

## Bottom Ash Data

2021 Week 18

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on May 12, 2021. The data represents bottom ash composite results for week 18 of 2021 (April 25, 2021 to May 1, 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** : **VA21A8402**  
**Contact** : **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** : 04-May-2021 12:45  
**Date Analysis Commenced** : 06-May-2021  
**Issue Date** : 12-May-2021 09:56

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>
Janice Leung	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
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.



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2118-A-1	BA2118-A-2	BA2118-A-3	BA2118-A-4	BA2118-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-001	VA21A8402-002	VA21A8402-003	VA21A8402-004	VA21A8402-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.4	17.7	15.5	19.3	17.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.9	11.0	10.8	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	30400	39000	27200	29200	50900	
antimony	7440-36-0	E440	0.10	mg/kg	133	107	152	145	114	
arsenic	7440-38-2	E440	0.10	mg/kg	33.4	27.2	39.5	37.2	31.3	
barium	7440-39-3	E440	0.50	mg/kg	382	586	356	415	623	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.38	0.36	0.37	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	10.6	8.84	13.4	13.0	9.11	
boron	7440-42-8	E440	5.0	mg/kg	185	206	176	220	274	
cadmium	7440-43-9	E440	0.020	mg/kg	15.4	19.5	17.6	16.7	12.3	
calcium	7440-70-2	E440	50	mg/kg	140000	117000	135000	136000	126000	
chromium	7440-47-3	E440	0.50	mg/kg	197	230	146	255	171	
cobalt	7440-48-4	E440	0.10	mg/kg	38.2	91.1	54.8	85.8	269	
copper	7440-50-8	E440	0.50	mg/kg	3250	5200	3030	8380	3330	
iron	7439-89-6	E440	50	mg/kg	62500	78900	53800	66000	47700	
lead	7439-92-1	E440	0.50	mg/kg	565	642	1260	1350	614	
lithium	7439-93-2	E440	2.0	mg/kg	24.8	18.8	20.1	25.0	21.5	
magnesium	7439-95-4	E440	20	mg/kg	10800	9750	10200	12200	11700	
manganese	7439-96-5	E440	1.0	mg/kg	863	872	852	1680	1080	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.0981	0.0588	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.0	17.9	18.4	24.4	22.1	
nickel	7440-02-0	E440	0.50	mg/kg	143	257	163	309	372	
phosphorus	7723-14-0	E440	50	mg/kg	10100	8990	11100	9970	10800	
potassium	7440-09-7	E440	100	mg/kg	4920	4810	5640	5240	5610	
selenium	7782-49-2	E440	0.20	mg/kg	0.53	0.35	0.48	0.62	0.46	
silver	7440-22-4	E440	0.10	mg/kg	7.34	4.71	8.30	6.15	4.96	
sodium	7440-23-5	E440	50	mg/kg	15700	15000	15500	15200	16900	
strontium	7440-24-6	E440	0.50	mg/kg	311	307	305	310	323	
sulfur	7704-34-9	E440	1000	mg/kg	14100	10300	14100	13700	11600	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2118-A-1	BA2118-A-2	BA2118-A-3	BA2118-A-4	BA2118-A-5
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-001	VA21A8402-002	VA21A8402-003	VA21A8402-004	VA21A8402-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.051	0.057	0.057	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	141	107	136	136	230	
titanium	7440-32-6	E440	1.0	mg/kg	298	710	252	331	808	
tungsten	7440-33-7	E440	0.50	mg/kg	11.1	9.74	10.7	9.69	9.74	
uranium	7440-61-1	E440	0.050	mg/kg	5.19	4.05	5.37	5.10	4.16	
vanadium	7440-62-2	E440	0.20	mg/kg	50.5	46.8	50.1	53.0	52.9	
zinc	7440-66-6	E440	2.0	mg/kg	5250	4100	4750	6340	5090	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.4	1.8	1.2	1.7	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.3	11.7	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.32	8.02	8.82	8.45	8.99	
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	6.09	5.96	6.01	6.03	5.97	
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	2.15	2.28	2.15	2.10	2.19	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.221	0.391	0.221	0.278	0.244	
calcium, TCLP	7440-70-2	E444	10	mg/L	1970	2060	2020	2010	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	0.708	0.692	0.877	0.739	1.04	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.14	0.997	0.879	1.36	1.53	
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	0.29	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	127	137	144	147	129	
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	0.56	1.33	0.79	0.67	0.86	
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	BA2118-A-1	BA2118-A-2	BA2118-A-3	BA2118-A-4	BA2118-A-5
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-001	VA21A8402-002	VA21A8402-003	VA21A8402-004	VA21A8402-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	63.7	61.4	56.4	91.0	62.6	62.6
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<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	BA2118-A-6	BA2118-A-7	BA2118-A-8	BA2118-A-9	BA2118-A-10
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-006	VA21A8402-007	VA21A8402-008	VA21A8402-009	VA21A8402-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.5	19.2	19.3	19.2	19.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.0	11.1	11.0	11.2	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	41500	28200	34900	34500	31400	
antimony	7440-36-0	E440	0.10	mg/kg	110	133	124	152	158	
arsenic	7440-38-2	E440	0.10	mg/kg	28.3	34.7	33.6	41.2	38.0	
barium	7440-39-3	E440	0.50	mg/kg	489	442	443	389	395	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.35	0.35	0.40	0.46	
bismuth	7440-69-9	E440	0.20	mg/kg	9.88	12.1	12.8	13.9	12.4	
boron	7440-42-8	E440	5.0	mg/kg	190	169	173	170	204	
cadmium	7440-43-9	E440	0.020	mg/kg	12.0	15.7	14.5	17.2	33.9	
calcium	7440-70-2	E440	50	mg/kg	126000	130000	127000	140000	142000	
chromium	7440-47-3	E440	0.50	mg/kg	168	158	185	314	250	
cobalt	7440-48-4	E440	0.10	mg/kg	31.1	132	28.1	46.9	182	
copper	7440-50-8	E440	0.50	mg/kg	3900	3330	3570	2480	5240	
iron	7439-89-6	E440	50	mg/kg	59000	70000	52300	64700	66100	
lead	7439-92-1	E440	0.50	mg/kg	582	710	562	986	821	
lithium	7439-93-2	E440	2.0	mg/kg	18.1	25.6	17.4	19.6	22.9	
magnesium	7439-95-4	E440	20	mg/kg	10200	10700	12400	11600	11200	
manganese	7439-96-5	E440	1.0	mg/kg	887	940	757	1680	997	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	0.0980	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.2	17.6	22.3	23.3	19.6	
nickel	7440-02-0	E440	0.50	mg/kg	105	193	350	170	429	
phosphorus	7723-14-0	E440	50	mg/kg	8110	9730	9340	10200	9500	
potassium	7440-09-7	E440	100	mg/kg	5200	5310	5410	5850	5050	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.56	0.41	0.50	0.54	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	----	----	11.4	
silver	7440-22-4	E440	0.10	mg/kg	5.52	7.91	14.3	14.1	----	
sodium	7440-23-5	E440	50	mg/kg	16800	15700	15700	16600	14900	
strontium	7440-24-6	E440	0.50	mg/kg	292	310	310	359	320	
sulfur	7704-34-9	E440	1000	mg/kg	12100	13400	12900	14400	15000	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2118-A-6	BA2118-A-7	BA2118-A-8	BA2118-A-9	BA2118-A-10
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-006	VA21A8402-007	VA21A8402-008	VA21A8402-009	VA21A8402-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.053	<0.050	0.078	0.064	
tin	7440-31-5	E440	2.0	mg/kg	131	164	190	163	210	
titanium	7440-32-6	E440	1.0	mg/kg	442	315	286	313	492	
tungsten	7440-33-7	E440	0.50	mg/kg	7.88	10.7	11.3	11.1	10.3	
uranium	7440-61-1	E440	0.050	mg/kg	4.24	4.79	4.23	4.75	4.73	
vanadium	7440-62-2	E440	0.20	mg/kg	47.9	51.1	46.0	53.4	53.3	
zinc	7440-66-6	E440	2.0	mg/kg	3990	5670	3920	7450	7700	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.2	1.9	1.6	<1.0	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.8	11.7	11.7	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.23	9.23	9.02	9.14	8.94	
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	6.18	5.98	6.13	6.14	5.95	
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	2.26	2.18	2.22	2.09	2.14	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.367	0.219	0.264	0.262	0.284	
calcium, TCLP	7440-70-2	E444	10	mg/L	2110	2020	2050	2080	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	0.875	0.545	2.29	0.756	0.634	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.41	1.07	0.926	1.34	1.20	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	137	133	135	136	134	
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	0.56	0.57	0.70	0.52	0.70	
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	BA2118-A-6	BA2118-A-7	BA2118-A-8	BA2118-A-9	BA2118-A-10
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00	28-Apr-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-006	VA21A8402-007	VA21A8402-008	VA21A8402-009	VA21A8402-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	54.7	49.7	60.0	47.3	75.0	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<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	BA2118-A-11	BA2118-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	28-Apr-2021 09:00	28-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-011	VA21A8402-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.3	18.2	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	33700	46700	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	116	134	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	38.1	36.2	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	422	473	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.34	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	10.9	13.2	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	142	160	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	12.5	16.1	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	116000	133000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	397	203	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	25.7	45.0	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	6250	4140	----	----	----	
iron	7439-89-6	E440	50	mg/kg	66500	63900	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	933	522	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	18.4	20.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10200	11000	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	974	1020	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	16.8	21.9	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	233	314	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9380	10200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4900	5360	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.45	0.39	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	17.5	6.68	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	13900	16100	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	347	320	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12100	13600	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.054	0.057	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2118-A-11	BA2118-A-12	----	----	----
Client sampling date / time					28-Apr-2021 09:00	28-Apr-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-011	VA21A8402-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	127	137	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	303	672	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	6.31	9.76	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.10	4.50	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	46.2	47.7	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	4700	7280	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.1	1.8	---	---	---	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.49	9.16	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	5.96	7.04	---	---	---	
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	2.17	2.11	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.240	0.279	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	2120	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.980	1.37	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.01	0.847	---	---	---	
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	138	134	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.60	0.91	---	---	---	
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	BA2118-A-11	BA2118-A-12	----	----	----
					Client sampling date / time	28-Apr-2021 09:00	28-Apr-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A8402-011	VA21A8402-012	-----	-----	-----	
					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	55.5	50.4	----	----	----	
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>VA21A8402</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	: 04-May-2021 12:45
PO	: VANCO 0000050390	Issue Date	: 12-May-2021 09:56
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	VA21A8402-001	BA2118-A-1	chromium	7440-47-3	E440	30.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A8402-001	BA2118-A-1	copper	7440-50-8	E440	39.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A8402-001	BA2118-A-1	manganese	7439-96-5	E440	125 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A8402-001	BA2118-A-1	titanium	7440-32-6	E440	92.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A8402-001	BA2118-A-1	tungsten	7440-33-7	E440	31.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A8402-001	BA2118-A-1	zinc	7440-66-6	E440	34.4 % 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 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 : High Silver in Soil/Solid by CRC ICPMS</b>										
LDPE bag BA2118-A-10	E440.Ag	28-Apr-2021	10-May-2021	----	13 days	✓	11-May-2021	----	1 days	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-1	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-10	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-11	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-12	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-2	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2118-A-3	E510	28-Apr-2021	07-May-2021	----	10 days	✓	09-May-2021	28 days	2 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> BA2118-A-4	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2118-A-5	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2118-A-6	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2118-A-7	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2118-A-8	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
<b>LDPE bag</b> BA2118-A-9	E510	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	28 days	2 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2118-A-1	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2118-A-10	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
<b>LDPE bag</b> BA2118-A-11	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 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 BA2118-A-12	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-2	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-3	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-4	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-5	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-6	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-7	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-8	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2118-A-9	E440	28-Apr-2021	07-May-2021	----	10 days	✔	09-May-2021	180 days	3 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-1	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-10	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-11	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-12	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-2	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-3	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-4	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-5	E144	28-Apr-2021	----	----	----		06-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2118-A-6	E144	28-Apr-2021	----	----	----		06-May-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 BA2118-A-7	E144	28-Apr-2021	----	----	----		06-May-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2118-A-8	E144	28-Apr-2021	----	----	----		06-May-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2118-A-9	E144	28-Apr-2021	----	----	----		06-May-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-1	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-10	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-11	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-12	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-2	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-3	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-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 BA2118-A-4	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-5	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-6	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-7	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-8	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2118-A-9	E108	28-Apr-2021	07-May-2021	----	10 days	✔	07-May-2021	30 days	1 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2118-A-1	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2118-A-10	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2118-A-11	E512	07-May-2021	----	----	----		10-May-2021	28 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 : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-12	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-2	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-3	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-4	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-5	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-6	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-7	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-8	E512	07-May-2021	----	----	----		10-May-2021	28 days	13 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
<b>Glass vial - total (lab preserved)</b> BA2118-A-9	E512	07-May-2021	----	----	----		10-May-2021	28 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>											
HDPE - total (lab preserved) BA2118-A-1	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-10	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-11	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-12	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-2	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-3	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-4	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-5	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2118-A-6	E444	07-May-2021	----	----	----		10-May-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>										
HDPE - total (lab preserved) BA2118-A-7	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2118-A-8	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2118-A-9	E444	07-May-2021	----	----	----		10-May-2021	180 days	13 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-1	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-10	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-11	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-12	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-2	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2118-A-3	EPP444	28-Apr-2021	07-May-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: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-4	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-5	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-6	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-7	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-8	EPP444	28-Apr-2021	07-May-2021	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
<b>Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI)</b> BA2118-A-9	EPP444	28-Apr-2021	07-May-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	192317	1	16	6.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	192318	1	16	6.2	5.0	✔
Moisture Content by Gravimetry	E144	192322	1	16	6.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	192319	1	16	6.2	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	194809	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	192317	2	16	12.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	192318	2	16	12.5	10.0	✔
Moisture Content by Gravimetry	E144	192322	1	16	6.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	192319	1	16	6.2	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	194809	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	194066	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	192317	1	16	6.2	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	194067	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	192318	1	16	6.2	5.0	✔
Moisture Content by Gravimetry	E144	192322	1	16	6.2	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	194066	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	194067	1	12	8.3	5.0	✔



## Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108  Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144  Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444  Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510  Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512  Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



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



QUALITY CONTROL REPORT

Work Order : VA21A8402

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 : 04-May-2021 12:45
Date Analysis Commenced : 06-May-2021
Issue Date : 12-May-2021 09:56

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 Janice Leung, Kevin Duarte, Kim Jensen, Ophelia Chiu, and Robin Weeks.

Page : 2 of 11  
Work Order : VA21A8402  
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: 192319)</b>											
VA21A8402-001	BA2118-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.1%	5%	----
<b>Physical Tests (QC Lot: 192322)</b>											
VA21A8402-001	BA2118-A-1	moisture	----	E144	0.25	%	18.4	19.6	6.39%	20%	----
<b>Metals (QC Lot: 192317)</b>											
VA21A8402-001	BA2118-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 192318)</b>											
VA21A8402-001	BA2118-A-1	aluminum	7429-90-5	E440	50	mg/kg	30400	44500	37.7%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	133	125	6.22%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	33.4	36.7	9.47%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	382	550	36.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.39	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	10.6	7.94	28.5%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	185	185	0.110%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	15.4	11.9	25.3%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	140000	123000	13.0%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	197	145	30.5%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	38.2	38.8	1.61%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	3250	2180	39.4%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	62500	69000	9.82%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	565	508	10.6%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	24.8	21.1	16.2%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	10800	11400	5.09%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	863	3730	125%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	21.0	27.4	26.4%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	143	136	4.95%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10100	8820	13.3%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4920	4660	5.37%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.53	0.53	0.002	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	7.34	5.15	35.0%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15700	15900	1.28%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	311	316	1.46%	40%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
<b>Metals (QC Lot: 192318) - continued</b>											
VA21A8402-001	BA2118-A-1	sulfur	7704-34-9	E440	1000	mg/kg	14100	11800	17.9%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.061	<0.050	0.011	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	141	108	26.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	298	808	92.2%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	11.1	8.14	31.1%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	5.19	4.14	22.4%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	50.5	46.3	8.62%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5250	3710	34.4%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.4	0.1	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: 192322)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 192317)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 192318)</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: 192318) - continued</b>						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
<b>Metals (QCLot: 194809)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 194066)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 194067)</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	----



## Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Physical Tests (QCLot: 192319)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
<b>Physical Tests (QCLot: 192322)</b>									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
<b>Metals (QCLot: 192317)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
<b>Metals (QCLot: 192318)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	100	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	102	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.9	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	111	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	94.5	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.4	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	99.7	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	92.6	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	93.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	98.9	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.5	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	105	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	103	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	101	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	105	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.7	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	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: 192318) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	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	102	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	102	80.0	120	----
<b>Metals (QCLot: 194809)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	98.8	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: 194066)</b>										
VA21A8402-001	BA2118-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.8	50.0	140	----
<b>TCLP Metals (QCLot: 194067)</b>										
VA21A8402-001	BA2118-A-1	antimony, TCLP	7440-36-0	E444	5.0 mg/L	5 mg/L	101	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.3	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.2 mg/L	12.5 mg/L	106	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.235 mg/L	0.25 mg/L	94.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.242 mg/L	0.25 mg/L	96.8	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	1.19 mg/L	1.25 mg/L	95.0	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.25 mg/L	2.5 mg/L	89.9	50.0	140	----
		iron, TCLP	7439-89-6	E444	234 mg/L	250 mg/L	93.6	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.56 mg/L	10 mg/L	95.6	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	250 mg/L	250 mg/L	99.9	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.30 mg/L	2.5 mg/L	91.9	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.16 mg/L	5 mg/L	103	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.115 mg/L	0.1 mg/L	115	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.1	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.66 mg/L	5 mg/L	93.2	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	95.2	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	10 mg/L	10 mg/L	95.8	70.0	130	----



## 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: 192317)</b>									
QC-192317-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----
<b>Metals (QCLot: 192318)</b>									
QC-192318-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
QC-192318-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	108	70.0	130	----
QC-192318-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
QC-192318-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	107	70.0	130	----
QC-192318-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	104	70.0	130	----
QC-192318-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	111	40.0	160	----
QC-192318-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	101	70.0	130	----
QC-192318-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	97.8	70.0	130	----
QC-192318-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	107	70.0	130	----
QC-192318-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.6	70.0	130	----
QC-192318-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	99.0	70.0	130	----
QC-192318-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	98.8	70.0	130	----
QC-192318-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	98.0	70.0	130	----
QC-192318-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	96.3	70.0	130	----
QC-192318-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	99.3	70.0	130	----
QC-192318-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	104	70.0	130	----
QC-192318-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	104	70.0	130	----
QC-192318-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	101	70.0	130	----
QC-192318-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	95.9	70.0	130	----
QC-192318-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
QC-192318-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
QC-192318-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	101	70.0	130	----
QC-192318-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	96.2	40.0	160	----
QC-192318-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	97.2	70.0	130	----
QC-192318-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	115	70.0	130	----
QC-192318-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130	----
QC-192318-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	106	70.0	130	----

Page : 11 of 11  
 Work Order : VA21A8402  
 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: 192318) - continued</b>									
QC-192318-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
QC-192318-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	103	70.0	130	----



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

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)	
					X	X			X	X
BA2118-A-1		28-Apr-21	9:00	Soil	X	X			X	
BA2118-A-2		28-Apr-21	9:00	Soil	X	X			X	
BA2118-A-3		28-Apr-21	9:00	Soil	X	X			X	
BA2118-A-4		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-5		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-6		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-7		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-8		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-9		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-10		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-11		28-Apr-21	9:00	Soil	X	X			X	1
BA2118-A-12		28-Apr-21	9:00	Soil	X	X			X	1

**Environmental Division  
 Vancouver**  
 Work Order Reference  
**VA21A8402**



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.

<b>SHIPMENT RELEASE</b> (client use)			<b>SHIPMENT RECEPTION</b> (lab use only)				<b>SHIPMENT VERIFICATION</b> (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
<i>[Signature]</i>	4-May-21	0800	HA	5/4	1245P	22 °C				Yes / No ? If Yes add SIF