

## Bottom Ash Data

2021 Week 42

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The following analytical report represents bottom ash composite results for week 42 of 2021 (October 10, 2021 to October 16, 2021).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.



CERTIFICATE OF ANALYSIS

Work Order : **VA21C3221**  
Client : **Covanta Burnaby Renewable Energy, ULC**  
Contact : Steve McKinney  
Address : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
Telephone : 604 521 1025  
Project : Weekly Bottom Ash - Suite  
PO : VANCO 0000050390  
C-O-C number : ----  
Sampler : ----  
Site : ----  
Quote number : Standing Offer (BC work)  
No. of samples received : 12  
No. of samples analysed : 12

Page : 1 of 11  
Laboratory : Vancouver - Environmental  
Account Manager : Brent Mack  
Address : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
Telephone : 778-370-3279  
Date Samples Received : 20-Oct-2021 11:50  
Date Analysis Commenced : 30-Oct-2021  
Issue Date : 04-Nov-2021 16:39

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>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	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
Owen Cheng		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	BA2142A-1	BA2142-A-2	BA2142-A-3	BA2142-A-4	BA2142-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-001	VA21C3221-002	VA21C3221-003	VA21C3221-004	VA21C3221-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.5	24.9	23.9	24.0	24.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	11.3	11.3	11.3	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	38300	35600	35000	32600	45300	
antimony	7440-36-0	E440	0.10	mg/kg	97.4	72.2	86.5	121	81.5	
arsenic	7440-38-2	E440	0.10	mg/kg	27.7	17.6	27.1	26.9	19.3	
barium	7440-39-3	E440	0.50	mg/kg	678	682	814	549	824	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.40	0.44	0.51	0.39	
bismuth	7440-69-9	E440	0.20	mg/kg	291	328	246	241	200	
boron	7440-42-8	E440	5.0	mg/kg	176	156	176	239	303	
cadmium	7440-43-9	E440	0.020	mg/kg	11.7	8.38	7.63	11.7	7.32	
calcium	7440-70-2	E440	50	mg/kg	138000	123000	129000	135000	132000	
chromium	7440-47-3	E440	0.50	mg/kg	155	109	158	179	164	
cobalt	7440-48-4	E440	0.10	mg/kg	48.0	27.7	50.4	109	31.1	
copper	7440-50-8	E440	0.50	mg/kg	2760	1320	2100	5390	2030	
iron	7439-89-6	E440	50	mg/kg	62700	46400	76600	88600	64800	
lead	7439-92-1	E440	0.50	mg/kg	469	361	717	732	386	
lithium	7439-93-2	E440	2.0	mg/kg	24.8	21.4	22.3	25.9	25.3	
magnesium	7439-95-4	E440	20	mg/kg	12000	13100	12500	10700	13800	
manganese	7439-96-5	E440	1.0	mg/kg	794	755	919	1160	1250	
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	48.0	51.0	61.0	89.6	42.4	
nickel	7440-02-0	E440	0.50	mg/kg	158	111	184	283	178	
phosphorus	7723-14-0	E440	50	mg/kg	12300	9820	12000	12400	9780	
potassium	7440-09-7	E440	100	mg/kg	4370	4190	4400	4240	4560	
selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.34	0.39	0.45	0.40	
silver	7440-22-4	E440.Ag	0.10	mg/kg	8.79	----	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	5.96	6.42	8.39	14.7	
sodium	7440-23-5	E440	50	mg/kg	15400	14600	15600	14000	16400	
strontium	7440-24-6	E440	0.50	mg/kg	307	283	293	306	288	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2142A-1	BA2142-A-2	BA2142-A-3	BA2142-A-4	BA2142-A-5
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-001	VA21C3221-002	VA21C3221-003	VA21C3221-004	VA21C3221-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
sulfur	7704-34-9	E440	1000	mg/kg	10500	7800	9200	10900	8700	
thallium	7440-28-0	E440	0.050	mg/kg	0.064	0.054	0.056	0.066	0.080	
tin	7440-31-5	E440	2.0	mg/kg	104	77.3	107	135	80.6	
titanium	7440-32-6	E440	1.0	mg/kg	680	533	414	323	664	
tungsten	7440-33-7	E440	0.50	mg/kg	26.1	48.1	17.1	21.8	22.7	
uranium	7440-61-1	E440	0.050	mg/kg	5.05	3.95	4.07	4.95	3.89	
vanadium	7440-62-2	E440	0.20	mg/kg	62.4	49.4	56.3	64.9	65.2	
zinc	7440-66-6	E440	2.0	mg/kg	4240	2660	5990	5010	16700	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.4	1.7	2.7	1.9	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.9	11.8	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.79	9.99	9.91	9.80	9.67	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.25	6.21	6.31	6.51	6.24	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.87	1.92	2.32	1.77	2.13	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.142	0.170	0.116	0.093	0.186	
calcium, TCLP	7440-70-2	E444	10	mg/L	1990	2060	2060	1880	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	0.624	0.833	0.953	1.09	1.04	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.08	1.17	0.877	0.802	1.02	
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	135	141	136	121	137	
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	0.50	0.54	0.62	0.45	0.74	
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	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2142A-1	BA2142-A-2	BA2142-A-3	BA2142-A-4	BA2142-A-5
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-001	VA21C3221-002	VA21C3221-003	VA21C3221-004	VA21C3221-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<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	<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	61.0	34.6	35.5	18.3	57.0	
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 (Matrix: Soil/Solid)					Client sample ID	BA2142-A-6	BA2142-A-7	BA2142-A-8	BA2142-A-9	BA2142-A-10
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-006	VA21C3221-007	VA21C3221-008	VA21C3221-009	VA21C3221-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.9	23.9	23.0	22.6	23.2	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.3	11.2	11.4	11.4	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	37200	43900	48600	34400	35100	
antimony	7440-36-0	E440	0.10	mg/kg	93.9	87.1	102	105	112	
arsenic	7440-38-2	E440	0.10	mg/kg	18.3	24.4	21.3	25.7	27.4	
barium	7440-39-3	E440	0.50	mg/kg	864	706	715	635	628	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	0.38	0.37	0.43	
bismuth	7440-69-9	E440	0.20	mg/kg	311	224	170	258	255	
boron	7440-42-8	E440	5.0	mg/kg	288	214	214	159	241	
cadmium	7440-43-9	E440	0.020	mg/kg	156	7.93	8.10	13.3	17.3	
calcium	7440-70-2	E440	50	mg/kg	130000	129000	143000	134000	143000	
chromium	7440-47-3	E440	0.50	mg/kg	339	166	133	141	463	
cobalt	7440-48-4	E440	0.10	mg/kg	27.1	55.0	47.2	92.8	104	
copper	7440-50-8	E440	0.50	mg/kg	1860	6820	2370	3260	2380	
iron	7439-89-6	E440	50	mg/kg	58600	80900	54700	61600	62100	
lead	7439-92-1	E440	0.50	mg/kg	506	415	1170	898	652	
lithium	7439-93-2	E440	2.0	mg/kg	21.0	26.3	27.3	28.6	27.6	
magnesium	7439-95-4	E440	20	mg/kg	12500	11800	13300	11300	11800	
manganese	7439-96-5	E440	1.0	mg/kg	673	983	1290	993	961	
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	71.1	55.6	110	87.8	89.6	
nickel	7440-02-0	E440	0.50	mg/kg	298	304	146	171	417	
phosphorus	7723-14-0	E440	50	mg/kg	11300	11800	14300	12100	13800	
potassium	7440-09-7	E440	100	mg/kg	4590	4340	4240	4220	4610	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.39	0.37	0.68	0.58	
silver	7440-22-4	E440	0.10	mg/kg	7.03	5.21	5.90	5.61	8.62	
sodium	7440-23-5	E440	50	mg/kg	17100	15000	15900	14100	15400	
strontium	7440-24-6	E440	0.50	mg/kg	374	296	332	304	410	
sulfur	7704-34-9	E440	1000	mg/kg	8100	9100	8700	10900	12600	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.056	0.062	0.064	0.074	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2142-A-6	BA2142-A-7	BA2142-A-8	BA2142-A-9	BA2142-A-10
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-006	VA21C3221-007	VA21C3221-008	VA21C3221-009	VA21C3221-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	93.4	158	543	194	137	
titanium	7440-32-6	E440	1.0	mg/kg	522	562	634	425	343	
tungsten	7440-33-7	E440	0.50	mg/kg	15.0	20.0	14.8	17.2	23.3	
uranium	7440-61-1	E440	0.050	mg/kg	4.06	3.95	4.07	4.75	5.33	
vanadium	7440-62-2	E440	0.20	mg/kg	53.0	53.8	57.6	64.8	74.3	
zinc	7440-66-6	E440	2.0	mg/kg	5030	4970	3220	4710	4250	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	2.4	2.3	1.7	1.8	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	11.9	12.0	11.9	12.0	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.98	10.3	9.95	9.82	9.99	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	2.92	2.92	2.92	
pH, TCLP final	----	EPP444	0.010	pH units	6.21	6.01	5.90	6.37	6.68	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.88	2.04	1.94	1.77	1.69	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.238	0.294	0.149	0.159	0.071	
calcium, TCLP	7440-70-2	E444	10	mg/L	2050	2160	2160	2000	1920	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.47	1.19	1.24	0.806	0.750	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.806	1.22	1.44	1.23	0.556	
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	0.55	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	132	150	143	129	116	
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	0.72	0.60	0.67	0.50	0.48	
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	BA2142-A-6	BA2142-A-7	BA2142-A-8	BA2142-A-9	BA2142-A-10
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00	13-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-006	VA21C3221-007	VA21C3221-008	VA21C3221-009	VA21C3221-010	
					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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	33.7	49.8	55.3	24.8	13.4	
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	BA2142-A-11	BA2142-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	13-Oct-2021 09:00	13-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-011	VA21C3221-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	23.1	24.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.4	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	41400	27700	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	90.9	78.7	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	23.4	18.4	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	765	473	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.45	0.36	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	253	662	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	228	163	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	9.11	9.41	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	127000	124000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	145	118	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	46.8	39.3	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2010	2480	----	----	----	
iron	7439-89-6	E440	50	mg/kg	67600	49900	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	407	1720	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	25.7	22.4	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11000	10200	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1480	671	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	51.5	50.2	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	361	142	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	12500	10900	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4500	4280	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.82	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.28	5.60	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15600	13900	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	285	278	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	9300	10200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.062	0.065	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2142-A-11	BA2142-A-12	----	----	----
Client sampling date / time					13-Oct-2021 09:00	13-Oct-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-011	VA21C3221-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
tin	7440-31-5	E440	2.0	mg/kg	102	88.9	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	590	221	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	11.9	9.74	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.17	4.21	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	53.7	50.4	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	4770	7260	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.8	---	---	---	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	12.0	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.96	10.3	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.92	2.92	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.10	6.46	---	---	---	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	---	---	---	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	---	---	---	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.98	1.80	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.153	0.230	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	1930	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.13	0.958	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.04	1.02	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.34	0.64	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	139	127	---	---	---	
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	0.55	---	---	---	
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	BA2142-A-11	BA2142-A-12	----	----	----
					Client sampling date / time	13-Oct-2021 09:00	13-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C3221-011	VA21C3221-012	-----	-----	-----	
					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	40.8	23.9	----	----	----	
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>VA21C3221</b>	Page	: 1 of 14
Client	: <b>Covanta Burnaby Renewable Energy, ULC</b>	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 20-Oct-2021 11:50
PO	: VANCO 0000050390	Issue Date	: 04-Nov-2021 16:39
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- 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.



## 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 BA2142A-1	E440.Ag	13-Oct-2021	03-Nov-2021	----	----		03-Nov-2021	----	21 days		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142A-1	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days		✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-10	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days		✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-11	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days		✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-12	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days		✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-2	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days		✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-3	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 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 BA2142-A-4	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-5	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-6	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-7	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-8	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2142-A-9	E510	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	28 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2142A-1	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2142-A-10	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2142-A-11	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 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 ICMS</b>											
LDPE bag BA2142-A-12	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-2	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-3	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-4	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-5	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-6	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-7	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-8	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2142-A-9	E440	13-Oct-2021	01-Nov-2021	----	----		02-Nov-2021	180 days	20 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 BA2142A-1	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-10	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-11	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-12	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-2	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-3	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-4	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-5	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2142-A-6	E144	13-Oct-2021	----	----	----		31-Oct-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 BA2142-A-7	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2142-A-8	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2142-A-9	E144	13-Oct-2021	----	----	----		31-Oct-2021	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142A-1	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-10	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-11	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-12	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-2	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-3	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 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 BA2142-A-4	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-5	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-6	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-7	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-8	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2142-A-9	E108	13-Oct-2021	01-Nov-2021	----	----		01-Nov-2021	30 days	19 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2142A-1	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2142-A-10	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
HDPE - total (lab preserved) BA2142-A-11	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-12	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-2	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-3	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-4	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-5	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-6	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-7	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-8	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 days	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-9	E512	30-Oct-2021	----	----	----		01-Nov-2021	----	19 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) BA2142A-1	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-10	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-11	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-12	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-2	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-3	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-4	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-5	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2142-A-6	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 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> BA2142-A-7	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2142-A-8	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✓
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
<b>HDPE - total (lab preserved)</b> BA2142-A-9	E444	30-Oct-2021	----	----	----		01-Nov-2021	180 days	19 days	✓
<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> BA2142A-1	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-10	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-11	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-12	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-2	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-3	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-4	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-5	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-6	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-7	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-8	EPP444	13-Oct-2021	30-Oct-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> BA2142-A-9	EPP444	13-Oct-2021	30-Oct-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	334350	1	14	7.1	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	334351	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	334352	1	14	7.1	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	334346	1	19	5.2	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	336846	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	334350	2	14	14.2	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	334351	2	15	13.3	10.0	✔
Moisture Content by Gravimetry	E144	334352	1	14	7.1	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	334346	1	19	5.2	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	336846	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	334334	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	334350	1	14	7.1	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	334335	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	334351	1	15	6.6	5.0	✔
Moisture Content by Gravimetry	E144	334352	1	14	7.1	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	334334	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	334335	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)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl.  Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method.  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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
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 : VA21C3221

Page : 1 of 11

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

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 20-Oct-2021 11:50
Date Analysis Commenced : 30-Oct-2021
Issue Date : 04-Nov-2021 16:39

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 Caleb Deroche (Lab Analyst, Metals), Janice Leung (Supervisor - Organics Instrumentation, Organics), Kevin Duarte (Supervisor - Metals ICP Instrumentation, Metals), Kim Jensen (Department Manager - Metals, Metals), Ophelia Chiu (Department Manager - Organics, Organics), and Owen Cheng (Metals, Metals).

Page : 2 of 11  
Work Order : VA21C3221  
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: 334346)</b>											
VA21C3221-001	BA2142A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.3	0.7%	5%	----
<b>Physical Tests (QC Lot: 334352)</b>											
KS2103505-001	Anonymous	moisture	----	E144	0.25	%	24.4	24.0	1.50%	20%	----
<b>Metals (QC Lot: 334350)</b>											
KS2103467-001	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 334351)</b>											
KS2103467-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	10600	9680	8.78%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.27	0.24	0.03	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	6.45	5.22	21.0%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	142	135	5.16%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.50	0.45	0.05	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	0.22	<0.20	0.02	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.231	0.204	12.6%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	2450	2340	4.77%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	18.8	17.1	9.07%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	9.27	8.73	6.02%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	7.98	7.31	8.77%	30%	----
		iron	7439-89-6	E440	50	mg/kg	17600	15800	11.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	9.19	8.29	10.3%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	16.4	15.5	5.51%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	2490	2290	8.65%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	512	452	12.5%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.89	0.77	14.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	15.3	13.9	9.52%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	572	492	15.0%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	1280	1190	7.32%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.27	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	0.10	<0.10	0.004	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	<50	<50	0	Diff <2x LOR	----
		strontium	7440-24-6	E440	0.50	mg/kg	20.7	19.8	4.10%	40%	----



Sub-Matrix: **Soil/Solid**

*Laboratory Duplicate (DUP) Report*

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
<b>Metals (QC Lot: 334351) - continued</b>											
KS2103467-001	Anonymous	sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.123	0.114	0.009	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	84.7	59.5	35.0%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.798	0.761	4.82%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	41.0	37.0	10.3%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	57.0	52.1	8.97%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	0	Diff <2x LOR	----



## 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: 334352)</b>						
moisture	----	E144	0.25	%	<0.25	----
<b>Metals (QCLot: 334350)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 334351)</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: 334351) - 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: 336846)</b>						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 334334)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 334335)</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: 334346)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
<b>Physical Tests (QCLot: 334352)</b>									
moisture	----	E144	0.25	%	50 %	99.9	90.0	110	----
<b>Metals (QCLot: 334350)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	105	80.0	120	----
<b>Metals (QCLot: 334351)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	112	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	108	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	105	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.7	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	104	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	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	99.5	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	103	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	105	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.5	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	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	102	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	90.4	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	103	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.8	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.9	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: 334351) - continued</b>									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	100	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.5	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	96.1	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	101	80.0	120	----
<b>Metals (QCLot: 336846)</b>									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	94.5	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: 334334)</b>										
VA21C3221-001	BA2142A-1	mercury, TCLP	7439-97-6	E512	0.0012 mg/L	0.001 mg/L	118	50.0	140	----
<b>TCLP Metals (QCLot: 334335)</b>										
VA21C3221-001	BA2142A-1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.9 mg/L	5 mg/L	98.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.2 mg/L	12.5 mg/L	97.3	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.240 mg/L	0.25 mg/L	96.2	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.28 mg/L	10 mg/L	92.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.245 mg/L	0.25 mg/L	97.9	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	1.20 mg/L	1.25 mg/L	96.3	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	2.29 mg/L	2.5 mg/L	91.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	234 mg/L	250 mg/L	93.7	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.83 mg/L	10 mg/L	98.3	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	250 mg/L	250 mg/L	99.8	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.41 mg/L	2.5 mg/L	96.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.95 mg/L	5 mg/L	99.0	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.105 mg/L	0.1 mg/L	105	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	95.6	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.79 mg/L	5 mg/L	95.9	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.74 mg/L	0.75 mg/L	98.7	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	82.7	50.0	150	----



## 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: 334350)</b>									
QC-334350-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
<b>Metals (QCLot: 334351)</b>									
QC-334351-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
QC-334351-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	104	70.0	130	----
QC-334351-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
QC-334351-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	106	70.0	130	----
QC-334351-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	110	70.0	130	----
QC-334351-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	108	40.0	160	----
QC-334351-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	108	70.0	130	----
QC-334351-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
QC-334351-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
QC-334351-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	107	70.0	130	----
QC-334351-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	105	70.0	130	----
QC-334351-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	106	70.0	130	----
QC-334351-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-334351-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	106	70.0	130	----
QC-334351-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	105	70.0	130	----
QC-334351-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
QC-334351-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
QC-334351-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
QC-334351-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	104	70.0	130	----
QC-334351-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
QC-334351-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	----
QC-334351-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
QC-334351-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	97.1	40.0	160	----
QC-334351-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	97.3	70.0	130	----
QC-334351-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	115	70.0	130	----
QC-334351-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130	----
QC-334351-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----

Page : 11 of 11  
 Work Order : VA21C3221  
 Client : Covanta Burnaby Renewable Energy, ULC  
 Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

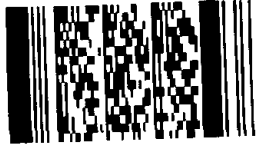
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
<b>Metals (QCLot: 334351) - continued</b>									
QC-334351-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
QC-334351-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	96.3	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 Skrypyk			<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: <input type="checkbox"/> Yes <input type="checkbox"/> No			Email 2: rjohnson4@covanta.com			<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT					
			Email 3: dskrypyk@covanta.com			<b>Analysis Request</b>					
			brent.kirkpatrick@metrovancover.org Sarah.Wellman@metrovancover.org								

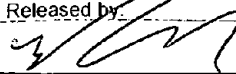
<b>Invoice To</b> Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			<b>Client / Project Information</b>			Please indicate below Filtered, Preserved or both (F, P, F/P)																																	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No			Job #:			<table border="1"> <tr> <td rowspan="4">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4">MOISTURE</td> <td rowspan="4">Chrome 6</td> <td rowspan="4">MET-CSR+FULL-VA (all metals)</td> <td colspan="6">Number of Containers</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																							
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																																			
Company:			PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																				
Contact:			LSD: (includes 2:1 pH)																																				
Address:			Quote #:																																				
Phone: Fax:																																							

[Lab] Work Order # (lab use only)		ALS Contact:	Sampler:									
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
BA2142-A-1		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-2		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-3		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-4		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-5		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-6		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-7		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-8		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-9		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-10		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-11		13-Oct-21	9:00	Soil	X	X		X				1
BA2142-A-12		13-Oct-21	9:00	Soil	X	X		X				1

**Environmental Division**  
**Vancouver**  
 Work Order Reference  
**VA21C3221**  
  
 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 (client use)</b>			<b>SHIPMENT RECEPTION (lab use only)</b>			<b>SHIPMENT VERIFICATION (lab use only)</b>				
Released by: 	Date (dd-mmm-yy): 20-Oct-21	Time (hh-mm): 0800	Received by:	Date:	Time:	Temperature: 20°C	Verified by: JTV	Date: Oct-20-21	Time: 11:50	Observations: Yes / No? If Yes add SIF