metrovancouver

Bottom Ash Data

2020 Week 35

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on September 8, 2020. The data represents bottom ash composite results for week 35 of 2020 (August 23, 2020 to August 29, 2020).

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	: **VA20B4170**	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	: +1 604 253 4188
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 01-Sep-2020 11:20
PO	: VANCO 0000049378	Date Analysis Commenced	: 04-Sep-2020
C-O-C number	: ----	Issue Date	: 10-Sep-2020 11:11
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*
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

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.

Analytical results in reports identified as "Preliminary Report" are considered authorized for use.

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2035-A-1	BA2035-A-2	BA2035-A-3	BA2035-A-4	BA2035-A-5
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-001	VA20B4170-002	VA20B4170-003	VA20B4170-004	VA20B4170-005
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		18.7	20.8	19.5	19.4	19.5
pH (1:2 soil:water)	----	E108	0.10	pH units		10.2	10.1	10.2	10.3	10.4
Metals										
aluminum	7429-90-5	E440	50	mg/kg		42400	44400	38900	36400	30900
antimony	7440-36-0	E440	0.10	mg/kg		77.2	99.6	110	100	116
arsenic	7440-38-2	E440	0.10	mg/kg		31.7	36.8	42.1	36.0	40.1
barium	7440-39-3	E440	0.50	mg/kg		708	582	560	613	665
beryllium	7440-41-7	E440	0.10	mg/kg		0.40	0.44	3.75	0.40	0.38
bismuth	7440-69-9	E440	0.20	mg/kg		54.7	49.0	48.5	13.5	12.8
boron	7440-42-8	E440	5.0	mg/kg		325	369	321	195	224
cadmium	7440-43-9	E440	0.020	mg/kg		9.06	11.1	12.5	16.3	11.2
calcium	7440-70-2	E440	50	mg/kg		121000	142000	160000	130000	125000
chromium	7440-47-3	E440	0.50	mg/kg		150	162	183	123	156
cobalt	7440-48-4	E440	0.10	mg/kg		58.2	20.9	53.7	94.5	76.5
copper	7440-50-8	E440	0.50	mg/kg		1640	2190	10500	34700	3420
iron	7439-89-6	E440	50	mg/kg		43000	76800	64900	39400	52600
lead	7439-92-1	E440	0.50	mg/kg		1630	1280	1270	1560	678
lithium	7439-93-2	E440	2.0	mg/kg		24.0	26.9	24.3	27.2	21.8
magnesium	7439-95-4	E440	20	mg/kg		10800	13500	14700	11600	12100
manganese	7439-96-5	E440	1.0	mg/kg		754	1040	1620	729	835
mercury	7439-97-6	E510	0.0500	mg/kg		0.206	0.0961	0.134	0.194	0.130
molybdenum	7439-98-7	E440	0.10	mg/kg		30.0	23.5	39.6	25.5	24.6
nickel	7440-02-0	E440	0.50	mg/kg		128	126	242	83.7	111
phosphorus	7723-14-0	E440	50	mg/kg		9890	11700	12900	11400	11700
potassium	7440-09-7	E440	100	mg/kg		4380	5890	6140	5460	4720
selenium	7782-49-2	E440	0.20	mg/kg		0.30	0.31	0.42	0.30	0.31
silver	7440-22-4	E440	0.10	mg/kg		3.83	6.43	8.92	5.93	4.03
sodium	7440-23-5	E440	50	mg/kg		13700	15400	16000	14400	13400
strontium	7440-24-6	E440	0.50	mg/kg		285	279	325	291	299
sulfur	7704-34-9	E440	1000	mg/kg		9100	12000	13000	10300	10500

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2035-A-1	BA2035-A-2	BA2035-A-3	BA2035-A-4	BA2035-A-5
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-001	VA20B4170-002	VA20B4170-003	VA20B4170-004	VA20B4170-005
						Result	Result	Result	Result	Result
Metals										
thallium	7440-28-0	E440	0.050	mg/kg		0.061	0.084	0.092	0.077	0.068
tin	7440-31-5	E440	2.0	mg/kg		67.9	113	266	284	86.7
titanium	7440-32-6	E440	1.0	mg/kg		793	435	368	478	789
tungsten	7440-33-7	E440	0.50	mg/kg		7.04	3.35	11.7	4.64	5.50
uranium	7440-61-1	E440	0.050	mg/kg		5.34	6.57	6.98	5.95	5.72
vanadium	7440-62-2	E440	0.20	mg/kg		52.4	58.3	66.1	52.1	53.2
zinc	7440-66-6	E440	2.0	mg/kg		4780	3960	4250	3580	3450
zirconium	7440-67-7	E440	1.0	mg/kg		1.1	2.5	1.3	1.6	1.3
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.7	11.6	11.6	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.22	9.17	9.32	9.46	9.39
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		5.99	5.84	5.70	6.11	5.70
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		3.07	2.70	3.59	3.56	2.92
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.148	0.189	0.667	0.150	0.168
calcium, TCLP	7440-70-2	E444	10	mg/L		1820	1800	2020	1780	1940
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		1.10	1.08	2.70	2.66	0.502
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.12	1.55	2.28	1.16	1.51
iron, TCLP	7439-89-6	E444	5.0	mg/L		<5.0	<5.0	<5.0	<5.0	6.2
lead, TCLP	7439-92-1	E444	0.25	mg/L		0.40	<0.25	6.32	<0.25	0.48
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		108	114	118	106	122
mercury, TCLP	7439-97-6	E512	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.50	0.92	0.51	0.34	0.45
selenium, TCLP	7782-49-2	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2035-A-1	BA2035-A-2	BA2035-A-3	BA2035-A-4	BA2035-A-5
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-001	VA20B4170-002	VA20B4170-003	VA20B4170-004	VA20B4170-005
						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		43.6	77.1	48.5	33.9	78.6

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	BA2035-A-6	BA2035-A-7	BA2035-A-8	BA2035-A-9	BA2035-A-10
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-006	VA20B4170-007	VA20B4170-008	VA20B4170-009	VA20B4170-010
						Result	Result	Result	Result	Result
Physical Tests										
moisture	----	E144	0.25	%		19.4	17.7	19.8	18.0	19.8
pH (1:2 soil:water)	----	E108	0.10	pH units		10.3	10.5	10.3	10.4	10.6
Metals										
aluminum	7429-90-5	E440	50	mg/kg		30700	45100	34800	45200	41600
antimony	7440-36-0	E440	0.10	mg/kg		136	126	173	104	156
arsenic	7440-38-2	E440	0.10	mg/kg		35.8	42.8	47.4	30.5	49.9
barium	7440-39-3	E440	0.50	mg/kg		671	582	787	670	700
beryllium	7440-41-7	E440	0.10	mg/kg		1.38	0.48	0.46	0.48	0.46
bismuth	7440-69-9	E440	0.20	mg/kg		18.0	17.6	15.7	13.1	11.8
boron	7440-42-8	E440	5.0	mg/kg		200	228	188	261	269
cadmium	7440-43-9	E440	0.020	mg/kg		10.9	11.5	21.7	10.9	11.9
calcium	7440-70-2	E440	50	mg/kg		130000	161000	141000	147000	158000
chromium	7440-47-3	E440	0.50	mg/kg		175	162	245	948	173
cobalt	7440-48-4	E440	0.10	mg/kg		35.9	150	53.1	32.6	183
copper	7440-50-8	E440	0.50	mg/kg		5910	2360	28100	1690	6840
iron	7439-89-6	E440	50	mg/kg		44000	63600	51500	66400	67900
lead	7439-92-1	E440	0.50	mg/kg		904	1790	22300	876	1540
lithium	7439-93-2	E440	2.0	mg/kg		20.5	27.3	22.3	24.0	42.7
magnesium	7439-95-4	E440	20	mg/kg		11200	15300	12500	13200	13400
manganese	7439-96-5	E440	1.0	mg/kg		778	1140	904	923	946
mercury	7439-97-6	E510	0.0500	mg/kg		0.198	0.304	0.326	0.206	0.181
molybdenum	7439-98-7	E440	0.10	mg/kg		29.0	31.0	47.3	41.8	32.4
nickel	7440-02-0	E440	0.50	mg/kg		186	165	443	589	1080
phosphorus	7723-14-0	E440	50	mg/kg		13000	13200	13900	11900	13000
potassium	7440-09-7	E440	100	mg/kg		4800	6150	6040	5990	6640
selenium	7782-49-2	E440	0.20	mg/kg		0.45	0.34	0.34	0.33	0.34
silver	7440-22-4	E440	0.10	mg/kg		5.40	4.37	8.42	3.67	3.45
sodium	7440-23-5	E440	50	mg/kg		13800	16900	14600	15200	16300
strontium	7440-24-6	E440	0.50	mg/kg		310	528	337	336	373
sulfur	7704-34-9	E440	1000	mg/kg		11200	11800	12400	11800	11400
thallium	7440-28-0	E440	0.050	mg/kg		0.089	0.087	0.202	0.073	0.076

Analytical Results

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

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2035-A-6	BA2035-A-7	BA2035-A-8	BA2035-A-9	BA2035-A-10
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-006	VA20B4170-007	VA20B4170-008	VA20B4170-009	VA20B4170-010
						Result	Result	Result	Result	Result
Metals										
tin	7440-31-5	E440	2.0	mg/kg		204	971	120	106	121
titanium	7440-32-6	E440	1.0	mg/kg		484	419	387	543	404
tungsten	7440-33-7	E440	0.50	mg/kg		7.26	6.08	6.59	4.77	4.68
uranium	7440-61-1	E440	0.050	mg/kg		5.89	6.63	7.47	6.15	6.18
vanadium	7440-62-2	E440	0.20	mg/kg		52.9	68.0	61.9	57.8	60.4
zinc	7440-66-6	E440	2.0	mg/kg		6280	4270	4770	5710	4240
zirconium	7440-67-7	E440	1.0	mg/kg		1.1	1.1	1.2	1.6	1.0
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.6	11.7	11.6	11.6
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.35	9.34	9.12	9.09	9.24
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	2.90	2.90	2.90
pH, TCLP final	----	EPP444	0.010	pH units		5.96	6.10	5.84	5.96	5.65
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		3.04	2.92	2.38	3.01	3.61
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.194	0.147	0.189	0.139	0.195
calcium, TCLP	7440-70-2	E444	10	mg/L		1820	1900	1780	1730	1960
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		0.988	0.408	0.462	0.444	0.611
copper, TCLP	7440-50-8	E444	0.050	mg/L		1.76	1.49	1.29	0.868	1.38
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		0.99	<0.25	<0.25	0.74	0.47
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		111	116	110	114	119
mercury, TCLP	7439-97-6	E512	0.0100	mg/L		<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.39	0.68	0.47	0.37	0.50
selenium, TCLP	7782-49-2	E444	1.00	mg/L		<1.00	<1.00	<1.00	<1.00	<1.00
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
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**)

Analyte	CAS Number	Method	LOR	Unit	Client sample ID	BA2035-A-6	BA2035-A-7	BA2035-A-8	BA2035-A-9	BA2035-A-10
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00	26-Aug-2020 09:00
						VA20B4170-006	VA20B4170-007	VA20B4170-008	VA20B4170-009	VA20B4170-010
						Result	Result	Result	Result	Result
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L		35.7	40.3	34.6	36.5	41.1

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	BA2035-A-11	BA2035-A-12	----	----	----
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	----	----	----
						VA20B4170-011	VA20B4170-012	--------	--------	--------
						Result	Result	----	----	----
Physical Tests										
moisture	----	E144	0.25	%		18.9	18.2	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units		10.4	10.3	----	----	----
Metals										
aluminum	7429-90-5	E440	50	mg/kg		35200	49900	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg		115	118	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg		46.7	33.8	----	----	----
barium	7440-39-3	E440	0.50	mg/kg		682	523	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg		0.50	0.47	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg		20.0	18.6	----	----	----
boron	7440-42-8	E440	5.0	mg/kg		264	238	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg		11.1	10.3	----	----	----
calcium	7440-70-2	E440	50	mg/kg		149000	148000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg		141	182	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg		23.2	73.2	----	----	----
copper	7440-50-8	E440	0.50	mg/kg		1710	2900	----	----	----
iron	7439-89-6	E440	50	mg/kg		52800	63100	----	----	----
lead	7439-92-1	E440	0.50	mg/kg		1940	694	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg		28.1	22.7	----	----	----
magnesium	7439-95-4	E440	20	mg/kg		13400	12700	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg		1110	973	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg		0.190	0.310	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg		34.2	27.8	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg		154	148	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg		11900	12700	----	----	----
potassium	7440-09-7	E440	100	mg/kg		6100	5940	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg		0.32	0.33	----	----	----
silver	7440-22-4	E440	0.10	mg/kg		3.31	6.24	----	----	----
sodium	7440-23-5	E440	50	mg/kg		16900	16800	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg		330	399	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg		11700	11800	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg		0.081	0.083	----	----	----

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2035-A-11	BA2035-A-12	----	----	----
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA20B4170-011	VA20B4170-012	--------	--------	--------
						Result	Result	----	----	----
Metals										
tin	7440-31-5	E440	2.0	mg/kg		161	102	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg		463	345	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg		4.82	3.61	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg		6.90	6.76	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg		59.3	60.8	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg		3780	8070	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg		1.1	2.1	----	----	----
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units		11.6	11.6	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units		9.16	9.10	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units		2.90	2.90	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units		5.64	5.61	----	----	----
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		3.41	2.61	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L		0.173	0.311	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L		1830	1650	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L		<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L		0.516	0.894	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L		0.906	1.51	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L		6.5	<5.0	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L		2.09	<0.25	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L		108	107	----	----	----
mercury, TCLP	7439-97-6	E512	0.0100	mg/L		<0.0100	<0.0100	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L		0.61	0.43	----	----	----
selenium, TCLP	7782-49-2	E444	1.00	mg/L		<1.00	<1.00	----	----	----
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	BA2035-A-11	BA2035-A-12	----	----	----
					Client sampling date / time	26-Aug-2020 09:00	26-Aug-2020 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit		VA20B4170-011	VA20B4170-012	--------	--------	--------
						Result	Result	----	----	----
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L		44.0	39.0	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: **VA20B4170**	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	: +1 604 253 4188
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 01-Sep-2020 11:20
PO	: VANCO 0000049378	Issue Date	: 10-Sep-2020 11:11
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Duplicate outliers occur.
- No Matrix Spike outliers occur.
- 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
Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-8167900 2	----	antimony	7440-36-0	E440	126 % MES	80.0-120%	Recovery greater than upper control limit
Metals	QC-MRG2-8167900 2	----	iron	7439-89-6	E440	158 % LCS-H	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	*Description*
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
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 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 : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-1	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-10	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-11	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-12	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-2	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-3	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-4	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 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 BA2035-A-5	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-6	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-7	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-8	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2035-A-9	E510	26-Aug-2020	08-Sep-2020	28 days	13 days	✓	09-Sep-2020	14 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-1	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-10	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-11	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-12	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 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 BA2035-A-2	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-3	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-4	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-5	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-6	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-7	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-8	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2035-A-9	E440	26-Aug-2020	08-Sep-2020	180 days	13 days	✓	08-Sep-2020	166 days	0 days	✓
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-1	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	

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 BA2035-A-10	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-11	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-12	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-2	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-3	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-4	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-5	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-6	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-7	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	

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 BA2035-A-8	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2035-A-9	E144	26-Aug-2020	----	----	----		04-Sep-2020	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-1	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-10	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-11	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-12	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-2	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-3	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-4	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 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 BA2035-A-5	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-6	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-7	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-8	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2035-A-9	E108	26-Aug-2020	08-Sep-2020	30 days	13 days	✓	08-Sep-2020	16 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-1	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-10	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-11	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-12	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 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
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-2	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-3	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-4	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-5	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-6	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-7	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-8	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2035-A-9	E512	04-Sep-2020	----	----	----		09-Sep-2020	0 days	0 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-1	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 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 (lab preserved) BA2035-A-10	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-11	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-12	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-2	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-3	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-4	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-5	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-6	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-7	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 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 (lab preserved) BA2035-A-8	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE (lab preserved) BA2035-A-9	E444	04-Sep-2020	----	----	----		09-Sep-2020	189 days	14 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-1	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-10	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-11	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-12	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-2	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-3	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-4	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	

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) BA2035-A-5	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-6	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-7	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-8	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2035-A-9	EPP444	26-Aug-2020	04-Sep-2020	----	----		----	----	----	

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	81680	1	20	5.0	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	81679	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	81682	1	20	5.0	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	81681	1	20	5.0	5.0	✓
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	81680	2	20	10.0	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	81679	2	20	10.0	10.0	✓
Moisture Content by Gravimetry	E144	81682	1	20	5.0	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	81681	1	20	5.0	5.0	✓
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	83421	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	81680	1	20	5.0	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	83420	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	81679	1	20	5.0	5.0	✓
Moisture Content by Gravimetry	E144	81682	1	20	5.0	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	83421	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	83420	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.
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	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 HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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	: **VA20B4170**	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	: +1 604 253 4188
Project	: Weekly Bottom Ash-Suite	Date Samples Received	: 01-Sep-2020 11:20
PO	: VANCO 0000049378	Date Analysis Commenced	: 04-Sep-2020
C-O-C number	: ----	Issue Date	: 10-Sep-2020 11:11
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*
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	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: 81681)											
VA20B4097-021	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.33	7.38	0.680%	5%	----
Physical Tests (QC Lot: 81682)											
VA20B4097-021	Anonymous	moisture	----	E144	0.25	%	58.5	57.8	1.08%	20%	----
Metals (QC Lot: 81679)											
VA20B4097-021	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	34500	34800	0.999%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	1.04	1.02	2.35%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	8.52	8.65	1.43%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	539	561	3.94%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.80	0.83	3.68%	30%	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	16.4	16.4	0.04	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	1.06	1.09	3.02%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	5310	5410	1.87%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	111	113	1.60%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	35.2	36.0	2.38%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	75.8	77.2	1.92%	30%	----
		iron	7439-89-6	E440	50	mg/kg	45600	46800	2.71%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	8.85	8.85	0.0221%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	39.2	39.5	0.810%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	22300	22200	0.0747%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	4310	4320	0.0780%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	6.03	6.05	0.324%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	207	210	1.59%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	689	714	3.59%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	3780	3900	3.14%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	2.02	2.02	0.226%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	0.25	0.25	0.004	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	312	310	0.564%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	87.2	86.6	0.582%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.528	0.518	1.90%	30%	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----

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: 81679) - continued											
VA20B4097-021	Anonymous	titanium	7440-32-6	E440	1.0	mg/kg	204	188	8.06%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.478	0.486	1.60%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	99.2	101	1.87%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	168	172	2.14%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	3.0	3.3	0.2	Diff <2x LOR	----
Metals (QC Lot: 81680)											
VA20B4097-021	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0978	0.0979	0.0822%	40%	----

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: 81682)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 81679)						
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	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 81679) - continued						
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: 81680)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 83420)						
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	----
TCLP Metals (QCLot: 83421)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----

Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 81681)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.7	95.0	105	----
Physical Tests (QCLot: 81682)									
moisture	----	E144	0.25	%	50 %	99.3	90.0	110	----
Metals (QCLot: 81679)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	103	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	# 126	80.0	120	MES
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	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	117	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	101	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	103	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.8	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	# 158	80.0	120	LCS-H
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	112	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	117	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	107	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	109	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	112	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	108	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	104	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	109	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	115	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	103	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	115	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	107	80.0	120	----

Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
					Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 81679) - continued									
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	102	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	112	80.0	120	----
Metals (QCLot: 81680)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.6	80.0	120	----

Qualifiers

Qualifier	Description
LCS-H	*Lab Control Sample recovery was above ALS DQO. Non-detected sample results are considered reliable. Other results, if reported, have been qualified.*
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: 83420)										
VA20B4170-001	BA2035-A-1	antimony, TCLP	7440-36-0	E444	4.7 mg/L	5 mg/L	93.7	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	91.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.4 mg/L	12.5 mg/L	99.4	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.237 mg/L	0.25 mg/L	94.7	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.82 mg/L	10 mg/L	88.2	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.236 mg/L	0.25 mg/L	94.3	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	1.15 mg/L	1.25 mg/L	91.8	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	2.14 mg/L	2.5 mg/L	85.7	50.0	140	----
		iron, TCLP	7439-89-6	E444	224 mg/L	250 mg/L	89.7	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.3 mg/L	10 mg/L	103	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	242 mg/L	250 mg/L	96.8	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.22 mg/L	2.5 mg/L	88.7	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.71 mg/L	5 mg/L	94.1	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.113 mg/L	0.1 mg/L	113	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	96.7	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.70 mg/L	0.75 mg/L	93.1	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 83421)										
VA20B4170-001	BA2035-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	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	Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Concentration	RM	Low	High	Qualifier
Metals (QCLot: 81679)									
QC-81679-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	100	70.0	130	----
QC-81679-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
QC-81679-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
QC-81679-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	----
QC-81679-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	101	70.0	130	----
QC-81679-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	108	40.0	160	----
QC-81679-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	99.6	70.0	130	----
QC-81679-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	111	70.0	130	----
QC-81679-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	102	70.0	130	----
QC-81679-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
QC-81679-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
QC-81679-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
QC-81679-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	116	70.0	130	----
QC-81679-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	110	70.0	130	----
QC-81679-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
QC-81679-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
QC-81679-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	107	70.0	130	----
QC-81679-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
QC-81679-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	95.5	70.0	130	----
QC-81679-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	104	70.0	130	----
QC-81679-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
QC-81679-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	110	70.0	130	----
QC-81679-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	93.5	40.0	160	----
QC-81679-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	96.5	70.0	130	----
QC-81679-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	110	70.0	130	----
QC-81679-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	102	70.0	130	----
QC-81679-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	106	70.0	130	----
QC-81679-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	93.7	70.0	130	----
QC-81679-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	98.9	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: 81680)									
QC-81680-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----

ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

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
1	BA2035-A-1	26-Aug-20	9:00	Soil	X	X		X	1
2	BA2035-A-2	26-Aug-20	9:00	Soil	X	X		X	1
3	BA2035-A-3	26-Aug-20	9:00	Soil	X	X		X	1
4	BA2035-A-4	26-Aug-20	9:00	Soil	X	X		X	1
5	BA2035-A-5	26-Aug-20	9:00	Soil	X	X		X	1
6	BA2035-A-6	26-Aug-20	9:00	Soil	X	X		X	1
7	BA2035-A-7	26-Aug-20	9:00	Soil	X	X		X	1
8	BA2035-A-8	26-Aug-20	9:00	Soil	X	X		X	1
9	BA2035-A-9	26-Aug-20	9:00	Soil	X	X		X	1
10	BA2035-A-10	26-Aug-20	9:00	Soil	X	X		X	1
11	BA2035-A-11	26-Aug-20	9:00	Soil	X	X		X	1
12	BA2035-A-12	26-Aug-20	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA20B4170

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:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	1-Sep-20	0800	cm	01/09/20	11:20 am	22.2 °C				

GENF 20.00 Front