

## Bottom Ash Data

2021 Week 16

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on April 28, 2021. The data represents bottom ash composite results for week 16 of 2021 (April 11, 2021 to April 17, 2021).

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



**Environmental**

## CERTIFICATE OF ANALYSIS

**Work Order** : **VA21A7330**  
**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** : 20-Apr-2021 11:30  
**Date Analysis Commenced** : 23-Apr-2021  
**Issue Date** : 28-Apr-2021 10:40

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>
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
Kim Jensen	Department Manager - Metals	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.

## Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2116-A-1	BA2116-A-2	BA2116-A-3	BA2116-A-4	BA2116-A-5
(Matrix: Soil/Solid)					Client sampling date / time	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-001	VA21A7330-002	VA21A7330-003	VA21A7330-004	VA21A7330-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	16.6	17.8	18.3	17.5	17.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	11.5	11.5	11.5	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	40400	51000	34100	37500	33600	
antimony	7440-36-0	E440	0.10	mg/kg	120	125	298	128	124	
arsenic	7440-38-2	E440	0.10	mg/kg	31.1	43.0	35.1	26.9	32.8	
barium	7440-39-3	E440	0.50	mg/kg	604	720	515	645	548	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.41	0.35	0.43	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	8.51	30.8	8.32	8.10	12.0	
boron	7440-42-8	E440	5.0	mg/kg	211	278	181	181	176	
cadmium	7440-43-9	E440	0.020	mg/kg	10.7	12.1	9.96	8.53	12.9	
calcium	7440-70-2	E440	50	mg/kg	144000	151000	135000	143000	140000	
chromium	7440-47-3	E440	0.50	mg/kg	165	213	139	139	154	
cobalt	7440-48-4	E440	0.10	mg/kg	63.3	39.3	45.6	161	25.5	
copper	7440-50-8	E440	0.50	mg/kg	3250	6580	25700	2280	9270	
iron	7439-89-6	E440	50	mg/kg	80900	85500	59900	55800	59300	
lead	7439-92-1	E440	0.50	mg/kg	589	534	441	778	1270	
lithium	7439-93-2	E440	2.0	mg/kg	28.3	24.0	20.8	23.7	22.8	
magnesium	7439-95-4	E440	20	mg/kg	13100	12800	10800	11800	11200	
manganese	7439-96-5	E440	1.0	mg/kg	916	1060	800	932	801	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0672	<0.0500	0.0577	<0.0500	0.0714	
molybdenum	7439-98-7	E440	0.10	mg/kg	14.6	20.3	15.4	35.7	17.2	
nickel	7440-02-0	E440	0.50	mg/kg	114	877	220	242	174	
phosphorus	7723-14-0	E440	50	mg/kg	11100	12000	9300	8720	10900	
potassium	7440-09-7	E440	100	mg/kg	4950	5750	4620	4540	5880	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.53	0.31	0.29	0.39	
silver	7440-22-4	E440	0.10	mg/kg	5.50	5.37	7.26	7.36	7.50	
sodium	7440-23-5	E440	50	mg/kg	15200	17800	14000	13800	15100	
strontium	7440-24-6	E440	0.50	mg/kg	297	338	282	307	295	
sulfur	7704-34-9	E440	1000	mg/kg	12400	13800	11400	12300	13600	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2116-A-1	BA2116-A-2	BA2116-A-3	BA2116-A-4	BA2116-A-5
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-001	VA21A7330-002	VA21A7330-003	VA21A7330-004	VA21A7330-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	191	139	262	119	286	
titanium	7440-32-6	E440	1.0	mg/kg	652	738	285	503	307	
tungsten	7440-33-7	E440	0.50	mg/kg	8.12	7.13	6.74	4.78	5.87	
uranium	7440-61-1	E440	0.050	mg/kg	2.66	3.10	2.29	2.62	3.12	
vanadium	7440-62-2	E440	0.20	mg/kg	36.4	41.7	32.3	37.3	35.6	
zinc	7440-66-6	E440	2.0	mg/kg	4380	10300	4060	3460	5980	
zirconium	7440-67-7	E440	1.0	mg/kg	2.2	1.5	<7.0 <sup>DLM</sup>	1.1	1.0	
<b>Speciated Metals</b>										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.70	----	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	11.8	11.8	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	10.4	10.4	10.3	10.6	10.3	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.36	6.63	6.43	6.54	6.43	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.85	2.04	1.95	1.99	2.04	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.151	0.130	0.236	0.178	0.200	
calcium, TCLP	7440-70-2	E444	10	mg/L	1850	1970	1990	1940	2030	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.78	0.422	0.772	1.50	0.728	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.876	0.631	0.834	0.684	0.729	
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	125	129	122	127	124	
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	0.47	0.41	0.76	0.66	0.35	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2116-A-1	BA2116-A-2	BA2116-A-3	BA2116-A-4	BA2116-A-5
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-001	VA21A7330-002	VA21A7330-003	VA21A7330-004	VA21A7330-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
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	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	56.2	24.1	33.9	33.5	33.8	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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	BA2116-A-6	BA2116-A-7	BA2116-A-8	BA2116-A-9	BA2116-A-10
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-006	VA21A7330-007	VA21A7330-008	VA21A7330-009	VA21A7330-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	17.5	16.8	17.7	17.8	19.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	11.3	11.3	11.3	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	39700	31300	35800	35300	33900	
antimony	7440-36-0	E440	0.10	mg/kg	129	130	116	163	145	
arsenic	7440-38-2	E440	0.10	mg/kg	29.3	35.5	33.9	46.9	31.1	
barium	7440-39-3	E440	0.50	mg/kg	680	558	570	538	541	
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.46	0.39	0.37	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	17.1	11.8	8.10	11.4	8.56	
boron	7440-42-8	E440	5.0	mg/kg	166	179	144	164	222	
cadmium	7440-43-9	E440	0.020	mg/kg	9.33	14.1	11.1	12.8	10.5	
calcium	7440-70-2	E440	50	mg/kg	130000	149000	138000	146000	138000	
chromium	7440-47-3	E440	0.50	mg/kg	143	159	203	586	148	
cobalt	7440-48-4	E440	0.10	mg/kg	26.6	213	41.2	46.2	40.2	
copper	7440-50-8	E440	0.50	mg/kg	11000	2000	1890	11000	7940	
iron	7439-89-6	E440	50	mg/kg	56300	70100	63600	64400	70900	
lead	7439-92-1	E440	0.50	mg/kg	440	535	576	1960	713	
lithium	7439-93-2	E440	2.0	mg/kg	29.1	29.2	21.9	21.6	22.2	
magnesium	7439-95-4	E440	20	mg/kg	12500	11800	12700	13000	11800	
manganese	7439-96-5	E440	1.0	mg/kg	777	1640	980	943	908	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0640	<0.0500	0.0709	0.0777	
molybdenum	7439-98-7	E440	0.10	mg/kg	15.7	18.6	17.6	18.5	16.2	
nickel	7440-02-0	E440	0.50	mg/kg	137	109	117	291	713	
phosphorus	7723-14-0	E440	50	mg/kg	9280	11800	10400	12700	11800	
potassium	7440-09-7	E440	100	mg/kg	5520	5630	5400	5270	4660	
selenium	7782-49-2	E440	0.20	mg/kg	0.34	0.72	0.37	0.54	0.44	
silver	7440-22-4	E440	0.10	mg/kg	4.34	5.32	4.26	6.31	18.1	
sodium	7440-23-5	E440	50	mg/kg	16600	15500	15900	15000	13900	
strontium	7440-24-6	E440	0.50	mg/kg	374	352	318	356	299	
sulfur	7704-34-9	E440	1000	mg/kg	11800	14700	12700	14700	12400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2116-A-6	BA2116-A-7	BA2116-A-8	BA2116-A-9	BA2116-A-10
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-006	VA21A7330-007	VA21A7330-008	VA21A7330-009	VA21A7330-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	171	130	111	151	170	
titanium	7440-32-6	E440	1.0	mg/kg	595	324	463	295	399	
tungsten	7440-33-7	E440	0.50	mg/kg	11.9	6.32	5.23	8.49	30.9	
uranium	7440-61-1	E440	0.050	mg/kg	2.63	2.79	2.67	2.93	2.45	
vanadium	7440-62-2	E440	0.20	mg/kg	35.8	35.8	42.5	37.9	31.7	
zinc	7440-66-6	E440	2.0	mg/kg	3660	4400	3280	5300	3570	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	<1.0	1.2	1.0	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.9	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	10.3	10.4	10.4	10.4	10.3	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.42	6.40	6.62	6.82	6.54	
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	2.00	1.96	2.05	1.93	1.95	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.301	0.177	0.143	0.134	0.143	
calcium, TCLP	7440-70-2	E444	10	mg/L	1940	1960	2020	1870	1990	
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	0.651	0.508	0.502	0.773	0.555	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.427	0.424	0.701	0.791	0.634	
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	122	125	128	122	126	
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	0.76	0.49	0.46	0.46	0.40	
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	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	





## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2116-A-6	BA2116-A-7	BA2116-A-8	BA2116-A-9	BA2116-A-10
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	14-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-006	VA21A7330-007	VA21A7330-008	VA21A7330-009	VA21A7330-010	
					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	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	24.0	39.1	29.5	37.5	26.9	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2116-A-11	BA2116-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	14-Apr-2021 09:00	14-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-011	VA21A7330-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	16.8	18.8	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.4	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	25700	39500	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	200	135	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	41.4	35.2	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	384	484	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.43	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	11.8	11.8	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	202	209	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	13.7	14.3	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	144000	150000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	151	172	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	55.1	72.4	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1610	5770	----	----	----	
iron	7439-89-6	E440	50	mg/kg	50800	59500	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	2630	1470	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	24.0	22.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12100	12500	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1060	1090	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0790	0.0984	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	15.7	16.8	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	120	237	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11600	11400	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5090	5480	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.53	0.48	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	10.4	11.4	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14600	16000	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	305	334	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13500	12200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2116-A-11	BA2116-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	14-Apr-2021 09:00	14-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-011	VA21A7330-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	171	131	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	172	210	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	6.32	4.75	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	2.96	3.09	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	33.6	36.6	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5280	3930	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.2	---	---	---	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	12.0	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	10.1	10.4	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.48	6.45	---	---	---	
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	2.03	1.88	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.158	0.132	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	1940	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.60	0.648	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.724	0.566	---	---	---	
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	126	123	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.41	0.43	---	---	---	
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	---	---	---	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2116-A-11	BA2116-A-12	----	----	----
Client sampling date / time					14-Apr-2021 09:00	14-Apr-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A7330-011	VA21A7330-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>TCLP Metals</b>										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	26.4	44.4	----	----	----	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

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

## QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: <b>VA21A7330</b>	Page	: 1 of 15
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	: 20-Apr-2021 11:30
PO	: VANCO 0000050390	Issue Date	: 28-Apr-2021 10:40
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	VA21A7330-001	BA2116-A-1	cobalt	7440-48-4	E440	171 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	copper	7440-50-8	E440	58.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	lead	7439-92-1	E440	78.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	lithium	7439-93-2	E440	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	molybdenum	7439-98-7	E440	60.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	nickel	7440-02-0	E440	46.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	strontium	7440-24-6	E440	61.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A7330-001	BA2116-A-1	titanium	7440-32-6	E440	45.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

**Result Qualifiers**

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



## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 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 BA2116-A-1	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-10	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-11	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-12	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-2	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-3	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2116-A-4	E510	14-Apr-2021	26-Apr-2021	----	13 days	✓	26-Apr-2021	28 days	1 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2116-A-5	E510	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	28 days	1 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2116-A-6	E510	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	28 days	1 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2116-A-7	E510	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	28 days	1 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2116-A-8	E510	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	28 days	1 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2116-A-9	E510	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	28 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2116-A-1	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2116-A-10	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2116-A-11	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2116-A-12	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 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 BA2116-A-2	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-3	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-4	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-5	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-6	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-7	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-8	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2116-A-9	E440	14-Apr-2021	26-Apr-2021	----	13 days	✔	26-Apr-2021	180 days	1 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2116-A-1	E144	14-Apr-2021	----	----	----		23-Apr-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 BA2116-A-10	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-11	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-12	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-2	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-3	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-4	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-5	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-6	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2116-A-7	E144	14-Apr-2021	----	----	----		23-Apr-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 BA2116-A-8	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2116-A-9	E144	14-Apr-2021	----	----	----		23-Apr-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-1	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-10	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-11	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-12	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-2	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-3	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-4	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 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 BA2116-A-5	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-6	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-7	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-8	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2116-A-9	E108	14-Apr-2021	26-Apr-2021	----	13 days	✔	27-Apr-2021	30 days	1 days	✔	
<b>Speciated Metals : Hexavalent Chromium (Cr VI) by IC</b>											
Glass soil jar/Teflon lined cap BA2116-A-1	E532	14-Apr-2021	23-Apr-2021	30 days	9 days	✔	23-Apr-2021	7 days	1 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-1	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-10	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-11	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 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		
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-12	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-2	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-3	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-4	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-5	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-6	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-7	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-8	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2116-A-9	E512	23-Apr-2021	----	----	----		26-Apr-2021	----	13 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) BA2116-A-1	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-10	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-11	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-12	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-2	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-3	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-4	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-5	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2116-A-6	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 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> BA2116-A-7	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2116-A-8	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2116-A-9	E444	23-Apr-2021	----	----	----		26-Apr-2021	180 days	13 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> BA2116-A-1	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-10	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-11	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-12	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-2	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-3	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-4	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-5	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-6	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-7	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-8	EPP444	14-Apr-2021	23-Apr-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> BA2116-A-9	EPP444	14-Apr-2021	23-Apr-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>							
Hexavalent Chromium (Cr VI) by IC	E532	183939	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	183946	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	183947	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	183949	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	183948	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	183939	2	1	200.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	183946	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	183947	2	15	13.3	10.0	✔
Moisture Content by Gravimetry	E144	183949	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	183948	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	183939	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	185356	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	183946	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	185251	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	183947	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	183949	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	185356	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	185251	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.
Hexavalent Chromium (Cr VI) by IC	E532 Edmonton - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
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.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532  Edmonton - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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 : VA21A7330

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 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 : 20-Apr-2021 11:30
Date Analysis Commenced : 23-Apr-2021
Issue Date : 28-Apr-2021 10:40

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 Alex Drake (Lab Analyst, Inorganics, Edmonton, Alberta), Kim Jensen (Department Manager - Metals, Metals, Burnaby, British Columbia), Ophelia Chiu (Department Manager - Organics, Organics, Burnaby, British Columbia), and Robin Weeks (Team Leader - Metals, Metals, Burnaby, British Columbia).

Page : 2 of 11  
Work Order : VA21A7330  
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: 183948)</b>											
VA21A7330-001	BA2116-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.2	1.3%	5%	----
<b>Physical Tests (QC Lot: 183949)</b>											
VA21A7330-001	BA2116-A-1	moisture	----	E144	0.25	%	16.6	18.0	8.21%	20%	----
<b>Metals (QC Lot: 183946)</b>											
VA21A7330-001	BA2116-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0672	0.0673	0.00009	Diff <2x LOR	----
<b>Metals (QC Lot: 183947)</b>											
VA21A7330-001	BA2116-A-1	aluminum	7429-90-5	E440	50	mg/kg	40400	36600	10.0%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	120	160	28.7%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	31.1	31.6	1.79%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	604	527	13.6%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	0.004	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.51	8.76	2.86%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	211	211	0.241%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	10.7	14.4	29.8%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	144000	145000	0.934%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	165	195	16.6%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	63.3	805	171%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	3250	1790	58.0%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	80900	61000	28.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	589	1350	78.7%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	28.3	40.6	35.7%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	13100	12000	8.19%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	916	821	10.9%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	14.6	27.4	60.6%	40%	DUP-H
		nickel	7440-02-0	E440	0.50	mg/kg	114	182	46.1%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11100	10400	5.99%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4950	5140	3.80%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.37	0.01	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.50	5.07	8.07%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15200	15100	0.277%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	297	561	61.5%	40%	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: 183947) - continued</b>											
VA21A7330-001	BA2116-A-1	sulfur	7704-34-9	E440	1000	mg/kg	12400	13900	10.9%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	191	265	32.5%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	652	412	45.2%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	8.12	6.14	27.8%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	2.66	2.64	1.12%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	36.4	34.4	5.68%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4380	3710	16.6%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	2.2	1.6	0.5	Diff <2x LOR	----
<b>Speciated Metals (QC Lot: 183939)</b>											
VA21A7330-001	BA2116-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	0.70	0.68	2.00%	35%	----

**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: 183949)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 183946)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 183947)</b>						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----





Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 183947) - continued</b>						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
<b>Speciated Metals (QCLot: 183939)</b>						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 185251)</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	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
<b>TCLP Metals (QCLot: 185356)</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: 183948)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
<b>Physical Tests (QCLot: 183949)</b>									
moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
<b>Metals (QCLot: 183946)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
<b>Metals (QCLot: 183947)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	99.9	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	98.3	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	93.8	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.5	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.6	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.4	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	106	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	100.0	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.9	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	108	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	100	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	98.8	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	101	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	106	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
<b>Metals (QCLot: 183947) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	99.3	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	103	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.8	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	88.8	80.0	120	----
<b>Speciated Metals (QCLot: 183939)</b>									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	16 mg/kg	99.2	80.0	120	----



### Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>TCLP Metals (QCLot: 185251)</b>										
VA21A7330-001	BA2116-A-1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	98.2	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.4	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	101	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.223 mg/L	0.25 mg/L	89.1	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.12 mg/L	10 mg/L	91.2	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.228 mg/L	0.25 mg/L	91.4	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	1.11 mg/L	1.25 mg/L	88.5	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.12 mg/L	2.5 mg/L	84.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	213 mg/L	250 mg/L	85.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.58 mg/L	10 mg/L	95.8	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	267 mg/L	250 mg/L	107	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.16 mg/L	2.5 mg/L	86.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.54 mg/L	5 mg/L	90.8	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.109 mg/L	0.1 mg/L	109	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.2	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.66 mg/L	5 mg/L	93.3	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.68 mg/L	0.75 mg/L	90.8	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	86.7	70.0	130	----
<b>TCLP Metals (QCLot: 185356)</b>										
VA21A7330-001	BA2116-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	95.2	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: 183946)</b>									
QC-183946-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	96.4	70.0	130	----
<b>Metals (QCLot: 183947)</b>									
QC-183947-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
QC-183947-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	113	70.0	130	----
QC-183947-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
QC-183947-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	112	70.0	130	----
QC-183947-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
QC-183947-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	134	40.0	160	----
QC-183947-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	97.1	70.0	130	----
QC-183947-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	109	70.0	130	----
QC-183947-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
QC-183947-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.8	70.0	130	----
QC-183947-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	96.3	70.0	130	----
QC-183947-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
QC-183947-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
QC-183947-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
QC-183947-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	----
QC-183947-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
QC-183947-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
QC-183947-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	100	70.0	130	----
QC-183947-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	93.6	70.0	130	----
QC-183947-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
QC-183947-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
QC-183947-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	102	70.0	130	----
QC-183947-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	139	40.0	160	----
QC-183947-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	98.9	70.0	130	----
QC-183947-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	117	70.0	130	----
QC-183947-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-183947-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A7330  
 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: 183947) - continued</b>									
QC-183947-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	95.5	70.0	130	----
QC-183947-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	100	70.0	130	----
<b>Speciated Metals (QCLot: 183939)</b>									
QC-183939-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	220 mg/kg	109	80.0	120	----



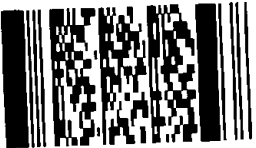
<b>Report To</b>		<b>Report Format / Distribution</b>		<b>Service Requested (Rush for routine analysis subject to availability)</b>	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypnyk	<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: dskrypnyk@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 #:											
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite										
Contact:		LSD:	(includes 2:1 pH)										
Address:		Quote #:											
Phone:													

Lab Work Order # (lab use only)	7330	ALS Contact:		Sampler:											
------------------------------------	------	--------------	--	----------	--	--	--	--	--	--	--	--	--	--	--

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)							Number of Containers
1	BA2116-A-1	14-Apr-21	9:00	Soil	X	X	X	X							1
2	BA2116-A-2	14-Apr-21	9:00	Soil	X	X		X							1
3	BA2116-A-3	14-Apr-21	9:00	Soil	X	X		X							1
4	BA2116-A-4	14-Apr-21	9:00	Soil	X	X		X							1
5	BA2116-A-5	14-Apr-21	9:00	Soil	X	X		X							1
6	BA2116-A-6	14-Apr-21	9:00	Soil	X	X		X							1
7	BA2116-A-7	14-Apr-21	9:00	Soil	X	X		X							1
8	BA2116-A-8	14-Apr-21	9:00	Soil	X	X		X							1
9	BA2116-A-9	14-Apr-21	9:00	Soil	X	X		X							1
10	BA2116-A-10	14-Apr-21	9:00	Soil	X	X		X							1
11	BA2116-A-11	14-Apr-21	9:00	Soil	X	X		X							1
12	BA2116-A-12	14-Apr-21	9:00	Soil	X	X		X							1

Environmental Division  
 Vancouver  
 Work Order Reference  
**VA21A7330**



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)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
[Signature]	20-Apr-21	0800	PO			21.5°C		April 20 2021	11:30am	Yes / No ? If Yes add SIF