Bottom Ash Data

2021 Week 10

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on March 19, 2021. The data represents bottom ash composite results for week 10 of 2021 (February 28, 2021 to March 6, 2021).

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

ALS Environmental

CERTIFICATE OF ANALYSIS

Work Order	: **VA21A4430**	Page	: 1 of 11
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 BC Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 10-Mar-2021 09:45
PO	: VANCO 0000050390	Date Analysis Commenced	: 14-Mar-2021
C-O-C number	: ----	Issue Date	: 19-Mar-2021 09:46
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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*
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Woochan Song	Lab Assistant	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).

Unit	*Description*
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.

Qualifiers

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

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2110-A-1	BA2110-A-2	BA2110-A-3	BA2110-A-4	BA2110-A-5
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
						VA21A4430-001	VA21A4430-002	VA21A4430-003	VA21A4430-004	VA21A4430-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		20.7	20.8	22.1	19.6	20.4
pH (1:2 soil:water)	----	E108	0.10	pH units		12.0	12.0	11.8	12.0	12.0
Metals										
aluminum	7429-90-5	E440	50	mg/kg		31100	32500	33000	32900	31100
antimony	7440-36-0	E440	0.10	mg/kg		133	135	130	144	218
arsenic	7440-38-2	E440	0.10	mg/kg		22.3	24.6	24.9	23.5	27.0
barium	7440-39-3	E440	0.50	mg/kg		576	539	537	431	556
beryllium	7440-41-7	E440	0.10	mg/kg		0.37	0.45	0.40	0.39	0.40
bismuth	7440-69-9	E440	0.20	mg/kg		8.16	7.10	12.0	9.60	12.0
boron	7440-42-8	E440	5.0	mg/kg		176	222	231	185	196
cadmium	7440-43-9	E440	0.020	mg/kg		11.4	10.4	11.2	10.7	13.0
calcium	7440-70-2	E440	50	mg/kg		129000	131000	130000	130000	131000
chromium	7440-47-3	E440	0.50	mg/kg		157	142	179	172	159
cobalt	7440-48-4	E440	0.10	mg/kg		598	63.4	164	52.8	70.1
copper	7440-50-8	E440	0.50	mg/kg		41600	2400	5330	1800	25900
iron	7439-89-6	E440	50	mg/kg		50200	50300	63300	53600	65100
lead	7439-92-1	E440	0.50	mg/kg		709	380	343	424	375
lithium	7439-93-2	E440	2.0	mg/kg		61.0	19.8	32.8	20.2	21.6
magnesium	7439-95-4	E440	20	mg/kg		11400	11400	10900	10300	11000
manganese	7439-96-5	E440	1.0	mg/kg		732	706	896	870	1220
mercury	7439-97-6	E510	0.0500	mg/kg		0.0572	0.142	0.126	0.0885	0.168
molybdenum	7439-98-7	E440	0.10	mg/kg		15.8	23.8	17.7	16.6	15.9
nickel	7440-02-0	E440	0.50	mg/kg		604	384	307	125	204
phosphorus	7723-14-0	E440	50	mg/kg		10600	8790	10500	10200	11200
potassium	7440-09-7	E440	100	mg/kg		5010	5480	5120	5380	5410
selenium	7782-49-2	E440	0.20	mg/kg		1.32	0.57	0.40	0.45	0.62
silver	7440-22-4	E440	0.10	mg/kg		7.77	5.31	4.82	6.65	5.32
sodium	7440-23-5	E440	50	mg/kg		14700	15100	16500	16500	16400
strontium	7440-24-6	E440	0.50	mg/kg		348	301	332	307	324
sulfur	7704-34-9	E440	1000	mg/kg		14200	13600	12700	13800	16100

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2110-A-1	BA2110-A-2	BA2110-A-3	BA2110-A-4	BA2110-A-5
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
						VA21A4430-001	VA21A4430-002	VA21A4430-003	VA21A4430-004	VA21A4430-005
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		<0.050	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		190	114	142	130	127
titanium	7440-32-6	E440	1.0	mg/kg		676	740	457	360	669
tungsten	7440-33-7	E440	0.50	mg/kg		7.63	16.4	9.01	10.8	13.0
uranium	7440-61-1	E440	0.050	mg/kg		1.99	2.15	2.10	2.12	2.21
vanadium	7440-62-2	E440	0.20	mg/kg		27.9	28.6	29.4	28.5	29.1
zinc	7440-66-6	E440	2.0	mg/kg		15700	4250	3460	4730	4460
zirconium	7440-67-7	E440	1.0	mg/kg		1.2	1.3	1.4	2.0	1.2
TCLP Metals										
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		2.18	2.30	2.12	2.21	2.14
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.146	0.157	0.161	0.284	0.213
calcium, TCLP	7440-70-2	E444	10	mg/L		2210	2170	2120	2160	2120
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		1.17	0.910	0.931	1.17	3.21
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.835	0.225	0.670	0.628	0.657
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	0.28	<0.25	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		130	132	132	134	131
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		0.42	0.54	0.43	0.41	0.68
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.0	12.0	12.1	12.1	12.1
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		10.6	10.7	10.4	10.5	10.4
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		6.76	6.85	6.67	7.74	7.11
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: **Soil** (Matrix: **Soil/Solid**)					Client sample ID	BA2110-A-1	BA2110-A-2	BA2110-A-3	BA2110-A-4	BA2110-A-5
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA21A4430-001**	**VA21A4430-002**	**VA21A4430-003**	**VA21A4430-004**	**VA21A4430-005**
						Result	Result	Result	Result	Result
TCLP Metals										
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		44.8	36.9	21.8	18.7	25.3

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

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2110-A-6	BA2110-A-7	BA2110-A-8	BA2110-A-9	BA2110-A-10
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
						VA21A4430-006	VA21A4430-007	VA21A4430-008	VA21A4430-009	VA21A4430-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		21.1	21.6	21.0	21.0	21.4
pH (1:2 soil:water)	----	E108	0.10	pH units		11.9	11.8	12.1	12.0	11.6
Metals										
aluminum	7429-90-5	E440	50	mg/kg		30800	29700	34000	31600	26500
antimony	7440-36-0	E440	0.10	mg/kg		149	132	130	135	125
arsenic	7440-38-2	E440	0.10	mg/kg		132	21.2	21.1	23.9	53.8
barium	7440-39-3	E440	0.50	mg/kg		500	512	546	521	434
beryllium	7440-41-7	E440	0.10	mg/kg		<0.72 DLM	0.37	0.40	0.36	0.34
bismuth	7440-69-9	E440	0.20	mg/kg		7.25	6.43	7.24	7.34	7.42
boron	7440-42-8	E440	5.0	mg/kg		345	203	212	178	175
cadmium	7440-43-9	E440	0.020	mg/kg		13.3	9.96	10.6	10.9	12.5
calcium	7440-70-2	E440	50	mg/kg		119000	128000	125000	122000	116000
chromium	7440-47-3	E440	0.50	mg/kg		135	171	195	184	181
cobalt	7440-48-4	E440	0.10	mg/kg		311	29.5	23.3	107	41.8
copper	7440-50-8	E440	0.50	mg/kg		2520	1890	1850	13700	11700
iron	7439-89-6	E440	50	mg/kg		74000	55300	74100	76500	55700
lead	7439-92-1	E440	0.50	mg/kg		408	715	379	412	918
lithium	7439-93-2	E440	2.0	mg/kg		20.3	19.6	19.2	25.2	18.8
magnesium	7439-95-4	E440	20	mg/kg		10000	11800	12000	10500	9920
manganese	7439-96-5	E440	1.0	mg/kg		755	691	1070	843	854
mercury	7439-97-6	E510	0.0500	mg/kg		0.0654	0.143	0.0946	0.216	0.0687
molybdenum	7439-98-7	E440	0.10	mg/kg		15.4	17.4	18.7	17.9	16.8
nickel	7440-02-0	E440	0.50	mg/kg		423	98.2	125	418	251
phosphorus	7723-14-0	E440	50	mg/kg		8660	11000	9290	9920	9570
potassium	7440-09-7	E440	100	mg/kg		4460	5870	5340	4650	4900
selenium	7782-49-2	E440	0.20	mg/kg		<1.45 DLM	0.40	0.46	0.45	0.40
silver	7440-22-4	E440.Ag	0.10	mg/kg		----	6.44	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		22.1	----	5.26	4.87	6.73
sodium	7440-23-5	E440	50	mg/kg		13600	15500	16000	15100	15900
strontium	7440-24-6	E440	0.50	mg/kg		274	303	320	302	286
sulfur	7704-34-9	E440	1000	mg/kg		<7200 DLM	12900	14300	13600	13300

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2110-A-6	BA2110-A-7	BA2110-A-8	BA2110-A-9	BA2110-A-10
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
						VA21A4430-006	VA21A4430-007	VA21A4430-008	VA21A4430-009	VA21A4430-010
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		<0.362 DLM	<0.050	<0.050	<0.050	<0.050
tin	7440-31-5	E440	2.0	mg/kg		540	144	119	128	186
titanium	7440-32-6	E440	1.0	mg/kg		414	476	433	472	288
tungsten	7440-33-7	E440	0.50	mg/kg		9.15	13.9	14.7	7.91	11.0
uranium	7440-61-1	E440	0.050	mg/kg		1.86	1.93	1.91	1.94	1.92
vanadium	7440-62-2	E440	0.20	mg/kg		28.2	32.5	29.1	27.8	28.4
zinc	7440-66-6	E440	2.0	mg/kg		3440	6160	4270	7260	7920
zirconium	7440-67-7	E440	1.0	mg/kg		<7.2 DLM	1.2	1.3	1.3	1.3
TCLP Metals										
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		2.27	2.37	2.21	2.11	2.23
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.147	0.329	0.149	0.129	0.208
calcium, TCLP	7440-70-2	E444	10	mg/L		2190	2260	2150	2130	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		0.955	1.06	0.763	0.692	0.963
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.584	0.712	0.571	0.501	0.704
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		136	130	137	132	142
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		0.36	0.44	0.58	0.40	0.63
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.0	12.1	12.1	12.2	12.1
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		10.0	8.75	8.75	9.71	10.3
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units		6.95	7.70	6.95	6.75	7.26
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	<0.10	<0.10	<0.10
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	<1.0	<1.0	<1.0

Analytical Results

Sub-Matrix: **Soil** (Matrix: **Soil/Solid**)					Client sample ID	**BA2110-A-6**	**BA2110-A-7**	**BA2110-A-8**	**BA2110-A-9**	**BA2110-A-10**
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00	03-Mar-2021 09:00
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA21A4430-006**	**VA21A4430-007**	**VA21A4430-008**	**VA21A4430-009**	**VA21A4430-010**
						Result	Result	Result	Result	Result
TCLP Metals										
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		21.0	26.5	23.2	20.9	25.5

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

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID: BA2110-A-11	BA2110-A-12	----	----	----
					Client sampling date / time: 03-Mar-2021 09:00	03-Mar-2021 09:00	----	----	----
					VA21A4430-011	VA21A4430-012	--------	--------	--------
					Result	Result	----	----	----
Physical Tests									
moisture	----	E144	0.25	%	20.5	21.1	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.8	12.1	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	27400	30400	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	131	131	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	21.4	22.1	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	453	483	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.40	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	6.66	7.46	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	265	219	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	12.0	9.36	----	----	----
calcium	7440-70-2	E440	50	mg/kg	125000	131000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	168	138	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	37.7	199	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	2850	1140	----	----	----
iron	7439-89-6	E440	50	mg/kg	52000	49700	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	818	642	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	24.1	24.0	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	10200	10600	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	718	988	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.0589	0.0762	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	23.3	13.1	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	169	144	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	9580	13600	----	----	----
potassium	7440-09-7	E440	100	mg/kg	5220	5190	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.42	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	7.08	4.44	----	----	----
sodium	7440-23-5	E440	50	mg/kg	15700	16100	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	329	302	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	13100	13200	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----

Analytical Results

Sub-Matrix: **Soil**
(Matrix: **Soil/Solid**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2110-A-11	BA2110-A-12	----	----	----
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	----	----	----
						VA21A4430-011	VA21A4430-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
tin	7440-31-5	E440	2.0	mg/kg		158	123	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		330	309	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		11.2	6.83	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		2.05	2.13	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		33.0	26.2	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		4020	3200	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.4	1.9	----	----	----
TCLP Metals										
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		2.21	2.42	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.156	0.165	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		2220	2230	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.911	0.575	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.828	0.846	----	----	----
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		136	136	----	----	----
mercury, TCLP	7439-97-6	E512	0.0010	mg/L		<0.0010	<0.0010	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.66	0.37	----	----	----
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		12.1	12.1	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.93	9.46	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		7.44	7.43	----	----	----
selenium, TCLP	7782-49-2	E444	0.10	mg/L		<0.10	<0.10	----	----	----
silver, TCLP	7440-22-4	E444	0.050	mg/L		<0.050	<0.050	----	----	----
thallium, TCLP	7440-28-0	E444	1.0	mg/L		<1.0	<1.0	----	----	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L		<0.15	<0.15	----	----	----

Analytical Results

Sub-Matrix: **Soil** (Matrix: **Soil/Solid**)					Client sample ID	**BA2110-A-11**	**BA2110-A-12**	**----**	**----**	**----**
					Client sampling date / time	03-Mar-2021 09:00	03-Mar-2021 09:00	----	----	----
Analyte	*CAS Number*	*Method*	*LOR*	*Unit*		**VA21A4430-011**	**VA21A4430-012**	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L		37.3	32.7	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA21A4430**	Page	: 1 of 16
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	: 10-Mar-2021 09:45
PO	: VANCO 0000050390	Issue Date	: 19-Mar-2021 09:46
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

Anonymous: Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.

Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA21A4430-001	BA2110-A-1	chromium	7440-47-3	E440	52.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	cobalt	7440-48-4	E440	157 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	copper	7440-50-8	E440	136 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	iron	7439-89-6	E440	49.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	lead	7439-92-1	E440	167 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	lithium	7439-93-2	E440	101 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	manganese	7439-96-5	E440	40.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	molybdenum	7439-98-7	E440	66.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	nickel	7440-02-0	E440	128 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	selenium	7782-49-2	E440	0.86 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA21A4430-001	BA2110-A-1	tin	7440-31-5	E440	43.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	tungsten	7440-33-7	E440	36.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21A4430-001	BA2110-A-1	zinc	7440-66-6	E440	108 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Analysis Holding Time Compliance

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

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

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 15:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : High Silver in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-7	E440.Ag	03-Mar-2021	18-Mar-2021	180 days	15 days	✓	18-Mar-2021	164 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-1	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-10	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-11	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-12	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-2	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-3	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-4	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-5	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-6	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-7	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-8	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2110-A-9	E510	03-Mar-2021	17-Mar-2021	28 days	14 days	✓	17-Mar-2021	13 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-1	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-10	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-11	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-12	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-2	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-3	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-4	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-5	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-6	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-7	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-8	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2110-A-9	E440	03-Mar-2021	17-Mar-2021	180 days	14 days	✓	17-Mar-2021	165 days	0 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-1	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-10	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-11	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-12	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-2	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-3	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-4	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-5	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-6	E144	03-Mar-2021	----	----	----		16-Mar-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-7	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-8	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2110-A-9	E144	03-Mar-2021	----	----	----		16-Mar-2021	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-1	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-10	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-11	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-12	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-2	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-3	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-4	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-5	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-6	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-7	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-8	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2110-A-9	E108	03-Mar-2021	17-Mar-2021	30 days	14 days	✓	17-Mar-2021	15 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-1	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-10	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-11	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-12	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-2	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-3	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-4	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-5	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-6	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-7	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-8	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 days	12 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - dissolved (lab preserved) BA2110-A-9	E512	14-Mar-2021	----	----	----		16-Mar-2021	38 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-1	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-10	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-11	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-12	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-2	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-3	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-4	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-5	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-6	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-7	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-8	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2110-A-9	E444	14-Mar-2021	----	----	----		15-Mar-2021	190 days	12 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-1	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-10	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-11	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-12	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-2	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-3	EPP444	03-Mar-2021	14-Mar-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 Rec	Holding Times Actual	Eval	Analysis Date	Holding Times Rec	Holding Times Actual	Eval
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-4	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-5	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-6	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-7	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-8	EPP444	03-Mar-2021	14-Mar-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2110-A-9	EPP444	03-Mar-2021	14-Mar-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			Count		Frequency (%)		
Analytical Methods	*Method*	*QC Lot #*	*QC*	*Regular*	*Actual*	*Expected*	*Evaluation*
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	164377	1	13	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	164378	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	164379	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	164376	1	14	7.1	5.0	✓
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	165358	1	1	100.0	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	164377	2	13	15.3	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	164378	2	13	15.3	10.0	✓
Moisture Content by Gravimetry	E144	164379	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	164376	1	14	7.1	5.0	✓
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	165358	1	1	100.0	5.0	✓
Mercury by CVAAS (TCLP)	E512	163782	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	164377	1	13	7.6	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	163783	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	164378	1	13	7.6	5.0	✓
Moisture Content by Gravimetry	E144	164379	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	163782	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	163783	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 ºC) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO3 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 HNO3 and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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 HNO3 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 HNO3 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	: **VA21A4430**	Page	: 1 of 11
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	: 10-Mar-2021 09:45
PO	: VANCO 0000050390	Date Analysis Commenced	: 14-Mar-2021
C-O-C number	: ----	Issue Date	: 19-Mar-2021 09:46
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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.

Signatories	*Position*	*Laboratory Department*
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Woochan Song	Lab Assistant	Metals, Burnaby, British Columbia

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: 164376)											
KS2100567-002	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.89	7.91	0.253%	5%	----
Physical Tests (QC Lot: 164379)											
VA21A4430-001	BA2110-A-1	moisture	----	E144	0.25	%	20.7	22.9	10.1%	20%	----
Metals (QC Lot: 164377)											
VA21A4430-001	BA2110-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	0.0572	0.106	0.0485	Diff <2x LOR	----
Metals (QC Lot: 164378)											
VA21A4430-001	BA2110-A-1	aluminum	7429-90-5	E440	50	mg/kg	31100	32200	3.75%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	133	145	8.60%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	22.3	27.0	19.1%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	576	546	5.33%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.16	7.66	6.40%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	176	160	9.90%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	11.4	11.1	2.25%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	129000	125000	3.15%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	157	267	52.0%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	598	71.4	157%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	41600	7850	136%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	50200	83000	49.2%	30%	DUP-H
		lead	7439-92-1	E440	0.50	mg/kg	709	7940	167%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	61.0	20.1	101%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	11400	10600	7.44%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	732	1100	40.0%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	15.8	31.5	66.6%	40%	DUP-H
		nickel	7440-02-0	E440	0.50	mg/kg	604	131	128%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	10600	9860	7.06%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5010	5210	3.92%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	1.32	# 0.46	0.86	Diff <2x LOR	DUP-H
		silver	7440-22-4	E440	0.10	mg/kg	7.77	8.97	14.4%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14700	15300	4.05%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	348	300	14.8%	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: 164378) - continued											
VA21A4430-001	BA2110-A-1	sulfur	7704-34-9	E440	1000	mg/kg	14200	13900	2.19%	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	190	123	43.1%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	676	518	26.5%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	7.63	11.1	36.8%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	1.99	2.12	6.38%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	27.9	33.7	18.6%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	15700	4680	108%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.4	0.2	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: 164379)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 164377)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 164378)						
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: 164378) - 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	----
Metals (QCLot: 165358)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 163782)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 163783)						
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	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 164376)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 164379)									
moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 164377)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	96.0	80.0	120	----
Metals (QCLot: 164378)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	100	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	104	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	94.9	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	104	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	108	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	103	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	102	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	107	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	105	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	107	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.5	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	----

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 164378) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	99.7	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	104	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	105	80.0	120	----
Metals (QCLot: 165358)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	106	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
TCLP Metals (QCLot: 163782)										
VA21A4430-001	BA2110-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.2	50.0	140	----
TCLP Metals (QCLot: 163783)										
VA21A4430-001	BA2110-A-1	antimony, TCLP	7440-36-0	E444	5.7 mg/L	5 mg/L	114	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.9	50.0	140	----
		barium, TCLP	7440-39-3	E444	8.0 mg/L	12.5 mg/L	63.7	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.242 mg/L	0.25 mg/L	96.7	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.57 mg/L	10 mg/L	95.7	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.236 mg/L	0.25 mg/L	94.2	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	2.31 mg/L	2.5 mg/L	92.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	249 mg/L	250 mg/L	99.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	181 mg/L	250 mg/L	72.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.39 mg/L	2.5 mg/L	95.5	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.04 mg/L	5 mg/L	101	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.123 mg/L	0.1 mg/L	123	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	105	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----

Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

Reference Material (RM) Report									
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%) Low	Recovery Limits (%) High	
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method					Qualifier
Metals (QCLot: 164377)									
QC-164377-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	102	70.0	130	----
Metals (QCLot: 164378)									
QC-164378-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	117	70.0	130	----
QC-164378-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	120	70.0	130	----
QC-164378-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	109	70.0	130	----
QC-164378-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	106	70.0	130	----
QC-164378-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	118	70.0	130	----
QC-164378-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
QC-164378-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	105	70.0	130	----
QC-164378-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-164378-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	117	70.0	130	----
QC-164378-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	107	70.0	130	----
QC-164378-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
QC-164378-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	110	70.0	130	----
QC-164378-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	----
QC-164378-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	113	70.0	130	----
QC-164378-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	106	70.0	130	----
QC-164378-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	112	70.0	130	----
QC-164378-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	110	70.0	130	----
QC-164378-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	107	70.0	130	----
QC-164378-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	109	70.0	130	----
QC-164378-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	125	70.0	130	----
QC-164378-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	111	70.0	130	----
QC-164378-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	108	70.0	130	----
QC-164378-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	112	40.0	160	----
QC-164378-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	108	70.0	130	----
QC-164378-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	125	70.0	130	----
QC-164378-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	117	70.0	130	----
QC-164378-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----

Sub-Matrix: **Soil/Solid**

					Reference Material (RM) Report				
					RM Target	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 164378) - continued									
QC-164378-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
QC-164378-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	106	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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COC # _____

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Other				◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk			☑ PDF ☐ Excel ☐ Digital ☐ Fax				○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	smckinney@covanta.com			○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	rjohnson4@covanta.com			○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			Analysis Request
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org			
					Sarah.Wellman@metrovancouver.org			
Invoice To	Same as Report ?			Client / Project Information				Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?		☐ Yes	☐ No	Job #:				
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
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
	BA2110-A-1	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-2	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-3	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-4	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-5	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-6	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-7	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-8	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-9	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-10	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-11	03-Mar-21	9:00	Soil	X	X				X						1
	BA2110-A-12	03-Mar-21	9:00	Soil	X	X				X						1

Environmental Division
Vancouver
Work Order Reference
VA21A4430

Telephone : +1 604 253 4188

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by: JC	Date: MAR 10 2021	Time: 945 AM	Temperature: 21 ± 2 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	10-Mar-21	0800	A1							

GENF 20.00 Front