

## Bottom Ash Data

2021 Week 6

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on February 22, 2021. The data represents bottom ash composite results for week 6 of 2021 (January 31, 2021 to February 6, 2021).

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



**CERTIFICATE OF ANALYSIS**

**Work Order** : **VA21A2466**  
**Client** : **Covanta Burnaby Renewable Energy, ULC**  
**Contact** : Steve McKinney  
**Address** : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
**Telephone** : 604 521 1025  
**Project** : Weekly Bottom Ash-Suite  
**PO** : VANCO 0000050390  
**C-O-C number** : ----  
**Sampler** : ----  
**Site** : ----  
**Quote number** : Standing Offer (BC work)  
**No. of samples received** : 12  
**No. of samples analysed** : 12

**Page** : 1 of 11  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Brent Mack  
**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
**Telephone** : 778-370-3279  
**Date Samples Received** : 10-Feb-2021 11:45  
**Date Analysis Commenced** : 12-Feb-2021  
**Issue Date** : 19-Feb-2021 15:59

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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

(Matrix: Soil/Solid)

					BA2106-A-1	BA2106-A-2	BA2106-A-3	BA2106-A-4	BA2106-A-5
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-001	VA21A2466-002	VA21A2466-003	VA21A2466-004	VA21A2466-005
					Result	Result	Result	Result	Result
<b>Physical Tests</b>									
moisture	----	E144	0.25	%	20.8	23.4	23.9	21.8	23.4
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	10.9	11.1	11.3	11.3
<b>Metals</b>									
aluminum	7429-90-5	E440	50	mg/kg	35400	37200	28900	35100	34800
antimony	7440-36-0	E440	0.10	mg/kg	144	116	88.8	128	84.8
arsenic	7440-38-2	E440	0.10	mg/kg	18.6	16.8	13.3	16.2	13.8
barium	7440-39-3	E440	0.50	mg/kg	661	679	571	608	611
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.44	0.36	0.51	0.38
bismuth	7440-69-9	E440	0.20	mg/kg	7.74	6.27	6.41	5.24	5.30
boron	7440-42-8	E440	5.0	mg/kg	208	200	187	234	201
cadmium	7440-43-9	E440	0.020	mg/kg	17.7	10.5	7.97	6.61	7.86
calcium	7440-70-2	E440	50	mg/kg	136000	129000	117000	128000	118000
chromium	7440-47-3	E440	0.50	mg/kg	174	177	198	168	202
cobalt	7440-48-4	E440	0.10	mg/kg	40.5	127	59.1	38.9	59.2
copper	7440-50-8	E440	0.50	mg/kg	45300	6950	1940	3640	1540
iron	7439-89-6	E440	50	mg/kg	66900	78300	80900	59300	79600
lead	7439-92-1	E440	0.50	mg/kg	893	1030	426	331	687
lithium	7439-93-2	E440	2.0	mg/kg	27.5	34.8	25.4	22.0	47.8
magnesium	7439-95-4	E440	20	mg/kg	12600	12300	10600	13300	12700
manganese	7439-96-5	E440	1.0	mg/kg	914	1050	876	745	1120
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0584	<0.0500	<0.0500	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	18.5	17.0	22.8	28.2	25.3
nickel	7440-02-0	E440	0.50	mg/kg	125	181	237	128	233
phosphorus	7723-14-0	E440	50	mg/kg	12000	10800	10900	9250	9260
potassium	7440-09-7	E440	100	mg/kg	5170	4570	4000	4710	3720
selenium	7782-49-2	E440	0.20	mg/kg	0.51	0.32	0.26	0.33	0.38
silver	7440-22-4	E440	0.10	mg/kg	6.61	5.70	5.72	4.58	3.22
sodium	7440-23-5	E440	50	mg/kg	16800	16200	15700	16000	13500
strontium	7440-24-6	E440	0.50	mg/kg	394	340	286	361	381
sulfur	7704-34-9	E440	1000	mg/kg	13200	10600	9200	11000	9600



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2106-A-1	BA2106-A-2	BA2106-A-3	BA2106-A-4	BA2106-A-5
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-001	VA21A2466-002	VA21A2466-003	VA21A2466-004	VA21A2466-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.050	<0.050	0.058	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	143	160	138	105	155	
titanium	7440-32-6	E440	1.0	mg/kg	497	684	259	270	251	
tungsten	7440-33-7	E440	0.50	mg/kg	5.16	6.07	4.88	6.89	14.4	
uranium	7440-61-1	E440	0.050	mg/kg	2.78	2.67	2.27	2.64	2.32	
vanadium	7440-62-2	E440	0.20	mg/kg	37.4	31.4	25.2	37.1	28.4	
zinc	7440-66-6	E440	2.0	mg/kg	4570	5350	7880	5220	3780	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.2	1.6	2.1	2.8	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	11.5	11.7	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.72	8.38	8.89	9.08	8.92	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.20	6.25	6.28	6.30	6.18	
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	1.95	2.00	2.04	2.02	2.00	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.138	0.132	0.122	0.365	0.157	
calcium, TCLP	7440-70-2	E444	10	mg/L	2060	2280	2210	2210	2120	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.807	0.678	0.982	1.12	1.04	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.32	0.911	1.18	0.728	0.456	
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	0.31	<0.25	<0.25	0.50	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	143	149	152	154	149	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.37	0.86	0.49	0.46	0.45	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2106-A-1	BA2106-A-2	BA2106-A-3	BA2106-A-4	BA2106-A-5
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-001	VA21A2466-002	VA21A2466-003	VA21A2466-004	VA21A2466-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
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	43.5	38.9	37.1	36.2	32.0	

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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2106-A-6	BA2106-A-7	BA2106-A-8	BA2106-A-9	BA2106-A-10
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-006	VA21A2466-007	VA21A2466-008	VA21A2466-009	VA21A2466-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.5	24.9	24.4	20.6	22.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.0	10.8	11.3	11.2	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	37300	36900	36900	36000	30600	
antimony	7440-36-0	E440	0.10	mg/kg	109	102	107	130	109	
arsenic	7440-38-2	E440	0.10	mg/kg	12.7	15.2	15.3	17.3	15.1	
barium	7440-39-3	E440	0.50	mg/kg	627	777	704	826	672	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.38	0.38	1.28	0.45	
bismuth	7440-69-9	E440	0.20	mg/kg	6.12	5.72	5.25	6.41	5.53	
boron	7440-42-8	E440	5.0	mg/kg	157	182	226	268	253	
cadmium	7440-43-9	E440	0.020	mg/kg	11.5	7.90	8.12	8.95	7.35	
calcium	7440-70-2	E440	50	mg/kg	119000	124000	138000	134000	135000	
chromium	7440-47-3	E440	0.50	mg/kg	139	239	396	182	163	
cobalt	7440-48-4	E440	0.10	mg/kg	27.5	42.4	46.2	124	44.2	
copper	7440-50-8	E440	0.50	mg/kg	6270	9400	1550	17800	4080	
iron	7439-89-6	E440	50	mg/kg	69100	84900	55200	76700	92100	
lead	7439-92-1	E440	0.50	mg/kg	375	1280	959	1180	418	
lithium	7439-93-2	E440	2.0	mg/kg	20.8	22.5	26.3	56.6	25.5	
magnesium	7439-95-4	E440	20	mg/kg	11300	10600	13300	13000	11900	
manganese	7439-96-5	E440	1.0	mg/kg	896	943	766	891	881	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	0.0747	
molybdenum	7439-98-7	E440	0.10	mg/kg	16.6	21.4	20.9	23.7	20.1	
nickel	7440-02-0	E440	0.50	mg/kg	122	221	352	244	217	
phosphorus	7723-14-0	E440	50	mg/kg	9380	11000	15000	10500	10200	
potassium	7440-09-7	E440	100	mg/kg	5020	4400	4560	4530	4250	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.32	0.32	0.53	0.41	
silver	7440-22-4	E440	0.10	mg/kg	6.15	5.00	4.45	13.2	4.23	
sodium	7440-23-5	E440	50	mg/kg	17000	15200	15800	17600	15300	
strontium	7440-24-6	E440	0.50	mg/kg	338	436	347	344	735	
sulfur	7704-34-9	E440	1000	mg/kg	11400	10200	10600	11500	10600	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2106-A-6	BA2106-A-7	BA2106-A-8	BA2106-A-9	BA2106-A-10
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-006	VA21A2466-007	VA21A2466-008	VA21A2466-009	VA21A2466-010
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	89.3	132	209	603	403
titanium	7440-32-6	E440	1.0	mg/kg	356	366	316	479	506
tungsten	7440-33-7	E440	0.50	mg/kg	5.36	3.75	5.11	8.61	8.75
uranium	7440-61-1	E440	0.050	mg/kg	2.48	2.53	2.43	2.54	2.61
vanadium	7440-62-2	E440	0.20	mg/kg	32.7	28.6	29.6	34.4	33.5
zinc	7440-66-6	E440	2.0	mg/kg	3300	4350	12700	5520	3730
zirconium	7440-67-7	E440	1.0	mg/kg	1.9	1.6	1.4	1.3	1.1
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	11.5	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.28	6.86	7.03	8.58	8.69
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units	6.29	6.09	6.04	6.11	6.18
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	2.01	2.07	2.00	2.05	2.04
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.142	0.130	0.204	0.296	0.167
calcium, TCLP	7440-70-2	E444	10	mg/L	2200	2200	2170	2160	2150
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.883	0.729	1.44	0.609	1.05
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.951	1.18	2.88	0.782	0.789
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	0.32	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	153	145	144	161	149
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.43	0.52	0.50	0.66	0.54
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15





**Analytical Results**

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2106-A-6	BA2106-A-7	BA2106-A-8	BA2106-A-9	BA2106-A-10
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00	03-Feb-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-006	VA21A2466-007	VA21A2466-008	VA21A2466-009	VA21A2466-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	31.1	61.4	52.8	32.1	33.0	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2106-A-11	BA2106-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-011	VA21A2466-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
<b>Physical Tests</b>										
moisture	---	E144	0.25	%	22.2	21.1	---	---	---	---
pH (1:2 soil:water)	---	E108	0.10	pH units	11.0	11.4	---	---	---	---
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	36300	30100	---	---	---	---
antimony	7440-36-0	E440	0.10	mg/kg	123	100	---	---	---	---
arsenic	7440-38-2	E440	0.10	mg/kg	18.0	14.4	---	---	---	---
barium	7440-39-3	E440	0.50	mg/kg	592	584	---	---	---	---
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.42	---	---	---	---
bismuth	7440-69-9	E440	0.20	mg/kg	8.78	12.4	---	---	---	---
boron	7440-42-8	E440	5.0	mg/kg	221	252	---	---	---	---
cadmium	7440-43-9	E440	0.020	mg/kg	14.1	21.8	---	---	---	---
calcium	7440-70-2	E440	50	mg/kg	137000	133000	---	---	---	---
chromium	7440-47-3	E440	0.50	mg/kg	242	210	---	---	---	---
cobalt	7440-48-4	E440	0.10	mg/kg	571	52.6	---	---	---	---
copper	7440-50-8	E440	0.50	mg/kg	1910	7560	---	---	---	---
iron	7439-89-6	E440	50	mg/kg	69800	72800	---	---	---	---
lead	7439-92-1	E440	0.50	mg/kg	410	383	---	---	---	---
lithium	7439-93-2	E440	2.0	mg/kg	43.9	25.1	---	---	---	---
magnesium	7439-95-4	E440	20	mg/kg	12600	11900	---	---	---	---
manganese	7439-96-5	E440	1.0	mg/kg	1170	864	---	---	---	---
mercury	7439-97-6	E510	0.0500	mg/kg	0.129	0.0752	---	---	---	---
molybdenum	7439-98-7	E440	0.10	mg/kg	27.8	53.7	---	---	---	---
nickel	7440-02-0	E440	0.50	mg/kg	203	137	---	---	---	---
phosphorus	7723-14-0	E440	50	mg/kg	11500	10900	---	---	---	---
potassium	7440-09-7	E440	100	mg/kg	5040	4070	---	---	---	---
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.34	---	---	---	---
silver	7440-22-4	E440	0.10	mg/kg	4.98	5.42	---	---	---	---
sodium	7440-23-5	E440	50	mg/kg	16600	16000	---	---	---	---
strontium	7440-24-6	E440	0.50	mg/kg	355	347	---	---	---	---
sulfur	7704-34-9	E440	1000	mg/kg	12000	10000	---	---	---	---
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	---



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2106-A-11	BA2106-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	03-Feb-2021 09:00	03-Feb-2021 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-011	VA21A2466-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	152	158	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	335	196	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	8.14	6.10	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	2.90	2.59	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	33.4	30.1	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	5350	4380	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.2	----	----	----	
<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	9.18	8.65	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.99	6.13	----	----	----	
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	2.06	1.96	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.197	0.156	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2100	2180	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.904	1.18	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.740	1.06	----	----	----	
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	145	156	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.77	0.47	----	----	----	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	----	----	----	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	



### Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2106-A-11	BA2106-A-12	----	----	----
Client sampling date / time					03-Feb-2021 09:00	03-Feb-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A2466-011	VA21A2466-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	49.4	39.6	----	----	----	

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA21A2466</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	: 778-370-3279
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 10-Feb-2021 11:45
PO	: VANCO 0000050390	Issue Date	: 19-Feb-2021 15:59
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	VA21A2466-001	BA2106-A-1	antimony	7440-36-0	E440	97.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	cadmium	7440-43-9	E440	89.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	cobalt	7440-48-4	E440	56.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	copper	7440-50-8	E440	137 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	silver	7440-22-4	E440	50.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	thallium	7440-28-0	E440	0.103 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA21A2466-001	BA2106-A-1	titanium	7440-32-6	E440	42.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	tungsten	7440-33-7	E440	31.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A2466-001	BA2106-A-1	zinc	7440-66-6	E440	142 % 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 : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-1	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-10	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-11	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-12	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-2	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-3	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	13 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-4	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✓	18-Feb-2021	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>											
LDPE bag BA2106-A-5	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✔	18-Feb-2021	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-6	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✔	18-Feb-2021	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-7	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✔	18-Feb-2021	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-8	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✔	18-Feb-2021	13 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2106-A-9	E510	03-Feb-2021	17-Feb-2021	28 days	14 days	✔	18-Feb-2021	13 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2106-A-1	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2106-A-10	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2106-A-11	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2106-A-12	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	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 BA2106-A-2	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-3	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-4	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-5	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-6	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-7	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-8	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2106-A-9	E440	03-Feb-2021	17-Feb-2021	180 days	14 days	✔	18-Feb-2021	165 days	0 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2106-A-1	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-10	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-11	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-12	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-2	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-3	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-4	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-5	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-6	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2106-A-7	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2106-A-8	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2106-A-9	E144	03-Feb-2021	----	----	----		12-Feb-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-1	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-10	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-11	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-12	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-2	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-3	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-4	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	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 BA2106-A-5	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-6	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-7	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-8	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2106-A-9	E108	03-Feb-2021	17-Feb-2021	30 days	14 days	✔	18-Feb-2021	15 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2106-A-1	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2106-A-10	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2106-A-11	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2106-A-12	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 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> BA2106-A-2	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-3	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-4	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-5	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-6	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-7	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-8	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2106-A-9	E512	16-Feb-2021	----	----	----		18-Feb-2021	41 days	15 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
<b>HDPE - total (lab preserved)</b> BA2106-A-1	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 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) BA2106-A-10	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-11	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-12	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-2	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-3	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-4	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-5	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-6	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2106-A-7	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 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> BA2106-A-8	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2106-A-9	E444	16-Feb-2021	----	----	----		18-Feb-2021	193 days	15 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> BA2106-A-1	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-10	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-11	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-12	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-2	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-3	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	
<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> BA2106-A-4	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----	





Matrix: **Soil/Solid**

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<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> BA2106-A-5	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----		
<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> BA2106-A-6	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----		
<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> BA2106-A-7	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----		
<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> BA2106-A-8	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----		
<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> BA2106-A-9	EPP444	03-Feb-2021	16-Feb-2021	----	----		----	----	----		

**Legend & Qualifier Definitions**

Rec. HT: ALS recommended hold time (see units).



## Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Mercury in Soil/Solid by CVAAS	E510	151076	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	151075	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	151078	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	151077	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	151076	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	151075	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	151078	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	151077	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	152268	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	151076	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	152269	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	151075	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	151078	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	152268	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	152269	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.
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.
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.

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Work Order : VA21A2466  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : Weekly Bottom Ash-Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444  Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.



QUALITY CONTROL REPORT

Work Order : VA21A2466

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Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash-Suite
PO : VANCO 0000050390
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 10-Feb-2021 11:45
Date Analysis Commenced : 12-Feb-2021
Issue Date : 19-Feb-2021 15:59

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Dee Lee (Analyst, Metals), Ophelia Chiu (Department Manager - Organics, Organics), and Robin Weeks (Team Leader - Metals, Metals).

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Work Order : VA21A2466  
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: 151077)</b>											
VA21A2466-001	BA2106-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	10.9	1.73%	5%	----
<b>Physical Tests (QC Lot: 151078)</b>											
VA21A2466-001	BA2106-A-1	moisture	----	E144	0.25	%	20.8	24.8	17.5%	20%	----
<b>Metals (QC Lot: 151075)</b>											
VA21A2466-001	BA2106-A-1	aluminum	7429-90-5	E440	50	mg/kg	35400	51500	37.1%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	144	418	97.3%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	18.6	15.5	17.8%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	661	791	17.9%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.42	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.74	9.48	20.2%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	208	276	28.4%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	17.7	6.73	89.6%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	136000	138000	1.36%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	174	168	4.09%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	40.5	72.4	56.5%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	45300	8510	137%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	66900	59200	12.1%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	893	842	5.79%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	27.5	26.5	3.60%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12600	12600	0.462%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	914	877	4.16%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	18.5	15.2	19.6%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	125	121	2.75%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	12000	12300	3.01%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5170	4360	16.9%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.51	0.33	0.18	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.61	3.96	50.1%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	16800	15700	6.39%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	394	337	15.7%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	13200	10100	26.9%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	# 0.153	0.103	Diff <2x LOR	DUP-H



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: 151075) - continued</b>											
VA21A2466-001	BA2106-A-1	tin	7440-31-5	E440	2.0	mg/kg	143	110	26.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	497	764	42.3%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	5.16	3.75	31.7%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	2.78	2.40	14.7%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	37.4	34.2	8.89%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4570	26900	142%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.6	0.4	Diff <2x LOR	----
<b>Metals (QC Lot: 151076)</b>											
VA21A2466-001	BA2106-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: 151078)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 151075)</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: 151075) - 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: 151076)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>TCLP Metals (QCLot: 152268)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 152269)</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: 151077)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.8	95.0	105	---
<b>Physical Tests (QCLot: 151078)</b>									
moisture	---	E144	0.25	%	50 %	101	90.0	110	---
<b>Metals (QCLot: 151075)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	107	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	107	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.3	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	109	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.4	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	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	113	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	104	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	109	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	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	102	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	112	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	109	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	109	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	115	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	98.1	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	107	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	104	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: 151075) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	107	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	109	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	110	80.0	120	----
<b>Metals (QCLot: 151076)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 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: 152268)</b>										
VA21A2466-001	BA2106-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	104	50.0	140	----
<b>TCLP Metals (QCLot: 152269)</b>										
VA21A2466-001	BA2106-A-1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	97.8	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	12.1 mg/L	12.5 mg/L	96.7	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.241 mg/L	0.25 mg/L	96.5	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.32 mg/L	10 mg/L	93.2	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.227 mg/L	0.25 mg/L	90.7	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	1.17 mg/L	1.25 mg/L	93.4	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.21 mg/L	2.5 mg/L	88.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	239 mg/L	250 mg/L	95.6	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.89 mg/L	10 mg/L	98.9	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	232 mg/L	250 mg/L	92.7	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.07 mg/L	5 mg/L	101	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.117 mg/L	0.1 mg/L	117	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.9	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.72 mg/L	0.75 mg/L	95.4	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: 151075)</b>									
QC-151075-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	113	70.0	130	----
QC-151075-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	95.8	70.0	130	----
QC-151075-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
QC-151075-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	106	70.0	130	----
QC-151075-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
QC-151075-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	121	40.0	160	----
QC-151075-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	125	70.0	130	----
QC-151075-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
QC-151075-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
QC-151075-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
QC-151075-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	97.3	70.0	130	----
QC-151075-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
QC-151075-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	94.7	70.0	130	----
QC-151075-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	109	70.0	130	----
QC-151075-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-151075-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
QC-151075-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
QC-151075-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
QC-151075-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	96.9	70.0	130	----
QC-151075-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
QC-151075-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
QC-151075-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	108	70.0	130	----
QC-151075-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	106	40.0	160	----
QC-151075-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	93.7	70.0	130	----
QC-151075-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	116	70.0	130	----
QC-151075-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-151075-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	70.0	130	----
QC-151075-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	98.8	70.0	130	----
QC-151075-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	99.5	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A2466  
 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: 151076)</b>									
QC-151076-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----



<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	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
	Burnaby BC	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Fax:			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
	<input type="checkbox"/> Yes		<input type="checkbox"/> No		<b>Analysis Request</b>	
		Email 3:	dskrypnik@covanta.com			
			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 #:							Number of Containers
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite						
Contact:		LSD:	(includes 2:1 pH)						
Address:		Quote #:							
Phone:		Fax:							

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
BA2106-A-1	Environmental Division Vancouver Work Order Reference <b>VA21A2466</b>  Telephone : +1 604 253 4188	03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-2		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-3		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-4		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-5		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-6		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-7		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-8		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-9		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-10		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-11		03-Feb-21	9:00	Soil	X	X	X	1	
BA2106-A-12		03-Feb-21	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:
<i>[Signature]</i>	10 Feb 21	0800	<i>[Signature]</i>	10 Feb 21	11:45am	15 °C				Yes / No ? If Yes add SIF