

## Bottom Ash Data

2020 Week 51

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on January 4, 2021. The data represents bottom ash composite results for week 51 of 2020 (December 13, 2020 to December 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** : **VA20C3947**  
**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** : 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** : 22-Dec-2020 13:00  
**Date Analysis Commenced** : 24-Dec-2020  
**Issue Date** : 31-Dec-2020 13:02

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	Metals, Burnaby, British Columbia
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Supervisor - Organics Instrumentation	Organics, 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

(Matrix: Soil/Solid)

					BA2051-A-1	BA2051-A-2	BA2051-A-3	BA2051-A-4	BA2051-A-5
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-001	VA20C3947-002	VA20C3947-003	VA20C3947-004	VA20C3947-005
					Result	Result	Result	Result	Result
<b>Physical Tests</b>									
moisture	----	E144	0.25	%	22.7	24.4	22.9	21.9	24.1
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.9	10.9	11.0	10.9
<b>Metals</b>									
aluminum	7429-90-5	E440	50	mg/kg	38100	43100	46100	33900	40900
antimony	7440-36-0	E440	0.10	mg/kg	123	114	120	148	140
arsenic	7440-38-2	E440	0.10	mg/kg	18.3	17.4	16.3	18.0	19.0
barium	7440-39-3	E440	0.50	mg/kg	537	528	448	503	489
beryllium	7440-41-7	E440	0.10	mg/kg	0.53	0.34	0.35	0.39	0.37
bismuth	7440-69-9	E440	0.20	mg/kg	6.96	10.6	7.39	6.16	10.8
boron	7440-42-8	E440	5.0	mg/kg	268	163	174	166	172
cadmium	7440-43-9	E440	0.020	mg/kg	15.3	8.69	13.9	14.9	14.7
calcium	7440-70-2	E440	50	mg/kg	140000	136000	131000	138000	135000
chromium	7440-47-3	E440	0.50	mg/kg	188	269	214	144	274
cobalt	7440-48-4	E440	0.10	mg/kg	131	24.0	37.9	44.5	1110
copper	7440-50-8	E440	0.50	mg/kg	3380	1940	1310	2460	2490
iron	7439-89-6	E440	50	mg/kg	62400	58400	38900	54800	50400
lead	7439-92-1	E440	0.50	mg/kg	497	325	482	371	403
lithium	7439-93-2	E440	2.0	mg/kg	34.2	26.5	22.2	24.1	33.1
magnesium	7439-95-4	E440	20	mg/kg	11800	11300	11600	12400	10900
manganese	7439-96-5	E440	1.0	mg/kg	792	1380	935	929	994
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	16.0	30.8	18.3	15.3	17.8
nickel	7440-02-0	E440	0.50	mg/kg	127	240	160	149	139
phosphorus	7723-14-0	E440	50	mg/kg	11500	12400	10500	10800	11000
potassium	7440-09-7	E440	100	mg/kg	5780	4970	5270	5050	5600
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.28	0.37	0.36	0.35
silver	7440-22-4	E440.Ag	0.10	mg/kg	5.49	----	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	----	4.33	4.48	5.14	9.60
sodium	7440-23-5	E440	50	mg/kg	15600	14400	15400	14900	15800
strontium	7440-24-6	E440	0.50	mg/kg	292	292	268	294	308



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2051-A-1	BA2051-A-2	BA2051-A-3	BA2051-A-4	BA2051-A-5
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-001	VA20C3947-002	VA20C3947-003	VA20C3947-004	VA20C3947-005
					Result	Result	Result	Result	Result
<b>Metals</b>									
sulfur	7704-34-9	E440	1000	mg/kg	15400	13600	15200	15600	16400
thallium	7440-28-0	E440	0.050	mg/kg	0.053	<0.050	0.051	0.051	0.060
tin	7440-31-5	E440	2.0	mg/kg	118	93.8	107	132	126
titanium	7440-32-6	E440	1.0	mg/kg	676	565	742	594	666
tungsten	7440-33-7	E440	0.50	mg/kg	38.1	8.91	12.4	8.11	16.2
uranium	7440-61-1	E440	0.050	mg/kg	4.32	3.55	4.38	4.54	4.68
vanadium	7440-62-2	E440	0.20	mg/kg	44.6	41.5	44.5	43.4	46.9
zinc	7440-66-6	E440	2.0	mg/kg	8650	5230	3330	7050	3930
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.9	2.3	1.3	1.6
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.6	11.7	11.5
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.12	8.42	8.64	8.39	8.29
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85
pH, TCLP final	----	EPP444	0.010	pH units	6.23	6.20	6.25	6.24	6.31
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.77	1.71	1.74	1.76	1.87
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.214	0.230	0.250	0.254	0.247
calcium, TCLP	7440-70-2	E444	10	mg/L	2060	2030	2030	2190	2210
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	1.32	1.12	1.16	0.950	0.764
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.16	1.02	1.77	1.21	1.06
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	144	141	139	148	144
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	0.39	0.37	0.39	0.42	0.74
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	BA2051-A-1	BA2051-A-2	BA2051-A-3	BA2051-A-4	BA2051-A-5
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-001	VA20C3947-002	VA20C3947-003	VA20C3947-004	VA20C3947-005	
					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	53.5	49.8	50.7	47.4	36.6	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2051-A-6	BA2051-A-7	BA2051-A-8	BA2051-A-9	BA2051-A-10
(Matrix: Soil/Solid)										
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-006	VA20C3947-007	VA20C3947-008	VA20C3947-009	VA20C3947-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.6	22.2	23.2	23.6	23.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	10.8	11.0	11.1	11.0	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	28800	37400	39000	30200	30500	
antimony	7440-36-0	E440	0.10	mg/kg	130	130	129	138	161	
arsenic	7440-38-2	E440	0.10	mg/kg	16.8	18.7	17.4	18.6	23.0	
barium	7440-39-3	E440	0.50	mg/kg	500	499	471	467	356	
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.38	0.35	0.37	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	7.48	6.42	5.63	11.1	7.37	
boron	7440-42-8	E440	5.0	mg/kg	161	164	168	179	160	
cadmium	7440-43-9	E440	0.020	mg/kg	14.0	12.6	14.2	15.4	20.2	
calcium	7440-70-2	E440	50	mg/kg	131000	138000	134000	144000	138000	
chromium	7440-47-3	E440	0.50	mg/kg	135	174	180	181	143	
cobalt	7440-48-4	E440	0.10	mg/kg	114	86.7	222	85.3	51.4	
copper	7440-50-8	E440	0.50	mg/kg	3730	2580	2290	2190	3580	
iron	7439-89-6	E440	50	mg/kg	52600	57500	78400	62700	44400	
lead	7439-92-1	E440	0.50	mg/kg	402	444	1210	783	626	
lithium	7439-93-2	E440	2.0	mg/kg	29.8	22.8	49.6	25.8	23.5	
magnesium	7439-95-4	E440	20	mg/kg	10700	11300	11200	11100	11900	
manganese	7439-96-5	E440	1.0	mg/kg	748	785	1030	1500	814	
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	14.0	24.2	17.5	18.4	15.4	
nickel	7440-02-0	E440	0.50	mg/kg	155	138	127	147	145	
phosphorus	7723-14-0	E440	50	mg/kg	11400	11500	10400	11200	11500	
potassium	7440-09-7	E440	100	mg/kg	5140	5420	5420	5210	5330	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.35	0.37	0.34	0.40	
silver	7440-22-4	E440	0.10	mg/kg	4.56	5.00	4.65	6.27	6.96	
sodium	7440-23-5	E440	50	mg/kg	14300	15100	15200	15000	15000	
strontium	7440-24-6	E440	0.50	mg/kg	492	310	330	384	319	
sulfur	7704-34-9	E440	1000	mg/kg	15400	16000	15600	15700	16200	
thallium	7440-28-0	E440	0.050	mg/kg	0.055	0.062	0.056	0.051	0.059	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2051-A-6	BA2051-A-7	BA2051-A-8	BA2051-A-9	BA2051-A-10
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-006	VA20C3947-007	VA20C3947-008	VA20C3947-009	VA20C3947-010
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	118	127	106	113	114
titanium	7440-32-6	E440	1.0	mg/kg	431	528	477	317	412
tungsten	7440-33-7	E440	0.50	mg/kg	9.88	16.4	10.1	12.5	17.6
uranium	7440-61-1	E440	0.050	mg/kg	4.44	4.64	4.42	4.49	5.04
vanadium	7440-62-2	E440	0.20	mg/kg	43.3	47.0	46.2	46.0	47.4
zinc	7440-66-6	E440	2.0	mg/kg	3940	7840	3750	3860	4850
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.5	1.6	1.3	1.4
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.4	11.5	11.5	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.50	8.31	8.26	8.73	8.71
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85
pH, TCLP final	----	EPP444	0.010	pH units	6.26	6.16	6.24	6.35	6.13
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.85	1.81	1.82	1.86	1.75
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.201	0.212	0.192	0.286	0.254
calcium, TCLP	7440-70-2	E444	10	mg/L	2200	2060	2120	2110	2110
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	0.532	1.35	0.784	0.792	0.578
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.02	1.06	0.949	1.24	1.19
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	0.33	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	149	143	149	147	144
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	0.45	0.46	0.46	0.41	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	BA2051-A-6	BA2051-A-7	BA2051-A-8	BA2051-A-9	BA2051-A-10
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00	16-Dec-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-006	VA20C3947-007	VA20C3947-008	VA20C3947-009	VA20C3947-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	39.0	43.0	50.4	44.5	70.0	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2051-A-11	BA2051-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	16-Dec-2020 09:00	16-Dec-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-011	VA20C3947-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	24.2	23.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.1	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	40600	28900	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	114	123	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	15.7	17.8	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	581	459	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.35	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	5.86	6.68	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	182	143	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	14.2	14.8	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	133000	135000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	169	128	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	34.3	58.0	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2610	5470	----	----	----	
iron	7439-89-6	E440	50	mg/kg	47600	47700	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	489	562	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	31.4	22.4	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11100	10600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	801	768	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	15.0	13.9	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	107	119	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10100	11600	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5250	4920	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.31	0.33	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	7.65	6.08	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15700	13900	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	302	284	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14500	15100	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.059	----	----	----	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2051-A-11	BA2051-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-011	VA20C3947-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	103	119	---	---	---	---
titanium	7440-32-6	E440	1.0	mg/kg	1170	636	---	---	---	---
tungsten	7440-33-7	E440	0.50	mg/kg	9.06	9.24	---	---	---	---
uranium	7440-61-1	E440	0.050	mg/kg	4.22	4.43	---	---	---	---
vanadium	7440-62-2	E440	0.20	mg/kg	43.0	42.8	---	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg	5120	9120	---	---	---	---
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.3	---	---	---	---
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.7	---	---	---	---
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.73	8.51	---	---	---	---
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	---	---	---	---
pH, TCLP final	----	EPP444	0.010	pH units	6.23	6.19	---	---	---	---
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	---
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	---	---	---	---
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	---	---	---	---
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	---	---	---	---
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.84	1.83	---	---	---	---
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.224	0.198	---	---	---	---
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2150	---	---	---	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	---
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.496	1.46	---	---	---	---
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.45	1.12	---	---	---	---
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	151	146	---	---	---	---
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	---	---	---	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.43	0.40	---	---	---	---
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	BA2051-A-11	BA2051-A-12	----	----	----
Client sampling date / time					16-Dec-2020 09:00	16-Dec-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20C3947-011	VA20C3947-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	57.0	47.6	----	----	----	

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA20C3947</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	: Weekly Bottom Ash - Suite	Date Samples Received	: 22-Dec-2020 13:00
PO	: VANCO 0000049378	Issue Date	: 31-Dec-2020 13:02
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	VA20C3947-001	BA2051-A-1	cadmium	7440-43-9	E440	36.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C3947-001	BA2051-A-1	copper	7440-50-8	E440	46.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C3947-001	BA2051-A-1	nickel	7440-02-0	E440	33.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C3947-001	BA2051-A-1	tungsten	7440-33-7	E440	72.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C3947-001	BA2051-A-1	zinc	7440-66-6	E440	75.1 % 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		
<b>Metals : High Silver in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2051-A-1	E440.Ag	16-Dec-2020	31-Dec-2020	180 days	15 days	✓	31-Dec-2020	164 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-1	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-2020	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-10	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-2020	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-11	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-2020	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-12	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-2020	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-2	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-2020	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-3	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✓	31-Dec-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		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-4	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-5	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-6	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-7	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-8	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2051-A-9	E510	16-Dec-2020	30-Dec-2020	28 days	14 days	✔	31-Dec-2020	13 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2051-A-1	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2051-A-10	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2051-A-11	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 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 BA2051-A-12	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-2	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-3	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-4	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-5	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-6	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-7	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-8	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2051-A-9	E440	16-Dec-2020	30-Dec-2020	180 days	14 days	✔	30-Dec-2020	165 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 BA2051-A-1	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-10	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-11	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-12	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-2	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-3	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-4	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-5	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2051-A-6	E144	16-Dec-2020	----	----	----		29-Dec-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 BA2051-A-7	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2051-A-8	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2051-A-9	E144	16-Dec-2020	----	----	----		29-Dec-2020	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-1	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-10	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-11	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-12	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-2	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-3	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 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 BA2051-A-4	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-5	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-6	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-7	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-8	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2051-A-9	E108	16-Dec-2020	30-Dec-2020	30 days	14 days	✔	30-Dec-2020	15 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2051-A-1	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2051-A-10	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2051-A-11	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-12	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-2	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-3	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-4	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-5	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-6	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-7	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-8	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2051-A-9	E512	24-Dec-2020	----	----	----		30-Dec-2020	35 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-1	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-10	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-11	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-12	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-2	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-3	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-4	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-5	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2051-A-6	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2051-A-7	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2051-A-8	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2051-A-9	E444	24-Dec-2020	----	----	----		30-Dec-2020	187 days	14 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-1	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-10	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-11	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-12	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-2	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-3	EPP444	16-Dec-2020	24-Dec-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: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-4	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-5	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-6	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-7	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-8	EPP444	16-Dec-2020	24-Dec-2020	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
<b>Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg)</b> BA2051-A-9	EPP444	16-Dec-2020	24-Dec-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	135825	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	135824	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	135826	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	135823	1	17	5.8	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	136601	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	135825	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	135824	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	135826	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	135823	1	17	5.8	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	136601	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	136132	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	135825	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	136133	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	135824	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	135826	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	136132	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	136133	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/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<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 : VA20C3947

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 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 : 22-Dec-2020 13:00
Date Analysis Commenced : 24-Dec-2020
Issue Date : 31-Dec-2020 13:02

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), and Ophelia Chiu (Supervisor - Organics Instrumentation).

Page : 2 of 11  
Work Order : VA20C3947  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : 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: 135823)</b>											
VA20C3947-001	BA2051-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.9	0.368%	5%	----
<b>Physical Tests (QC Lot: 135826)</b>											
VA20C3947-001	BA2051-A-1	moisture	----	E144	0.25	%	22.7	25.3	10.7%	20%	----
<b>Metals (QC Lot: 135824)</b>											
VA20C3947-001	BA2051-A-1	aluminum	7429-90-5	E440	50	mg/kg	38100	35100	8.36%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	123	127	2.90%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	18.3	18.1	0.742%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	537	506	5.94%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.53	0.40	0.12	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	6.96	7.56	8.20%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	268	200	28.9%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	15.3	22.3	36.9%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	140000	136000	2.95%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	188	189	0.294%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	131	170	26.3%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	3380	2110	46.2%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	62400	50500	21.1%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	497	531	6.67%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	34.2	41.7	19.9%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11800	11700	0.462%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	792	865	8.85%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	16.0	17.3	7.90%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	127	178	33.4%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11500	12100	5.40%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5780	5520	4.48%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.33	0.01	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	15600	15400	1.20%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	292	315	7.29%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	15400	16000	4.03%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.058	0.005	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	118	112	5.06%	40%	----



Sub-Matrix: **Soil/Solid**

*Laboratory Duplicate (DUP) Report*

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Metals (QC Lot: 135824) - continued</b>											
VA20C3947-001	BA2051-A-1	titanium	7440-32-6	E440	1.0	mg/kg	676	537	23.0%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	38.1	17.8	72.7%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	4.32	4.55	4.97%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	44.6	49.1	9.80%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	8650	3930	75.1%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.4	0.10	Diff <2x LOR	----
<b>Metals (QC Lot: 135825)</b>											
VA20C3947-001	BA2051-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----

**Qualifiers**

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.





## 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: 135826)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 135824)</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	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 135824) - continued</b>						
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: 135825)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 136601)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 136132)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 136133)</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				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 135823)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
<b>Physical Tests (QCLot: 135826)</b>									
moisture	---	E144	0.25	%	50 %	99.5	90.0	110	---
<b>Metals (QCLot: 135824)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.7	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.9	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.0	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	105	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	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	101	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.3	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.7	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.2	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	110	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	100	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	99.2	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	109	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	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	98.9	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	105	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	94.6	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	80.0	120	---



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Metals (QCLot: 135824) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	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	105	80.0	120	----
<b>Metals (QCLot: 135825)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	93.0	80.0	120	----
<b>Metals (QCLot: 136601)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	97.4	80.0	120	----



### Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>TCLP Metals (QCLot: 136132)</b>										
VA20C3947-001	BA2051-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.0	50.0	140	----
<b>TCLP Metals (QCLot: 136133)</b>										
VA20C3947-001	BA2051-A-1	antimony, TCLP	7440-36-0	E444	5.0 mg/L	5 mg/L	100	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	97.1	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.2 mg/L	12.5 mg/L	97.2	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.230 mg/L	0.25 mg/L	92.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.93 mg/L	10 mg/L	89.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.282 mg/L	0.25 mg/L	113	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	1.16 mg/L	1.25 mg/L	93.0	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	2.29 mg/L	2.5 mg/L	91.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	225 mg/L	250 mg/L	90.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.58 mg/L	10 mg/L	95.8	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	234 mg/L	250 mg/L	93.8	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.32 mg/L	2.5 mg/L	92.9	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.37 mg/L	5 mg/L	107	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.108 mg/L	0.1 mg/L	108	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.7	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.8	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: 135824)</b>									
QC-135824-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	114	70.0	130	----
QC-135824-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
QC-135824-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	111	70.0	130	----
QC-135824-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	110	70.0	130	----
QC-135824-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	100	70.0	130	----
QC-135824-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	116	40.0	160	----
QC-135824-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	102	70.0	130	----
QC-135824-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-135824-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	114	70.0	130	----
QC-135824-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
QC-135824-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	109	70.0	130	----
QC-135824-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
QC-135824-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	95.9	70.0	130	----
QC-135824-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	----
QC-135824-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	----
QC-135824-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
QC-135824-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
QC-135824-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-135824-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	108	70.0	130	----
QC-135824-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
QC-135824-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
QC-135824-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	103	70.0	130	----
QC-135824-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.6	40.0	160	----
QC-135824-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.1	70.0	130	----
QC-135824-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	121	70.0	130	----
QC-135824-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	107	70.0	130	----
QC-135824-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----
QC-135824-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
QC-135824-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	104	70.0	130	----

Page : 11 of 11  
 Work Order : VA20C3947  
 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	
<b>Metals (QCLot: 135825)</b>									
QC-135825-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.7	70.0	130	----



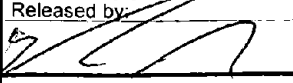
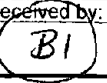
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Company: Covanta Energy		<input type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: Steve McKinney / Dan Skrypyk		<input checked="" type="checkbox"/> 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: _____		Email 2: rjohnson4@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
<input type="checkbox"/> Yes <input type="checkbox"/> No		Email 3: dskrypyk@covanta.com		<b>Analysis Request</b>	
		brent.kirkpatrick@metrovancover.org			
		Sarah.Wellman@metrovancover.org			

<b>Invoice To</b> Same as Report?		<b>Client / Project Information</b>		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 #:		<table border="1"> <tr> <td rowspan="5">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="5">MOISTURE</td> <td rowspan="5">Chrome 6</td> <td rowspan="5">MET-CSR+FULL-VA (all metals)</td> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)																																																																																										
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)																																																																																																				
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																																																																																					
Contact:		LSD: (includes 2:1 pH)																																																																																																					
Address:		Quote #:																																																																																																					
Phone: _____ Fax: _____																																																																																																							

Lab Work Order # (lab use only)		ALS Contact:	Sampler:																	
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)									Number of Containers			
BA2051-A-1	<p>Environmental Division Vancouver Work Order Reference <b>VA20C3947</b></p>  <p>Telephone : +1 604 253 4188</p>	16-Dec-20	9:00	Soil	X	X		X											1	
BA2051-A-2		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-3		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-4		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-5		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-6		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-7		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-8		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-9		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-10		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-11		16-Dec-20	9:00	Soil	X	X		X												1
BA2051-A-12		16-Dec-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-Dec-20	Time (hh-mm): 0800	Received by: 	Date: DEC 22 2020	Time: 1pm	Temperature: 18 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF