

Bottom Ash Data

2021 Week 28

The following analytical report represents bottom ash composite results for week 28 of 2021 (July 4, 2021 to July 10, 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 : VA21B4221
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 : 13-Jul-2021 11:55
Date Analysis Commenced : 15-Jul-2021
Issue Date : 21-Jul-2021 10:50

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.

Signatories	Position	Laboratory Department
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



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	BA2128-A-1	BA2128-A-2	BA2128-A-3	BA2128-A-4	BA2128-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-001	VA21B4221-002	VA21B4221-003	VA21B4221-004	VA21B4221-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.8	19.5	19.5	17.4	19.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.6	10.6	10.5	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	30600	36200	35600	31600	47000	
antimony	7440-36-0	E440	0.10	mg/kg	117	113	104	112	93.5	
arsenic	7440-38-2	E440	0.10	mg/kg	29.3	31.0	31.0	29.8	25.7	
barium	7440-39-3	E440	0.50	mg/kg	646	694	479	560	616	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.43	0.38	0.39	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	8.42	14.6	9.35	7.31	5.93	
boron	7440-42-8	E440	5.0	mg/kg	191	258	184	191	167	
cadmium	7440-43-9	E440	0.020	mg/kg	11.6	14.0	140	23.1	10.1	
calcium	7440-70-2	E440	50	mg/kg	129000	143000	131000	129000	115000	
chromium	7440-47-3	E440	0.50	mg/kg	193	217	139	153	721	
cobalt	7440-48-4	E440	0.10	mg/kg	368	56.4	138	62.1	30.5	
copper	7440-50-8	E440	0.50	mg/kg	13300	7450	2090	14400	3270	
iron	7439-89-6	E440	50	mg/kg	74500	94600	61400	61700	65600	
lead	7439-92-1	E440	0.50	mg/kg	5980	736	2030	987	1250	
lithium	7439-93-2	E440	2.0	mg/kg	41.6	28.5	33.0	25.0	19.9	
magnesium	7439-95-4	E440	20	mg/kg	11300	13600	12900	11600	11800	
manganese	7439-96-5	E440	1.0	mg/kg	820	3140	946	831	908	
mercury	7439-97-6	E510	0.0500	mg/kg	0.166	0.236	0.151	0.157	0.130	
molybdenum	7439-98-7	E440	0.10	mg/kg	32.7	28.6	25.3	28.0	100	
nickel	7440-02-0	E440	0.50	mg/kg	312	171	150	485	1250	
phosphorus	7723-14-0	E440	50	mg/kg	10500	12300	11400	11000	9470	
potassium	7440-09-7	E440	100	mg/kg	5500	6380	5800	5610	5350	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.40	0.31	0.41	0.34	
silver	7440-22-4	E440	0.10	mg/kg	6.12	7.46	4.78	8.10	4.53	
sodium	7440-23-5	E440	50	mg/kg	15300	17900	15400	15100	15100	
strontium	7440-24-6	E440	0.50	mg/kg	301	341	348	344	272	
sulfur	7704-34-9	E440	1000	mg/kg	11800	13000	12100	12200	10900	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0.056	<0.050	0.064	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-1	BA2128-A-2	BA2128-A-3	BA2128-A-4	BA2128-A-5
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-001	VA21B4221-002	VA21B4221-003	VA21B4221-004	VA21B4221-005	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	114	136	107	126	101	
titanium	7440-32-6	E440	1.0	mg/kg	545	517	274	352	460	
tungsten	7440-33-7	E440	0.50	mg/kg	23.7	17.9	13.3	16.3	12.3	
uranium	7440-61-1	E440	0.050	mg/kg	3.62	4.04	3.93	3.80	3.47	
vanadium	7440-62-2	E440	0.20	mg/kg	47.0	58.4	52.6	50.1	47.0	
zinc	7440-66-6	E440	2.0	mg/kg	7380	7010	5280	8830	6680	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.4	3.0	1.4	2.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.4	11.4	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.07	8.17	8.56	8.43	8.17	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.19	6.36	6.24	6.18	6.23	
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	2.12	2.20	2.28	2.18	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.237	0.145	0.202	0.181	0.154	
calcium, TCLP	7440-70-2	E444	10	mg/L	2080	1990	1950	1990	2020	
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	1.00	1.10	1.56	0.978	1.21	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.37	0.822	0.597	1.30	1.04	
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	139	134	152	148	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	0.49	0.49	0.59	0.59	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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-1	BA2128-A-2	BA2128-A-3	BA2128-A-4	BA2128-A-5
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-001	VA21B4221-002	VA21B4221-003	VA21B4221-004	VA21B4221-005	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	40.5	32.9	47.1	36.4	31.5	
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	BA2128-A-6	BA2128-A-7	BA2128-A-8	BA2128-A-9	BA2128-A-10
(Matrix: Soil/Solid)					Client sampling date / time	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-006	VA21B4221-007	VA21B4221-008	VA21B4221-009	VA21B4221-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.4	20.6	20.4	20.2	21.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.5	10.4	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31600	44800	32400	29200	32600	
antimony	7440-36-0	E440	0.10	mg/kg	94.7	154	112	325	115	
arsenic	7440-38-2	E440	0.10	mg/kg	23.4	30.1	33.9	30.8	34.8	
barium	7440-39-3	E440	0.50	mg/kg	662	858	608	528	582	
beryllium	7440-41-7	E440	0.10	mg/kg	0.41	0.47	0.41	0.44	0.38	
bismuth	7440-69-9	E440	0.20	mg/kg	5.84	10.4	7.08	20.2	9.20	
boron	7440-42-8	E440	5.0	mg/kg	200	301	217	201	226	
cadmium	7440-43-9	E440	0.020	mg/kg	9.00	11.8	11.6	14.1	15.8	
calcium	7440-70-2	E440	50	mg/kg	127000	159000	133000	138000	131000	
chromium	7440-47-3	E440	0.50	mg/kg	192	211	174	162	263	
cobalt	7440-48-4	E440	0.10	mg/kg	39.1	76.5	79.2	80.9	204	
copper	7440-50-8	E440	0.50	mg/kg	2170	9120	3950	6520	2550	
iron	7439-89-6	E440	50	mg/kg	77900	97900	73500	58800	63000	
lead	7439-92-1	E440	0.50	mg/kg	576	1520	435	1370	524	
lithium	7439-93-2	E440	2.0	mg/kg	33.4	30.4	32.3	28.6	35.0	
magnesium	7439-95-4	E440	20	mg/kg	11600	14300	12900	11500	12400	
manganese	7439-96-5	E440	1.0	mg/kg	971	1170	938	810	1110	
mercury	7439-97-6	E510	0.0500	mg/kg	0.148	0.126	0.283	0.203	0.142	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.1	34.8	24.3	28.9	32.2	
nickel	7440-02-0	E440	0.50	mg/kg	202	427	788	274	183	
phosphorus	7723-14-0	E440	50	mg/kg	9520	11300	10700	10700	12100	
potassium	7440-09-7	E440	100	mg/kg	4990	6280	6020	5460	6040	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.37	0.30	0.31	0.39	
silver	7440-22-4	E440	0.10	mg/kg	4.02	15.3	4.42	7.77	5.89	
sodium	7440-23-5	E440	50	mg/kg	14100	17900	16200	14900	16100	
strontium	7440-24-6	E440	0.50	mg/kg	402	354	298	296	331	
sulfur	7704-34-9	E440	1000	mg/kg	10400	12900	12200	11600	12100	
thallium	7440-28-0	E440	0.050	mg/kg	0.053	0.054	<0.050	0.052	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	87.0	1010	112	3140	123	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-6	BA2128-A-7	BA2128-A-8	BA2128-A-9	BA2128-A-10
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-006	VA21B4221-007	VA21B4221-008	VA21B4221-009	VA21B4221-010	
					Result	Result	Result	Result	Result	
Metals										
titanium	7440-32-6	E440	1.0	mg/kg	320	550	318	313	465	
tungsten	7440-33-7	E440	0.50	mg/kg	13.3	24.9	13.7	16.5	15.2	
uranium	7440-61-1	E440	0.050	mg/kg	3.51	4.26	3.74	3.88	3.82	
vanadium	7440-62-2	E440	0.20	mg/kg	44.9	60.1	50.1	54.3	54.0	
zinc	7440-66-6	E440	2.0	mg/kg	9500	9840	5450	4310	4440	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.7	1.2	1.6	2.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.4	11.4	11.5	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.77	7.80	8.34	7.94	8.14	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	6.07	6.23	6.14	6.35	6.17	
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	2.12	2.21	3.79	2.31	2.43	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.179	0.748	0.149	0.159	0.145	
calcium, TCLP	7440-70-2	E444	10	mg/L	1960	2000	2050	2100	2140	
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	1.58	1.28	1.11	1.22	1.43	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.48	1.10	1.21	1.02	1.22	
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	142	145	144	148	147	
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	0.63	0.45	0.55	0.48	0.65	
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	
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	50.3	63.2	33.6	48.3	32.0	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-6	BA2128-A-7	BA2128-A-8	BA2128-A-9	BA2128-A-10
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00	07-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-006	VA21B4221-007	VA21B4221-008	VA21B4221-009	VA21B4221-010	
TCLP Metals					Result	Result	Result	Result	Result	
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	BA2128-A-11	BA2128-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	07-Jul-2021 09:00	07-Jul-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-011	VA21B4221-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	20.8	19.7	---	---	---	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.6	---	---	---	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	32600	31400	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	126	123	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	34.6	30.0	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	542	562	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.35	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	13.2	7.55	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	229	217	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	144	11.7	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	147000	131000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	218	311	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	153	134	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	2780	5640	---	---	---	
iron	7439-89-6	E440	50	mg/kg	67700	70000	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	597	884	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	89.6	26.8	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	13000	12800	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	893	1490	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	0.164	0.138	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	24.0	25.6	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	191	1140	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	12100	11200	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	5910	5720	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.46	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	5.00	6.42	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	16000	15800	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	326	326	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	12500	12700	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.055	---	---	---	
tin	7440-31-5	E440	2.0	mg/kg	131	123	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-11	BA2128-A-12	----	----	----
Client sampling date / time					07-Jul-2021 09:00	07-Jul-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-011	VA21B4221-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
titanium	7440-32-6	E440	1.0	mg/kg	303	362	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	13.6	15.8	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.12	3.90	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	61.1	52.8	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	4760	5410	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	1.2	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.34	8.56	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.12	6.21	---	---	---	
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	2.20	2.20	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.178	0.175	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1970	2050	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.40	1.41	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.25	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	<0.25	<0.25	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	144	152	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.49	0.49	---	---	---	
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	---	---	---	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	38.6	36.0	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2128-A-11	BA2128-A-12	----	----	----
					Client sampling date / time	07-Jul-2021 09:00	07-Jul-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21B4221-011	VA21B4221-012	-----	-----	-----	
					Result	Result	----	----	----	
TCLP Metals										
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	: VA21B4221	Page	: 1 of 15
Client	: Covanta Burnaby Renewable Energy, ULC	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	: 13-Jul-2021 11:55
PO	: VANCO 0000050390	Issue Date	: 21-Jul-2021 10:48
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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA21B4221-001	BA2128-A-1	antimony	7440-36-0	E440	39.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	cobalt	7440-48-4	E440	138 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	copper	7440-50-8	E440	86.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	lead	7439-92-1	E440	169 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	lithium	7439-93-2	E440	38.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	manganese	7439-96-5	E440	40.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	tin	7440-31-5	E440	167 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	tungsten	7440-33-7	E440	182 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4221-001	BA2128-A-1	zinc	7440-66-6	E440	61.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-2438480 02	----	boron	7440-42-8	E440	78.7 % MES	80.0-120%	Recovery less than lower 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-1	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-10	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-11	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-12	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-2	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-3	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-4	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-5	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-6	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-7	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-8	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2128-A-9	E510	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	28 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2128-A-1	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2128-A-10	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2128-A-11	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2128-A-12	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 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		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-2	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-3	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-4	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-5	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-6	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-7	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-8	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2128-A-9	E440	07-Jul-2021	16-Jul-2021	----	----		19-Jul-2021	180 days	12 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2128-A-1	E144	07-Jul-2021	----	----	----		15-Jul-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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-10	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-11	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-12	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-2	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-3	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-4	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-5	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-6	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2128-A-7	E144	07-Jul-2021	----	----	----		15-Jul-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		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2128-A-8	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2128-A-9	E144	07-Jul-2021	----	----	----		15-Jul-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-1	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-10	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-11	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-12	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-2	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-3	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-4	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-5	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-6	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-7	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-8	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✓	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2128-A-9	E108	07-Jul-2021	16-Jul-2021	----	----		16-Jul-2021	30 days	9 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2128-A-1	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2128-A-10	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2128-A-11	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2128-A-12	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-2	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-3	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-4	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-5	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-6	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-7	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-8	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2128-A-9	E512	16-Jul-2021	----	----	----		18-Jul-2021	----	11 days	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2128-A-1	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-10	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-11	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-12	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-2	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-3	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-4	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-5	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-6	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2128-A-7	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 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	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2128-A-8	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2128-A-9	E444	16-Jul-2021	----	----	----		19-Jul-2021	180 days	12 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-1	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-10	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-11	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-12	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-2	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-3	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-4	EPP444	07-Jul-2021	16-Jul-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	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-5	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-6	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-7	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-8	EPP444	07-Jul-2021	16-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2128-A-9	EPP444	07-Jul-2021	16-Jul-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	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	243848	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	243849	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	243851	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	243850	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	243848	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	243849	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	243851	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	243850	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	245999	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	243848	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	246000	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	243849	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	243851	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	245999	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	246000	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 ₃ 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.
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 ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAAS 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 ₃ and HCl. This method is intended to liberate metals that may be environmentally available.

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Work Order : VA21B4221
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



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



QUALITY CONTROL REPORT

Work Order : VA21B4221

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 : 13-Jul-2021 11:55
Date Analysis Commenced : 15-Jul-2021
Issue Date : 21-Jul-2021 10:48

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 (Supervisor - Metals ICP Instrumentation), Ophelia Chiu (Department Manager - Organics), Robin Weeks (Team Leader - Metals), and Shaneel Dayal (Analyst).

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Work Order : VA21B4221
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



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
Physical Tests (QC Lot: 243850)											
VA21B4221-001	BA2128-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.5	10.5	0.1%	5%	----
Physical Tests (QC Lot: 243851)											
VA21B4221-001	BA2128-A-1	moisture	----	E144	0.25	%	20.8	20.9	0.538%	20%	----
Metals (QC Lot: 243848)											
VA21B4221-001	BA2128-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.166	0.133	0.0336	Diff <2x LOR	----
Metals (QC Lot: 243849)											
VA21B4221-001	BA2128-A-1	aluminum	7429-90-5	E440	50	mg/kg	30600	42200	31.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	117	174	39.1%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	29.3	27.5	6.23%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	646	636	1.57%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.42	0.007	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.42	6.30	28.7%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	191	239	22.5%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	11.6	10.2	13.1%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	129000	129000	0.209%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	193	154	22.1%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	368	67.0	138%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	13300	5250	86.8%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	74500	85700	14.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	5980	500	169%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	41.6	28.0	38.9%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	11300	12200	7.87%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	820	1240	40.7%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	32.7	25.9	23.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	312	370	17.0%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10500	10000	4.33%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5500	5520	0.338%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.38	0.03	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	6.12	5.56	9.58%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15300	16200	5.95%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	301	315	4.28%	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
Metals (QC Lot: 243849) - continued											
VA21B4221-001	BA2128-A-1	sulfur	7704-34-9	E440	1000	mg/kg	11800	12100	2.12%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	114	1270	167%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	545	667	20.1%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	23.7	518	182%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	3.62	3.81	5.10%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	47.0	55.2	16.2%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	7380	3900	61.8%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.7	0.5	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
Physical Tests (QCLot: 243851)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 243848)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 243849)						
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
Metals (QCLot: 243849) - continued						
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	----
TCLP Metals (QCLot: 245999)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 246000)						
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	
Physical Tests (QCLot: 243850)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.3	95.0	105	----
Physical Tests (QCLot: 243851)									
moisture	----	E144	0.25	%	50 %	99.9	90.0	110	----
Metals (QCLot: 243848)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	102	80.0	120	----
Metals (QCLot: 243849)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	117	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	84.6	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	83.9	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	# 78.7	80.0	120	MES
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	99.6	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	101	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	104	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	98.3	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	82.8	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	98.5	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	88.0	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	81.6	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	97.1	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	84.0	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	100	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	
Metals (QCLot: 243849) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	81.2	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	83.2	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	80.6	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.7	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	106	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	82.2	80.0	120	----

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).



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
TCLP Metals (QCLot: 245999)										
VA21B4221-001	BA2128-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	93.3	50.0	140	----
TCLP Metals (QCLot: 246000)										
VA21B4221-001	BA2128-A-1	antimony, TCLP	7440-36-0	E444	5.0 mg/L	5 mg/L	99.8	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		barium, TCLP	7440-39-3	E444	14.3 mg/L	12.5 mg/L	114	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.229 mg/L	0.25 mg/L	91.7	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.14 mg/L	10 mg/L	91.4	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.255 mg/L	0.25 mg/L	102	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	1.26 mg/L	1.25 mg/L	101	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.50 mg/L	2.5 mg/L	100	50.0	140	----
		iron, TCLP	7439-89-6	E444	234 mg/L	250 mg/L	93.6	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.88 mg/L	10 mg/L	98.8	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	277 mg/L	250 mg/L	111	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.47 mg/L	2.5 mg/L	98.8	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.90 mg/L	5 mg/L	97.9	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.112 mg/L	0.1 mg/L	112	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	94.8	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.82 mg/L	5 mg/L	96.4	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	93.3	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	
Metals (QCLot: 243848)									
QC-243848-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	107	70.0	130	----
Metals (QCLot: 243849)									
QC-243849-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
QC-243849-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	97.5	70.0	130	----
QC-243849-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	107	70.0	130	----
QC-243849-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	----
QC-243849-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	112	70.0	130	----
QC-243849-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
QC-243849-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	91.7	70.0	130	----
QC-243849-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-243849-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
QC-243849-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
QC-243849-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	94.6	70.0	130	----
QC-243849-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
QC-243849-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	97.0	70.0	130	----
QC-243849-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	100	70.0	130	----
QC-243849-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	104	70.0	130	----
QC-243849-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
QC-243849-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
QC-243849-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	99.4	70.0	130	----
QC-243849-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	95.4	70.0	130	----
QC-243849-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
QC-243849-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
QC-243849-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	100	70.0	130	----
QC-243849-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	91.6	40.0	160	----
QC-243849-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	95.1	70.0	130	----
QC-243849-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	116	70.0	130	----
QC-243849-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	98.6	70.0	130	----
QC-243849-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	106	70.0	130	----

Page : 11 of 11
 Work Order : VA21B4221
 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	
Metals (QCLot: 243849) - continued									
QC-243849-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
QC-243849-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	98.9	70.0	130	----



Report To		Report Format / Distribution		Service Requested (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 Skrypnyk	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
	Fax: _____	Email 3:	dskrypnyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
	<input type="checkbox"/> Yes <input type="checkbox"/> No		brent.kirkpatrick@metrovancover.org		Analysis Request	
			Sarah.Wellman@metrovancover.org			

Invoice To		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)					
Same as Report ?		Job #:							
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite							
Company:		LSD: (includes 2:1 pH)							
Contact:		Quote #:							
Address:									
Phone:									

Lab Work Order # (lab use only)		ALS Contact:	Sampler:									Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)				
1	BA2128-A-1	07-Jul-21	9:00	Soil	X	X		X			1	
2	BA2128-A-2	07-Jul-21	9:00	Soil	X	X		X			1	
3	BA2128-A-3	07-Jul-21	9:00	Soil	X	X		X			1	
4	BA2128-A-4	07-Jul-21	9:00	Soil	X	X		X			1	
5	BA2128-A-5	07-Jul-21	9:00	Soil	X	X		X			1	
6	BA2128-A-6	07-Jul-21	9:00	Soil	X	X		X			1	
7	BA2128-A-7	07-Jul-21	9:00	Soil	X	X		X			1	
8	BA2128-A-8	07-Jul-21	9:00	Soil	X	X		X			1	
9	BA2128-A-9	07-Jul-21	9:00	Soil	X	X		X			1	
10	BA2128-A-10	07-Jul-21	9:00	Soil	X	X		X			1	
11	BA2128-A-11	07-Jul-21	9:00	Soil	X	X		X			1	
12	BA2128-A-12	07-Jul-21	9:00	Soil	X	X		X			1	

Environmental Division
 Vancouver
 Work Order Reference
VA21B4221



Telephone : +1 604 253 4168

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
<i>[Signature]</i>	13-Jul-21	0800	cm	13/07/21	11:55 am	25 °C				Yes / No ? If Yes add SIF