	2.0	mg/kg	19.8	15.2	14.0	36.9	15.3
magnesium	7439-95-4	E440	20	mg/kg	10600	12600	10000	13900	14100
manganese	7439-96-5	E440	1.0	mg/kg	771	764	1080	671	754
mercury	7439-97-6	E510	0.0500	mg/kg	0.0804	0.0594	0.0646	0.0776	0.0598
molybdenum	7439-98-7	E440	0.10	mg/kg	16.7	16.7	12.9	13.0	13.9
nickel	7440-02-0	E440	0.50	mg/kg	112	84.5	1230	97.4	118
phosphorus	7723-14-0	E440	50	mg/kg	12900	10400	11400	11300	11600
potassium	7440-09-7	E440	100	mg/kg	5170	4620	5690	5120	5340
selenium	7782-49-2	E440	0.20	mg/kg	0.56	0.45	0.45	0.50	0.46
silver	7440-22-4	E440	0.10	mg/kg	5.36	4.99	3.64	4.89	3.86
sodium	7440-23-5	E440	50	mg/kg	13200	12000	12900	12500	14000
strontium	7440-24-6	E440	0.50	mg/kg	338	288	345	331	361
sulfur	7704-34-9	E440	1000	mg/kg	12500	10700	11600	11200	11600
thallium	7440-28-0	E440	0.050	mg/kg	0.054	0.056	0.063	0.055	0.057



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2042-A-6	BA2042-A-7	BA2042-A-8	BA2042-A-9	BA2042-A-10
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-006	VA20B8723-007	VA20B8723-008	VA20B8723-009	VA20B8723-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	273	164	140	146	166	
titanium	7440-32-6	E440	1.0	mg/kg	614	827	743	628	585	
tungsten	7440-33-7	E440	0.50	mg/kg	3.38	4.90	47.1	3.68	4.59	
uranium	7440-61-1	E440	0.050	mg/kg	8.08	6.39	7.80	6.83	7.38	
vanadium	7440-62-2	E440	0.20	mg/kg	65.4	52.9	63.7	61.9	60.9	
zinc	7440-66-6	E440	2.0	mg/kg	4160	6220	5560	4630	8240	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.8	1.3	1.3	1.0	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.0	12.0	12.0	12.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	10.2	9.63	8.81	9.08	8.91	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93	
pH, TCLP final	----	EPP444	0.010	pH units	6.48	6.33	6.51	6.45	6.32	
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	2.10	2.33	2.32	2.09	2.25	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.195	0.209	0.194	0.213	0.192	
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2090	2230	2170	2180	
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	0.488	0.527	0.310	0.256	0.561	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.842	0.925	0.749	0.691	0.643	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	137	131	129	127	137	
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	0.50	0.71	0.50	0.46	0.64	
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	BA2042-A-6	BA2042-A-7	BA2042-A-8	BA2042-A-9	BA2042-A-10
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00	14-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-006	VA20B8723-007	VA20B8723-008	VA20B8723-009	VA20B8723-010	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	32.7	36.7	26.4	36.8	33.1	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2042-A-11	BA2042-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					14-Oct-2020 09:00	14-Oct-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-011	VA20B8723-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	---	E144	0.25	%	22.4	22.7	---	---	---	
pH (1:2 soil:water)	---	E108	0.10	pH units	11.6	11.5	---	---	---	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	44000	34800	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	194	163	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	43.7	41.8	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	595	478	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.40	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	11.0	11.1	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	224	212	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	21.5	476	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	138000	141000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	154	154	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	29.9	133	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	2160	1670	---	---	---	
iron	7439-89-6	E440	50	mg/kg	22700	59800	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	335	335	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	18.4	22.0	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	8560	10600	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	564	688	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0636	0.0977	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	11.5	15.7	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	363	95.2	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	11600	12900	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	5080	5600	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.60	0.68	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	5.65	6.67	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	12900	13800	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	324	340	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	10900	13200	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.069	---	---	---	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2042-A-11	BA2042-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	14-Oct-2020 09:00	14-Oct-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-011	VA20B8723-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	138	147	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	923	465	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	3.61	6.66	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	8.72	8.27	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	70.0	66.9	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	7190	4580	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.0	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	11.9	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.92	9.00	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.95	6.00	----	----	----	
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	2.00	2.24	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.210	0.221	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1960	2100	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.446	0.917	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.815	0.321	----	----	----	
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	120	129	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.59	0.56	----	----	----	
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					Client sample ID		BA2042-A-11	BA2042-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		14-Oct-2020 09:00	14-Oct-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B8723-011	VA20B8723-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	76.7	43.0	----	----	----	----	----

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA20B8723</b>	Page	: 1 of 16
Client	: <b>Covanta Burnaby Renewable Energy, ULC</b>	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	: PO#46693 Weekly Bottom Ash-Suite	Date Samples Received	: 21-Oct-2020 11:45
PO	: VANCO 0000049378	Issue Date	: 30-Oct-2020 09:43
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
<b>Duplicate (DUP) RPDs</b>								
Metals	VA20B8723-001	BA2042-A-1	arsenic	7440-38-2	E440	32.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	cadmium	7440-43-9	E440	68.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	copper	7440-50-8	E440	53.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	iron	7439-89-6	E440	31.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	lead	7439-92-1	E440	74.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	lithium	7439-93-2	E440	33.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	nickel	7440-02-0	E440	74.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B8723-001	BA2042-A-1	tin	7440-31-5	E440	128 % DUP-H	40%	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		
<b>Metals : High Silver in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2042-A-1	E440.Ag	14-Oct-2020	27-Oct-2020	180 days	13 days	✓	27-Oct-2020	166 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-1	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-10	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-11	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-12	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-2	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-3	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✓	23-Oct-2020	19 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		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-4	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-5	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-6	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-7	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-8	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2042-A-9	E510	14-Oct-2020	23-Oct-2020	28 days	8 days	✔	23-Oct-2020	19 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2042-A-1	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2042-A-10	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2042-A-11	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 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		
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-12	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-2	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-3	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-4	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-5	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-6	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-7	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-8	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2042-A-9	E440	14-Oct-2020	23-Oct-2020	180 days	8 days	✔	23-Oct-2020	171 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	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-1	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-10	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-11	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-12	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-2	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-3	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-4	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-5	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2042-A-6	E144	14-Oct-2020	----	----	----		22-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		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2042-A-7	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2042-A-8	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2042-A-9	E144	14-Oct-2020	----	----	----		22-Oct-2020	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-1	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-10	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-11	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-12	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-2	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-3	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 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		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-4	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-5	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-6	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-7	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-8	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2042-A-9	E108	14-Oct-2020	23-Oct-2020	30 days	8 days	✔	23-Oct-2020	21 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2042-A-1	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2042-A-10	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2042-A-11	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-12	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-2	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-3	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-4	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-5	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-6	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-7	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-8	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2042-A-9	E512	23-Oct-2020	----	----	----		26-Oct-2020	37 days	12 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-1	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-10	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-11	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-12	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-2	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-3	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-4	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-5	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-6	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔





Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-7	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-8	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2042-A-9	E444	23-Oct-2020	----	----	----		26-Oct-2020	189 days	12 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-1	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-10	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-11	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-12	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-2	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2042-A-3	EPP444	14-Oct-2020	23-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	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-4	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-5	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-6	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-7	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-8	EPP444	14-Oct-2020	23-Oct-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2042-A-9	EPP444	14-Oct-2020	23-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	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Mercury in Soil/Solid by CVAAS	E510	106568	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	106569	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	106571	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	106570	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	108673	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	106568	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	106569	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	106571	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	106570	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	108673	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	108127	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	106568	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	108128	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	106569	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	106571	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	108127	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	108128	1	12	8.3	5.0	✔



## Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108  Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °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 <sub>3</sub> 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> 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 <sub>3</sub> 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°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444  Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA20B8723

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 : PO#46693 Weekly Bottom Ash-Suite
PO : VANCO 0000049378
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 : 21-Oct-2020 11:45
Date Analysis Commenced : 22-Oct-2020
Issue Date : 30-Oct-2020 09:43

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 Brianna Allen (Organics), Dee Lee (Metals), Kim Jensen (Metals), and Shaneel Dayal (Metals).

Page : 2 of 11  
Work Order : VA20B8723  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : PO#46693 Weekly Bottom Ash-Suite

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## 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
<b>Physical Tests (QC Lot: 106570)</b>											
VA20B8723-001	BA2042-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.1	0.0899%	5%	----
<b>Physical Tests (QC Lot: 106571)</b>											
VA20B8723-001	BA2042-A-1	moisture	----	E144	0.25	%	22.6	22.2	1.60%	20%	----
<b>Metals (QC Lot: 106568)</b>											
VA20B8723-001	BA2042-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.128	0.0866	0.0413	Diff <2x LOR	----
<b>Metals (QC Lot: 106569)</b>											
VA20B8723-001	BA2042-A-1	aluminum	7429-90-5	E440	50	mg/kg	32100	27300	15.9%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	219	219	0.173%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	47.2	65.5	32.4%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	505	565	11.2%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.41	0.009	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	12.7	12.9	1.86%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	186	188	0.506%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	44.8	21.9	68.8%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	162000	156000	4.02%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	221	180	20.4%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	188	194	3.23%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	3810	6560	53.0%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	44300	60500	31.0%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	418	911	74.2%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	24.1	17.3	33.1%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	11400	12300	7.43%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	926	772	18.1%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	23.2	20.7	11.1%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	320	146	74.8%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	15300	15000	2.15%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	6610	6260	5.48%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.67	0.74	0.07	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	15300	15600	1.67%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	409	422	3.14%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	17000	15700	7.88%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.076	0.0001	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
<b>Metals (QC Lot: 106569) - continued</b>											
VA20B8723-001	BA2042-A-1	tin	7440-31-5	E440	2.0	mg/kg	1860	406	128%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	496	484	2.62%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	9.57	8.29	14.3%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	9.22	9.64	4.38%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	78.6	73.0	7.41%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5400	7190	28.4%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.3	0.5	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
<b>Physical Tests (QCLot: 106571)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 106568)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 106569)</b>						
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
<b>Metals (QCLot: 106569) - continued</b>						
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	----
<b>Metals (QCLot: 108673)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 108127)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 108128)</b>						
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	----



## 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	
<b>Physical Tests (QCLot: 106570)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
<b>Physical Tests (QCLot: 106571)</b>									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
<b>Metals (QCLot: 106568)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
<b>Metals (QCLot: 106569)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.3	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	98.5	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.6	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	97.3	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.4	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.8	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.0	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	98.2	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.6	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	98.0	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	94.7	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.9	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	104	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	94.3	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	101	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	106	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.0	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
<b>Metals (QCLot: 106569) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	94.7	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	100	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.0	80.0	120	----
<b>Metals (QCLot: 108673)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	107	80.0	120	----



### Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
<b>TCLP Metals (QCLot: 108127)</b>										
VA20B8723-001	BA2042-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.0	50.0	140	----
<b>TCLP Metals (QCLot: 108128)</b>										
VA20B8723-001	BA2042-A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.3 mg/L	12.5 mg/L	98.6	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.13 mg/L	10 mg/L	91.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.233 mg/L	0.25 mg/L	93.2	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	1.14 mg/L	1.25 mg/L	91.5	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	2.23 mg/L	2.5 mg/L	89.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	233 mg/L	250 mg/L	93.1	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	224 mg/L	250 mg/L	89.7	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	4.80 mg/L	5 mg/L	96.0	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.118 mg/L	0.1 mg/L	118	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	93.0	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.2	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	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	
<b>Metals (QCLot: 106568)</b>									
QC-106568-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
<b>Metals (QCLot: 106569)</b>									
QC-106569-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	98.0	70.0	130	----
QC-106569-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
QC-106569-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	105	70.0	130	----
QC-106569-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	98.1	70.0	130	----
QC-106569-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
QC-106569-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	111	40.0	160	----
QC-106569-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	96.7	70.0	130	----
QC-106569-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
QC-106569-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	102	70.0	130	----
QC-106569-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	97.5	70.0	130	----
QC-106569-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	97.6	70.0	130	----
QC-106569-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
QC-106569-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	99.8	70.0	130	----
QC-106569-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
QC-106569-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	98.8	70.0	130	----
QC-106569-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	99.0	70.0	130	----
QC-106569-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	110	70.0	130	----
QC-106569-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	100	70.0	130	----
QC-106569-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	96.5	70.0	130	----
QC-106569-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	101	70.0	130	----
QC-106569-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	97.2	70.0	130	----
QC-106569-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	97.7	70.0	130	----
QC-106569-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	89.9	40.0	160	----
QC-106569-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	93.4	70.0	130	----
QC-106569-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	104	70.0	130	----
QC-106569-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	108	70.0	130	----
QC-106569-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	99.6	70.0	130	----

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 Work Order : VA20B8723  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : PO#46693 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	
<b>Metals (QCLot: 106569) - continued</b>									
QC-106569-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
QC-106569-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	90.7	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form

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COC #

Page \_\_\_ of \_\_\_

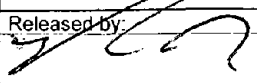
<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business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

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

Lab Work Order # (lab use only)		ALS Contact:	Sampler:					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type								
BA2042-A-1	<b>Environmental Division Vancouver</b> Work Order Reference <b>VA20B8723</b>  Telephone : +1 604 253 4188						X	X		X	1	
BA2042-A-2			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-3			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-4			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-5			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-6			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-7			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-8			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-9			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-10			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-11			14-Oct-20	9:00	Soil			X	X		X	1
BA2042-A-12			14-Oct-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)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	21-Oct-20	0800	HA	21/10	11:45am	19.6 °C				