

## Bottom Ash Data

2021 Week 5

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on February 9, 2021. The data represents bottom ash composite results for week 5 of 2021 (January 24, 2021 to January 30, 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** : **VA21A1859**  
**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** : 02-Feb-2021 11:50  
**Date Analysis Commenced** : 03-Feb-2021  
**Issue Date** : 09-Feb-2021 15:09

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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, 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	BA2105-A-1	BA2105-A-2	BA2105-A-3	BA2105-A-4	BA2105-A-5
(Matrix: Soil/Solid)					Client sampling date / time	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-001	VA21A1859-002	VA21A1859-003	VA21A1859-004	VA21A1859-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.6	21.8	23.3	23.5	23.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.3	11.3	11.4	11.4	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	33700	37000	33700	53000	40700	
antimony	7440-36-0	E440	0.10	mg/kg	164	121	132	114	148	
arsenic	7440-38-2	E440	0.10	mg/kg	21.7	18.6	21.2	17.8	24.4	
barium	7440-39-3	E440	0.50	mg/kg	625	549	477	626	554	
beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.39	0.44	0.76	0.54	
bismuth	7440-69-9	E440	0.20	mg/kg	8.10	13.8	10.3	7.98	7.69	
boron	7440-42-8	E440	5.0	mg/kg	327	182	211	214	239	
cadmium	7440-43-9	E440	0.020	mg/kg	19.5	17.3	14.2	11.6	20.6	
calcium	7440-70-2	E440	50	mg/kg	151000	135000	150000	142000	150000	
chromium	7440-47-3	E440	0.50	mg/kg	154	151	217	186	191	
cobalt	7440-48-4	E440	0.10	mg/kg	113	32.7	112	84.9	65.6	
copper	7440-50-8	E440	0.50	mg/kg	6090	9450	1690	2280	1800	
iron	7439-89-6	E440	50	mg/kg	62400	68000	64000	64800	75000	
lead	7439-92-1	E440	0.50	mg/kg	848	712	473	426	602	
lithium	7439-93-2	E440	2.0	mg/kg	32.5	28.5	32.0	37.9	32.4	
magnesium	7439-95-4	E440	20	mg/kg	11800	10300	11300	12200	12100	
manganese	7439-96-5	E440	1.0	mg/kg	1120	935	898	1390	1130	
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	18.4	23.8	18.1	18.1	22.4	
nickel	7440-02-0	E440	0.50	mg/kg	168	124	275	227	171	
phosphorus	7723-14-0	E440	50	mg/kg	10800	9460	9920	9050	10800	
potassium	7440-09-7	E440	100	mg/kg	5370	4440	5080	4700	5420	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.31	0.38	0.34	0.79	
silver	7440-22-4	E440	0.10	mg/kg	4.58	4.31	5.85	4.42	10.4	
sodium	7440-23-5	E440	50	mg/kg	16300	14400	15000	15500	15700	
strontium	7440-24-6	E440	0.50	mg/kg	335	294	455	370	318	
sulfur	7704-34-9	E440	1000	mg/kg	13100	13400	13200	11900	14100	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2105-A-1	BA2105-A-2	BA2105-A-3	BA2105-A-4	BA2105-A-5
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-001	VA21A1859-002	VA21A1859-003	VA21A1859-004	VA21A1859-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.080	0.066	0.074	0.060	0.075	
tin	7440-31-5	E440	2.0	mg/kg	192	122	143	135	231	
titanium	7440-32-6	E440	1.0	mg/kg	631	748	450	1350	689	
tungsten	7440-33-7	E440	0.50	mg/kg	8.41	8.34	5.71	6.55	7.54	
uranium	7440-61-1	E440	0.050	mg/kg	4.89	4.62	4.88	4.29	5.08	
vanadium	7440-62-2	E440	0.20	mg/kg	65.4	60.5	68.4	60.0	70.1	
zinc	7440-66-6	E440	2.0	mg/kg	12800	6160	5000	3420	4570	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.4	1.6	1.7	1.3	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.09	9.43	9.68	9.58	8.39	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.03	6.22	6.07	6.11	6.24	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.10	2.06	1.84	2.01	1.96	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.184	0.177	0.164	0.328	0.183	
calcium, TCLP	7440-70-2	E444	10	mg/L	2030	2160	2000	2030	2070	
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	0.784	3.31	1.07	0.504	0.410	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.01	0.547	0.845	1.10	0.916	
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	0.61	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	133	145	130	134	145	
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	0.67	0.69	0.69	1.14	0.46	
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	BA2105-A-1	BA2105-A-2	BA2105-A-3	BA2105-A-4	BA2105-A-5
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-001	VA21A1859-002	VA21A1859-003	VA21A1859-004	VA21A1859-005	
					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	45.8	43.1	50.0	71.6	44.1	

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	BA2105-A-6	BA2105-A-7	BA2105-A-8	BA2105-A-9	BA2105-A-10
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-006	VA21A1859-007	VA21A1859-008	VA21A1859-009	VA21A1859-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.2	23.4	22.7	22.0	22.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	11.4	11.4	11.5	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	38000	34400	32700	42400	32100	
antimony	7440-36-0	E440	0.10	mg/kg	124	151	138	157	142	
arsenic	7440-38-2	E440	0.10	mg/kg	24.7	20.4	20.8	31.6	19.3	
barium	7440-39-3	E440	0.50	mg/kg	620	540	592	550	541	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.43	0.54	0.52	0.43	
bismuth	7440-69-9	E440	0.20	mg/kg	8.01	13.0	15.2	11.5	12.3	
boron	7440-42-8	E440	5.0	mg/kg	223	314	278	266	204	
cadmium	7440-43-9	E440	0.020	mg/kg	12.1	16.5	16.2	15.7	13.8	
calcium	7440-70-2	E440	50	mg/kg	138000	149000	147000	159000	147000	
chromium	7440-47-3	E440	0.50	mg/kg	256	230	287	180	156	
cobalt	7440-48-4	E440	0.10	mg/kg	28.8	194	90.8	122	137	
copper	7440-50-8	E440	0.50	mg/kg	10000	4400	10200	2560	2990	
iron	7439-89-6	E440	50	mg/kg	61200	70500	94100	68400	70600	
lead	7439-92-1	E440	0.50	mg/kg	606	713	2550	609	729	
lithium	7439-93-2	E440	2.0	mg/kg	37.1	50.5	73.8	37.6	33.0	
magnesium	7439-95-4	E440	20	mg/kg	12100	12200	11700	12000	11400	
manganese	7439-96-5	E440	1.0	mg/kg	1040	1220	1100	1050	958	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	0.0883	
molybdenum	7439-98-7	E440	0.10	mg/kg	61.1	24.0	33.6	20.8	20.2	
nickel	7440-02-0	E440	0.50	mg/kg	221	337	246	221	349	
phosphorus	7723-14-0	E440	50	mg/kg	9420	11000	10200	11700	10700	
potassium	7440-09-7	E440	100	mg/kg	4800	5160	4960	5510	4940	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.38	0.39	0.40	0.32	
silver	7440-22-4	E440	0.10	mg/kg	4.15	5.81	7.61	7.69	5.75	
sodium	7440-23-5	E440	50	mg/kg	15200	16500	15200	16900	16400	
strontium	7440-24-6	E440	0.50	mg/kg	332	332	322	349	328	
sulfur	7704-34-9	E440	1000	mg/kg	11800	13400	13400	15100	13300	
thallium	7440-28-0	E440	0.050	mg/kg	0.063	0.073	0.089	0.085	0.070	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2105-A-6	BA2105-A-7	BA2105-A-8	BA2105-A-9	BA2105-A-10
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-006	VA21A1859-007	VA21A1859-008	VA21A1859-009	VA21A1859-010
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	130	177	162	261	132
titanium	7440-32-6	E440	1.0	mg/kg	775	510	592	785	559
tungsten	7440-33-7	E440	0.50	mg/kg	5.45	6.83	10.8	8.02	8.57
uranium	7440-61-1	E440	0.050	mg/kg	4.51	5.04	4.86	5.85	4.94
vanadium	7440-62-2	E440	0.20	mg/kg	58.8	68.5	72.0	68.7	58.6
zinc	7440-66-6	E440	2.0	mg/kg	4160	6060	5450	5350	7680
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.0	<1.0	1.3	1.0
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.9
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.03	9.32	8.72	9.11	9.25
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92
pH, TCLP final	----	EPP444	0.010	pH units	6.14	6.34	6.03	6.21	6.06
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.87	2.44	2.04	2.38	1.96
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.327	0.175	0.422	0.268	0.176
calcium, TCLP	7440-70-2	E444	10	mg/L	1940	2110	1950	2170	2080
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	0.625	1.24	0.736	1.44	0.694
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.587	0.619	0.742	1.14	1.24
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	144	143	135	150	139
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	0.65	0.52	0.74	0.69	0.59
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	BA2105-A-6	BA2105-A-7	BA2105-A-8	BA2105-A-9	BA2105-A-10
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00	27-Jan-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-006	VA21A1859-007	VA21A1859-008	VA21A1859-009	VA21A1859-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	55.6	38.7	46.6	65.9	49.8	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2105-A-11	BA2105-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-011	VA21A1859-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.1	22.1	----	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	----	----	----	----
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	33300	32700	----	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	138	130	----	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	22.2	20.0	----	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	468	529	----	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.39	----	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	7.68	7.75	----	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	248	177	----	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	13.8	15.8	----	----	----	----
calcium	7440-70-2	E440	50	mg/kg	144000	142000	----	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	167	157	----	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	39.5	37.9	----	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	2100	3210	----	----	----	----
iron	7439-89-6	E440	50	mg/kg	63100	65200	----	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	1550	1730	----	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	28.7	29.5	----	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	11500	11100	----	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	1360	864	----	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.188	<0.0500	----	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	24.2	16.3	----	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	162	140	----	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	9460	10800	----	----	----	----
potassium	7440-09-7	E440	100	mg/kg	4660	4860	----	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.36	----	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	4.48	5.09	----	----	----	----
sodium	7440-23-5	E440	50	mg/kg	15000	14700	----	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	336	311	----	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	13000	13500	----	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.070	----	----	----	----



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2105-A-11	BA2105-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					27-Jan-2021 09:00	27-Jan-2021 09:00	---	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-011	VA21A1859-012	-----	-----	-----	-----
					Result	Result	---	---	---	---
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	123	133	---	---	---	---
titanium	7440-32-6	E440	1.0	mg/kg	416	365	---	---	---	---
tungsten	7440-33-7	E440	0.50	mg/kg	31.6	6.64	---	---	---	---
uranium	7440-61-1	E440	0.050	mg/kg	4.78	4.85	---	---	---	---
vanadium	7440-62-2	E440	0.20	mg/kg	63.6	66.6	---	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg	4180	4570	---	---	---	---
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.2	---	---	---	---
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	---	---	---	---
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.14	9.11	---	---	---	---
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	---	---	---	---
pH, TCLP final	----	EPP444	0.010	pH units	6.12	6.12	---	---	---	---
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	1.89	2.07	---	---	---	---
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.247	0.211	---	---	---	---
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	2210	---	---	---	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	---
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.18	1.81	---	---	---	---
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.27	0.817	---	---	---	---
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	134	151	---	---	---	---
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.58	0.66	---	---	---	---
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					Client sample ID	BA2105-A-11	BA2105-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	27-Jan-2021 09:00	27-Jan-2021 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA21A1859-011	VA21A1859-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	42.3	71.6	----	----	----	

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA21A1859</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	: 02-Feb-2021 11:50
PO	: VANCO 0000050390	Issue Date	: 09-Feb-2021 15:09
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	VA21A1859-001	BA2105-A-1	antimony	7440-36-0	E440	30.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	boron	7440-42-8	E440	49.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	cadmium	7440-43-9	E440	40.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	cobalt	7440-48-4	E440	56.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	copper	7440-50-8	E440	118 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	tin	7440-31-5	E440	40.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	titanium	7440-32-6	E440	43.4 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A1859-001	BA2105-A-1	zinc	7440-66-6	E440	111 % 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 BA2105-A-1	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-10	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-11	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-12	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-2	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-3	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-Feb-2021	15 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-4	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✓	09-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>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-5	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✔	09-Feb-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-6	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✔	09-Feb-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-7	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✔	09-Feb-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-8	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✔	09-Feb-2021	15 days	0 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2105-A-9	E510	27-Jan-2021	08-Feb-2021	28 days	12 days	✔	09-Feb-2021	15 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2105-A-1	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2105-A-10	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2105-A-11	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2105-A-12	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 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 BA2105-A-2	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-3	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-4	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-5	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-6	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-7	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-8	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2105-A-9	E440	27-Jan-2021	08-Feb-2021	180 days	12 days	✔	08-Feb-2021	167 days	0 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2105-A-1	E144	27-Jan-2021	----	----	----		03-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 BA2105-A-10	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-11	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-12	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-2	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-3	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-4	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-5	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-6	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2105-A-7	E144	27-Jan-2021	----	----	----		03-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 BA2105-A-8	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2105-A-9	E144	27-Jan-2021	----	----	----		03-Feb-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-1	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-10	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-11	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-12	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-2	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-3	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2105-A-4	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 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>											
<b>LDPE bag</b> BA2105-A-5	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
<b>LDPE bag</b> BA2105-A-6	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
<b>LDPE bag</b> BA2105-A-7	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
<b>LDPE bag</b> BA2105-A-8	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
<b>LDPE bag</b> BA2105-A-9	E108	27-Jan-2021	08-Feb-2021	30 days	12 days	✔	09-Feb-2021	17 days	0 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2105-A-1	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2105-A-10	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2105-A-11	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2105-A-12	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-2	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-3	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-4	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-5	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-6	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-7	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-8	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
<b>Glass vial - total (lab preserved)</b> BA2105-A-9	E512	04-Feb-2021	----	----	----		07-Feb-2021	36 days	11 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2105-A-1	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-10	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-11	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-12	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-2	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-3	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-4	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-5	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-6	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2105-A-7	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔	





Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2105-A-8	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2105-A-9	E444	04-Feb-2021	----	----	----		07-Feb-2021	188 days	11 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> BA2105-A-1	EPP444	27-Jan-2021	04-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> BA2105-A-10	EPP444	27-Jan-2021	04-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> BA2105-A-11	EPP444	27-Jan-2021	04-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> BA2105-A-12	EPP444	27-Jan-2021	04-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> BA2105-A-2	EPP444	27-Jan-2021	04-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> BA2105-A-3	EPP444	27-Jan-2021	04-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> BA2105-A-4	EPP444	27-Jan-2021	04-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>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2105-A-5	EPP444	27-Jan-2021	04-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2105-A-6	EPP444	27-Jan-2021	04-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2105-A-7	EPP444	27-Jan-2021	04-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2105-A-8	EPP444	27-Jan-2021	04-Feb-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2105-A-9	EPP444	27-Jan-2021	04-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	147726	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	147725	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	147728	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	147727	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	147726	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	147725	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	147728	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	147727	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	148917	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	147726	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	148916	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	147725	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	147728	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	148917	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	148916	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 : VA21A1859  
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 : VA21A1859

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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 : 02-Feb-2021 11:50
Date Analysis Commenced : 03-Feb-2021
Issue Date : 09-Feb-2021 15:09

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), Kim Jensen (Department Manager - Metals), Ophelia Chiu (Department Manager - Organics), Owen Cheng (Metals), and Robin Weeks (Team Leader - Metals).

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Work Order : VA21A1859  
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: 147727)</b>											
VA21A1859-001	BA2105-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.7	1.64%	5%	----
<b>Physical Tests (QC Lot: 147728)</b>											
VA21A1859-001	BA2105-A-1	moisture	----	E144	0.25	%	22.6	20.4	10.1%	20%	----
<b>Metals (QC Lot: 147725)</b>											
VA21A1859-001	BA2105-A-1	aluminum	7429-90-5	E440	50	mg/kg	33700	36600	8.23%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	164	121	30.0%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	21.7	19.6	10.2%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	625	612	2.10%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.43	0.08	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.10	10.5	25.5%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	327	198	49.0%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	19.5	12.9	40.5%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	151000	142000	6.12%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	154	160	3.38%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	113	63.1	56.6%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	6090	1570	118%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	62400	73100	15.8%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	848	661	24.7%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	32.5	32.6	0.541%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11800	13000	9.01%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1120	901	21.4%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	18.4	16.6	9.98%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	168	198	16.2%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10800	10200	5.23%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5370	4990	7.28%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.37	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.58	4.36	4.91%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16300	17000	4.29%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	335	329	1.91%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	13100	12200	7.14%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.080	0.066	0.014	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

*Laboratory Duplicate (DUP) Report*

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Metals (QC Lot: 147725) - continued</b>											
VA21A1859-001	BA2105-A-1	tin	7440-31-5	E440	2.0	mg/kg	192	127	40.8%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	631	980	43.4%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	8.41	7.58	10.4%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.89	4.48	8.82%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	65.4	65.8	0.640%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	12800	3680	111%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.1	0.1	Diff <2x LOR	----
<b>Metals (QC Lot: 147726)</b>											
VA21A1859-001	BA2105-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: 147728)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 147725)</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: 147725) - 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: 147726)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>TCLP Metals (QCLot: 148916)</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	----
<b>TCLP Metals (QCLot: 148917)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



## Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 147727)</b>									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
<b>Physical Tests (QCLot: 147728)</b>									
moisture	---	E144	0.25	%	50 %	98.9	90.0	110	---
<b>Metals (QCLot: 147725)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	111	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	109	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	110	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	102	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	108	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	108	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	110	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	112	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	106	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	111	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	103	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	104	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	106	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	108	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	108	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.4	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: 147725) - continued</b>									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	108	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	110	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	80.0	120	----
<b>Metals (QCLot: 147726)</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  $\geq 1 \times$  spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>TCLP Metals (QCLot: 148916)</b>										
VA21A1859-001	BA2105-A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	105	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.1 mg/L	12.5 mg/L	105	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.238 mg/L	0.25 mg/L	95.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.85 mg/L	10 mg/L	88.5	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.243 mg/L	0.25 mg/L	97.1	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	1.27 mg/L	1.25 mg/L	101	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	2.38 mg/L	2.5 mg/L	95.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	261 mg/L	250 mg/L	104	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	246 mg/L	250 mg/L	98.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.45 mg/L	2.5 mg/L	98.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.10 mg/L	5 mg/L	102	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.119 mg/L	0.1 mg/L	119	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
<b>TCLP Metals (QCLot: 148917)</b>										
VA21A1859-001	BA2105-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.6	50.0	140	----



## Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
<b>Metals (QCLot: 147725)</b>									
QC-147725-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
QC-147725-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	102	70.0	130	----
QC-147725-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	111	70.0	130	----
QC-147725-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	111	70.0	130	----
QC-147725-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
QC-147725-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
QC-147725-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	118	70.0	130	----
QC-147725-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	107	70.0	130	----
QC-147725-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	112	70.0	130	----
QC-147725-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-147725-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-147725-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	111	70.0	130	----
QC-147725-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-147725-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	104	70.0	130	----
QC-147725-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	107	70.0	130	----
QC-147725-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	113	70.0	130	----
QC-147725-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
QC-147725-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-147725-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	104	70.0	130	----
QC-147725-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	113	70.0	130	----
QC-147725-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	----
QC-147725-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
QC-147725-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.0	40.0	160	----
QC-147725-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.9	70.0	130	----
QC-147725-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	121	70.0	130	----
QC-147725-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	109	70.0	130	----
QC-147725-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	112	70.0	130	----
QC-147725-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	110	70.0	130	----
QC-147725-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	99.7	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A1859  
 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: 147726)</b>									
QC-147726-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.7	70.0	130	----



ALS Environmental

Chain of Custody / Analytical Request Form

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COC #

Page of

<b>Report To</b>			<b>Report Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)					
Company: Covanta Energy			<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)					
Contact: Steve McKinney / Dan Skrypnik			<input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax			<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT					
Address: 5150 Riverbend Drive			Email 1: smckinney@covanta.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT					
Burnaby BC			Email 2: rjohnson4@covanta.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
Phone: 604-521-1025			Email 3: dskrypnik@covanta.com			<b>Analysis Request</b>					
Fax: <input type="checkbox"/> Yes <input type="checkbox"/> No			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>MET-TCLP-VA (all metals, Hg)</td> <td>MOISTURE</td> <td>Chrome 6</td> <td>MET-CSR+FULL-VA (all metals)</td> <td rowspan="4">Number of Containers</td> </tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><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)	Number of Containers												
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																								
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:									Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)				
1	BA2105-A-1	27-Jan-21	9:00	Soil	X	X		X				
2	BA2105-A-2	27-Jan-21	9:00	Soil	X	X		X				1
3	BA2105-A-3	27-Jan-21	9:00	Soil	X	X		X				1
4	BA2105-A-4	27-Jan-21	9:00	Soil	X	X		X				1
5	BA2105-A-5	27-Jan-21	9:00	Soil	X	X		X				1
6	BA2105-A-6	27-Jan-21	9:00	Soil	X	X		X				1
7	BA2105-A-7	27-Jan-21	9:00	Soil	X	X		X				1
8	BA2105-A-8	27-Jan-21	9:00	Soil	X	X		X				1
9	BA2105-A-9	27-Jan-21	9:00	Soil	X	X		X				1
10	BA2105-A-10	27-Jan-21	9:00	Soil	X	X		X				1
11	BA2105-A-11	27-Jan-21	9:00	Soil	X	X		X				1
12	BA2105-A-12	27-Jan-21	9:00	Soil	X	X		X				1

Environmental Division  
Vancouver  
Work Order Reference  
**VA21A1859**

Telephone: +1 604 253 4188

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): 2-feb-20	Time (hh-mm): 0800	Received by: MB	Date: Feb 2	Time: 11:50 AM	Temperature: 17.5 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF