

## Bottom Ash Data

2021 Week 20

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on May 26, 2021. The data represents bottom ash composite results for week 20 of 2021 (May 9, 2021 to May 15, 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 : **VA21A9436**  
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 : 17-May-2021 11:00  
Date Analysis Commenced : 19-May-2021  
Issue Date : 25-May-2021 16:40

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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia
Woochan Song	Lab Analyst	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	BA2120-A-1	BA2120-A-2	BA2120-A-3	BA2120-A-4	BA2120-A-5
(Matrix: Soil/Solid)					Client sampling date / time	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-001	VA21A9436-002	VA21A9436-003	VA21A9436-004	VA21A9436-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.2	17.3	17.6	17.8	16.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.5	11.8	11.6	11.5	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	31000	28200	27500	28700	41800	
antimony	7440-36-0	E440	0.10	mg/kg	117	102	84.5	112	110	
arsenic	7440-38-2	E440	0.10	mg/kg	31.4	30.0	22.4	30.6	34.4	
barium	7440-39-3	E440	0.50	mg/kg	597	589	481	489	630	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.37	0.32	0.36	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	15.2	15.0	6.46	14.2	7.20	
boron	7440-42-8	E440	5.0	mg/kg	225	200	170	214	246	
cadmium	7440-43-9	E440	0.020	mg/kg	12.3	16.3	9.60	12.7	11.0	
calcium	7440-70-2	E440	50	mg/kg	126000	121000	103000	118000	115000	
chromium	7440-47-3	E440	0.50	mg/kg	221	224	179	161	217	
cobalt	7440-48-4	E440	0.10	mg/kg	56.6	111	71.5	86.2	114	
copper	7440-50-8	E440	0.50	mg/kg	1970	29200	18900	3550	3490	
iron	7439-89-6	E440	50	mg/kg	60700	71200	66000	52700	71100	
lead	7439-92-1	E440	0.50	mg/kg	616	661	537	494	1500	
lithium	7439-93-2	E440	2.0	mg/kg	22.3	21.0	23.7	25.9	29.0	
magnesium	7439-95-4	E440	20	mg/kg	11200	11400	9930	11100	10900	
manganese	7439-96-5	E440	1.0	mg/kg	850	1470	752	785	997	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	20.5	18.6	16.9	21.0	21.9	
nickel	7440-02-0	E440	0.50	mg/kg	184	162	165	152	423	
phosphorus	7723-14-0	E440	50	mg/kg	11000	9740	8220	10300	9870	
potassium	7440-09-7	E440	100	mg/kg	4870	4590	4200	4700	4820	
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.37	0.40	0.38	0.38	
silver	7440-22-4	E440	0.10	mg/kg	5.58	6.42	4.48	9.52	6.86	
sodium	7440-23-5	E440	50	mg/kg	14700	13400	12800	14300	14400	
strontium	7440-24-6	E440	0.50	mg/kg	320	431	268	300	298	
sulfur	7704-34-9	E440	1000	mg/kg	13100	12800	9600	12400	11600	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2120-A-1	BA2120-A-2	BA2120-A-3	BA2120-A-4	BA2120-A-5
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-001	VA21A9436-002	VA21A9436-003	VA21A9436-004	VA21A9436-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.058	0.074	0.056	0.054	
tin	7440-31-5	E440	2.0	mg/kg	501	1500	184	185	102	
titanium	7440-32-6	E440	1.0	mg/kg	512	455	223	316	654	
tungsten	7440-33-7	E440	0.50	mg/kg	9.03	8.98	4.88	8.86	7.19	
uranium	7440-61-1	E440	0.050	mg/kg	5.60	5.26	4.37	5.38	4.64	
vanadium	7440-62-2	E440	0.20	mg/kg	54.2	52.4	51.8	51.4	52.0	
zinc	7440-66-6	E440	2.0	mg/kg	4880	3850	16000	4560	4830	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.2	1.8	1.4	1.4	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.9	11.9	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.24	8.73	8.90	8.91	8.24	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.22	6.07	6.10	6.06	6.00	
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	2.34	2.23	2.33	2.26	2.69	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.268	0.215	0.197	0.198	0.169	
calcium, TCLP	7440-70-2	E444	10	mg/L	1830	1840	1830	1900	1980	
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	0.392	0.746	1.95	0.968	0.693	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.726	0.691	0.543	1.03	0.830	
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	127	124	126	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	0.51	0.49	0.65	1.25	0.66	
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	BA2120-A-1	BA2120-A-2	BA2120-A-3	BA2120-A-4	BA2120-A-5
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-001	VA21A9436-002	VA21A9436-003	VA21A9436-004	VA21A9436-005	
					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	38.6	44.4	41.1	39.9	45.4	
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	BA2120-A-6	BA2120-A-7	BA2120-A-8	BA2120-A-9	BA2120-A-10
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-006	VA21A9436-007	VA21A9436-008	VA21A9436-009	VA21A9436-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	17.6	17.7	17.8	17.6	17.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.6	11.6	11.6	11.7	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	27500	30400	27400	37800	31500	
antimony	7440-36-0	E440	0.10	mg/kg	108	106	139	116	112	
arsenic	7440-38-2	E440	0.10	mg/kg	28.1	29.2	44.5	32.1	34.8	
barium	7440-39-3	E440	0.50	mg/kg	528	544	495	616	619	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.35	0.36	0.37	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	8.94	6.96	12.0	8.80	7.60	
boron	7440-42-8	E440	5.0	mg/kg	228	251	224	225	229	
cadmium	7440-43-9	E440	0.020	mg/kg	12.2	11.5	17.5	12.8	22.8	
calcium	7440-70-2	E440	50	mg/kg	118000	113000	136000	127000	118000	
chromium	7440-47-3	E440	0.50	mg/kg	298	145	190	188	183	
cobalt	7440-48-4	E440	0.10	mg/kg	136	1180	33.1	36.3	87.2	
copper	7440-50-8	E440	0.50	mg/kg	2700	2420	2190	1700	2070	
iron	7439-89-6	E440	50	mg/kg	61400	72000	55200	70100	49900	
lead	7439-92-1	E440	0.50	mg/kg	1510	530	557	788	503	
lithium	7439-93-2	E440	2.0	mg/kg	25.9	19.6	19.4	20.9	20.2	
magnesium	7439-95-4	E440	20	mg/kg	11400	11200	12100	12400	11300	
manganese	7439-96-5	E440	1.0	mg/kg	1380	857	1570	1010	818	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.4	19.9	21.4	22.1	23.2	
nickel	7440-02-0	E440	0.50	mg/kg	456	3530	181	163	847	
phosphorus	7723-14-0	E440	50	mg/kg	9670	9270	12200	10400	11000	
potassium	7440-09-7	E440	100	mg/kg	4960	4560	5620	5200	5060	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.39	0.49	0.44	0.41	
silver	7440-22-4	E440	0.10	mg/kg	5.31	4.48	5.93	5.47	9.17	
sodium	7440-23-5	E440	50	mg/kg	14300	13600	15100	15000	15000	
strontium	7440-24-6	E440	0.50	mg/kg	295	293	328	332	310	
sulfur	7704-34-9	E440	1000	mg/kg	11900	12500	15500	13400	13200	
thallium	7440-28-0	E440	0.050	mg/kg	0.065	0.057	0.073	0.057	0.054	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2120-A-6	BA2120-A-7	BA2120-A-8	BA2120-A-9	BA2120-A-10
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-006	VA21A9436-007	VA21A9436-008	VA21A9436-009	VA21A9436-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	106	90.8	135	108	138	
titanium	7440-32-6	E440	1.0	mg/kg	202	405	341	518	494	
tungsten	7440-33-7	E440	0.50	mg/kg	9.86	9.94	13.9	11.2	9.89	
uranium	7440-61-1	E440	0.050	mg/kg	5.06	4.89	6.87	5.50	5.27	
vanadium	7440-62-2	E440	0.20	mg/kg	50.9	52.2	58.2	54.7	53.7	
zinc	7440-66-6	E440	2.0	mg/kg	6340	5220	5800	6270	4240	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.3	1.0	1.3	1.0	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.9	11.8	11.9	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.53	8.55	9.05	8.69	8.57	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	2.85	2.85	2.85	
pH, TCLP final	----	EPP444	0.010	pH units	6.08	6.18	6.05	6.06	6.06	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.31	2.54	2.36	2.26	2.34	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.166	0.220	0.190	0.174	0.178	
calcium, TCLP	7440-70-2	E444	10	mg/L	1900	2080	1930	1900	1930	
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	0.856	0.821	0.433	0.521	0.920	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.661	0.449	0.644	0.579	0.585	
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	132	130	132	135	
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	0.57	0.77	0.55	0.53	0.75	
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	BA2120-A-6	BA2120-A-7	BA2120-A-8	BA2120-A-9	BA2120-A-10
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	12-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-006	VA21A9436-007	VA21A9436-008	VA21A9436-009	VA21A9436-010	
					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	47.1	33.3	41.5	35.5	36.2	
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	BA2120-A-11	BA2120-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	12-May-2021 09:00	12-May-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-011	VA21A9436-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	17.6	17.1	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.7	11.8	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	28300	27000	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	103	104	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	29.8	25.1	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	514	502	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.32	0.34	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.30	6.49	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	192	193	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	11.6	11.1	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	118000	114000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	180	168	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	47.2	25.3	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1600	1970	----	----	----	
iron	7439-89-6	E440	50	mg/kg	68600	43200	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	1540	397	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	17.6	16.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11100	9600	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	851	651	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.2	16.9	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	219	117	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10100	9530	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4800	4490	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.21	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.27	4.49	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14100	13600	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	298	300	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12300	10100	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.053	<0.050	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2120-A-11	BA2120-A-12	----	----	----
Client sampling date / time					12-May-2021 09:00	12-May-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-011	VA21A9436-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	275	121	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	279	226	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	10.8	7.13	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.09	4.48	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	50.3	49.7	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4070	3920	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.4	----	----	----	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.87	8.51	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.85	2.85	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.09	6.02	----	----	----	
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	2.35	2.25	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.173	0.202	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1890	1870	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.39	0.679	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.757	0.620	----	----	----	
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	133	128	----	----	----	
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	0.63	----	----	----	
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	BA2120-A-11	BA2120-A-12	----	----	----
					Client sampling date / time	12-May-2021 09:00	12-May-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21A9436-011	VA21A9436-012	-----	-----	-----	
					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	33.6	50.3	----	----	----	
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>VA21A9436</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	: 17-May-2021 11:00
PO	: VANCO 0000050390	Issue Date	: 25-May-2021 16:40
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**

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

### **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	VA21A9436-001	BA2120-A-1	beryllium	7440-41-7	E440	0.25 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA21A9436-001	BA2120-A-1	bismuth	7440-69-9	E440	61.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A9436-001	BA2120-A-1	cobalt	7440-48-4	E440	83.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A9436-001	BA2120-A-1	copper	7440-50-8	E440	49.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A9436-001	BA2120-A-1	nickel	7440-02-0	E440	71.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A9436-001	BA2120-A-1	tin	7440-31-5	E440	132 % 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.

Reference Material (RM) Sample								
Metals	QC-MRG2-202411003	----	titanium	7440-32-6	E440	132 % MES	70.0-130%	Recovery greater than upper control limit

**Result Qualifiers**

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



## 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 BA2120-A-1	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-10	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-11	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-12	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-2	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-3	E510	12-May-2021	21-May-2021	----	10 days	✓	23-May-2021	28 days	2 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-4	E510	12-May-2021	21-May-2021	----	10 days	✓	23-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>											
LDPE bag BA2120-A-5	E510	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-6	E510	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-7	E510	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-8	E510	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	28 days	2 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2120-A-9	E510	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	28 days	2 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2120-A-1	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2120-A-10	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2120-A-11	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2120-A-12	E440	12-May-2021	21-May-2021	----	10 days	✔	23-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 BA2120-A-2	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-3	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-4	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-5	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-6	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-7	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-8	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2120-A-9	E440	12-May-2021	21-May-2021	----	10 days	✔	23-May-2021	180 days	3 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2120-A-1	E144	12-May-2021	----	----	----		20-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 BA2120-A-10	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-11	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-12	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-2	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-3	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-4	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-5	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-6	E144	12-May-2021	----	----	----		20-May-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2120-A-7	E144	12-May-2021	----	----	----		20-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 BA2120-A-8	E144	12-May-2021	----	----	----		20-May-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2120-A-9	E144	12-May-2021	----	----	----		20-May-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-1	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-10	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-11	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-12	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-2	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-3	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-4	E108	12-May-2021	21-May-2021	----	10 days	✔	21-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 BA2120-A-5	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-6	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-7	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-8	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2120-A-9	E108	12-May-2021	21-May-2021	----	10 days	✔	21-May-2021	30 days	1 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-1	E512	19-May-2021	----	----	----		20-May-2021	----	9 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-10	E512	19-May-2021	----	----	----		20-May-2021	----	9 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-11	E512	19-May-2021	----	----	----		20-May-2021	----	9 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-12	E512	19-May-2021	----	----	----		20-May-2021	----	9 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>										
HDPE - total (lab preserved) BA2120-A-2	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-3	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-4	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-5	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-6	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-7	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-8	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-9	E512	19-May-2021	----	----	----		20-May-2021	----	9 days	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2120-A-1	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 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) BA2120-A-10	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-11	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-12	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-2	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-3	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-4	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-5	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-6	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2120-A-7	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 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> BA2120-A-8	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2120-A-9	E444	19-May-2021	----	----	----		20-May-2021	180 days	9 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> BA2120-A-1	EPP444	12-May-2021	19-May-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> BA2120-A-10	EPP444	12-May-2021	19-May-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> BA2120-A-11	EPP444	12-May-2021	19-May-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> BA2120-A-12	EPP444	12-May-2021	19-May-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> BA2120-A-2	EPP444	12-May-2021	19-May-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> BA2120-A-3	EPP444	12-May-2021	19-May-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> BA2120-A-4	EPP444	12-May-2021	19-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: 180 Day HT (e.g. metals ex. Hg)</b> BA2120-A-5	EPP444	12-May-2021	19-May-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> BA2120-A-6	EPP444	12-May-2021	19-May-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> BA2120-A-7	EPP444	12-May-2021	19-May-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> BA2120-A-8	EPP444	12-May-2021	19-May-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> BA2120-A-9	EPP444	12-May-2021	19-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	202411	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	202412	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	202414	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	202413	1	12	8.3	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Mercury in Soil/Solid by CVAAS	E510	202411	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	202412	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	202414	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	202413	1	12	8.3	5.0	✔
<b>Method Blanks (MB)</b>							
Mercury by CVAAS (TCLP)	E512	202398	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	202411	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	202396	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	202412	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	202414	1	12	8.3	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	202398	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	202396	1	12	8.3	5.0	✔



## Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.



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



QUALITY CONTROL REPORT

Work Order : VA21A9436

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 : 17-May-2021 11:00
Date Analysis Commenced : 19-May-2021
Issue Date : 25-May-2021 16:40

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 Kevin Duarte, Ophelia Chiu, Robin Weeks, Shaneel Dayal, and Woochan Song.

Page : 2 of 11  
Work Order : VA21A9436  
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: 202413)</b>											
VA21A9436-001	BA2120-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.5	11.6	0.9%	5%	----
<b>Physical Tests (QC Lot: 202414)</b>											
VA21A9436-001	BA2120-A-1	moisture	----	E144	0.25	%	18.2	17.4	4.56%	20%	----
<b>Metals (QC Lot: 202411)</b>											
VA21A9436-001	BA2120-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 202412)</b>											
VA21A9436-001	BA2120-A-1	aluminum	7429-90-5	E440	50	mg/kg	31000	27900	10.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	117	94.3	21.9%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	31.4	35.7	12.8%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	597	619	3.69%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	# 0.62	0.25	Diff <2x LOR	DUP-H
		bismuth	7440-69-9	E440	0.20	mg/kg	15.2	8.07	61.6%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	225	211	6.60%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.3	10.7	14.0%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	126000	117000	7.45%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	221	188	16.4%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	56.6	23.3	83.4%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1970	3250	49.0%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	60700	81100	28.7%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	616	472	26.4%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	22.3	27.0	19.3%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11200	12100	7.72%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	850	1070	23.2%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	20.5	22.7	10.2%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	184	389	71.4%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11000	8730	23.5%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4870	4600	5.72%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.36	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.58	5.91	5.70%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14700	14300	2.90%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	320	324	1.40%	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: 202412) - continued</b>											
VA21A9436-001	BA2120-A-1	sulfur	7704-34-9	E440	1000	mg/kg	13100	11400	13.6%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.067	0.061	0.006	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	501	103	132%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	512	416	20.7%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	9.03	10.5	15.1%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.60	4.73	16.9%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	54.2	52.3	3.44%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4880	4830	1.10%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.2	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: 202414)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 202411)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 202412)</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: 202412) - 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>TCLP Metals (QCLot: 202396)</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: 202398)</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				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Physical Tests (QCLot: 202413)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
<b>Physical Tests (QCLot: 202414)</b>									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
<b>Metals (QCLot: 202411)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
<b>Metals (QCLot: 202412)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	108	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	112	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.4	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	100	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	96.4	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.7	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	107	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	96.6	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	105	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	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	104	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	106	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.8	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Metals (QCLot: 202412) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.1	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	106	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	97.2	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.3	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	99.3	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: 202396)</b>										
VA21A9436-001	BA2120-A-1	antimony, TCLP	7440-36-0	E444	4.7 mg/L	5 mg/L	93.4	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.4 mg/L	5 mg/L	88.8	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.0 mg/L	12.5 mg/L	88.3	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.222 mg/L	0.25 mg/L	88.9	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.86 mg/L	10 mg/L	88.6	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	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	1.08 mg/L	1.25 mg/L	86.6	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	217 mg/L	250 mg/L	86.8	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.01 mg/L	10 mg/L	90.1	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	207 mg/L	250 mg/L	83.0	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.14 mg/L	2.5 mg/L	85.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.46 mg/L	5 mg/L	89.3	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.103 mg/L	0.1 mg/L	103	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	90.3	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.56 mg/L	5 mg/L	91.1	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.67 mg/L	0.75 mg/L	88.9	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	8 mg/L	10 mg/L	85.8	50.0	150	----
<b>TCLP Metals (QCLot: 202398)</b>										
VA21A9436-001	BA2120-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	87.3	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: 202411)</b>									
QC-202411-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	97.9	70.0	130	----
<b>Metals (QCLot: 202412)</b>									
QC-202412-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	114	70.0	130	----
QC-202412-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	108	70.0	130	----
QC-202412-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	120	70.0	130	----
QC-202412-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	115	70.0	130	----
QC-202412-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	103	70.0	130	----
QC-202412-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	127	40.0	160	----
QC-202412-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	97.4	70.0	130	----
QC-202412-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	99.6	70.0	130	----
QC-202412-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	120	70.0	130	----
QC-202412-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	108	70.0	130	----
QC-202412-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
QC-202412-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	105	70.0	130	----
QC-202412-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
QC-202412-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
QC-202412-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
QC-202412-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	114	70.0	130	----
QC-202412-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
QC-202412-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
QC-202412-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	----
QC-202412-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	126	70.0	130	----
QC-202412-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	114	70.0	130	----
QC-202412-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	107	70.0	130	----
QC-202412-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	97.3	40.0	160	----
QC-202412-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	94.2	70.0	130	----
QC-202412-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	# 132	70.0	130	MES
QC-202412-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	114	70.0	130	----
QC-202412-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	115	70.0	130	----



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: 202412) - continued</b>									
QC-202412-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	109	70.0	130	----
QC-202412-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	113	70.0	130	----

### Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).




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

<b>Invoice To</b> Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			<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 #:			<table border="1"> <tr> <td rowspan="2">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="2">MOISTURE</td> <td rowspan="2">Chrome 6</td> <td rowspan="2">MET-CSR+FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="2">Number of Containers</td> </tr> <tr> <td colspan="6"></td> </tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers						
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)													Number of Containers												
Phone: _____ Fax: _____			ALS Contact:			Sampler:																						

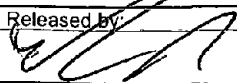
Lab Work Order # (lab use only) **9436**

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	BA2120-A-1	12-May-21	9:00	Soil	X	X		X							1
2	BA2120-A-2	12-May-21	9:00	Soil	X	X		X							1
3	BA2120-A-3	12-May-21	9:00	Soil	X	X		X							1
4	BA2120-A-4	12-May-21	9:00	Soil	X	X		X							1
5	BA2120-A-5	12-May-21	9:00	Soil	X	X		X							1
6	BA2120-A-6	12-May-21	9:00	Soil	X	X		X							1
7	BA2120-A-7	12-May-21	9:00	Soil	X	X		X							1
8	BA2120-A-8	12-May-21	9:00	Soil	X	X		X							1
9	BA2120-A-9	12-May-21	9:00	Soil	X	X		X							1
10	BA2120-A-10	12-May-21	9:00	Soil	X	X		X							1
11	BA2120-A-11	12-May-21	9:00	Soil	X	X		X							1
12	BA2120-A-12	12-May-21	9:00	Soil	X	X		X							1

**Environmental Division**  
**Vancouver**  
 Work Order Reference  
**VA21A9436**  
  
 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): 17-May-21	Time (hh-mm): 0900	Received by: TB	Date: May 17	Time: 11:00am	Temperature: 17.6 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF