

Bottom Ash Data

2020 Week 36

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on September 15, 2020. The data represents bottom ash composite results for week 36 of 2020 (August 30, 2020 to September 5, 2020).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA20B4647**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 11
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Sep-2020 11:10
Date Analysis Commenced : 10-Sep-2020
Issue Date : 15-Sep-2020 14:52

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

<i>Unit</i>	<i>Description</i>
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

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

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2036-A-1	BA2036-A-2	BA2036-A-3	BA2036-A-4	BA2036-A-5
(Matrix: Soil/Solid)					Client sampling date / time	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-001	VA20B4647-002	VA20B4647-003	VA20B4647-004	VA20B4647-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.8	19.3	18.6	20.0	19.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	11.2	11.2	11.0	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	41100	53100	27900	33900	33600	
antimony	7440-36-0	E440	0.10	mg/kg	83.3	81.9	90.6	78.0	89.4	
arsenic	7440-38-2	E440	0.10	mg/kg	28.8	33.2	27.4	29.1	28.7	
barium	7440-39-3	E440	0.50	mg/kg	676	643	470	574	565	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.39	0.38	0.41	0.42	
bismuth	7440-69-9	E440	0.20	mg/kg	5.09	4.49	8.81	8.58	11.5	
boron	7440-42-8	E440	5.0	mg/kg	273	180	154	142	146	
cadmium	7440-43-9	E440	0.020	mg/kg	9.10	7.62	8.16	8.10	9.82	
calcium	7440-70-2	E440	50	mg/kg	120000	109000	103000	116000	110000	
chromium	7440-47-3	E440	0.50	mg/kg	191	160	191	180	154	
cobalt	7440-48-4	E440	0.10	mg/kg	32.6	30.2	61.1	29.6	22.1	
copper	7440-50-8	E440	0.50	mg/kg	1210	3080	3180	1930	1540	
iron	7439-89-6	E440	50	mg/kg	72700	57800	69000	75200	59100	
lead	7439-92-1	E440	0.50	mg/kg	2880	4660	527	264	774	
lithium	7439-93-2	E440	2.0	mg/kg	16.8	17.1	20.0	18.0	20.6	
magnesium	7439-95-4	E440	20	mg/kg	11200	11100	9130	10200	9920	
manganese	7439-96-5	E440	1.0	mg/kg	1060	993	660	949	986	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	16.7	15.7	16.0	17.1	14.9	
nickel	7440-02-0	E440	0.50	mg/kg	193	94.6	126	114	116	
phosphorus	7723-14-0	E440	50	mg/kg	9490	9450	8390	10400	11400	
potassium	7440-09-7	E440	100	mg/kg	4030	4180	3920	4150	4700	
selenium	7782-49-2	E440	0.20	mg/kg	0.21	<0.20	0.23	0.31	0.22	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	10.3	----	----	28.7	
silver	7440-22-4	E440	0.10	mg/kg	2.39	----	2.56	2.32	----	
sodium	7440-23-5	E440	50	mg/kg	13800	12200	11300	12100	12300	
strontium	7440-24-6	E440	0.50	mg/kg	305	271	792	281	271	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2036-A-1	BA2036-A-2	BA2036-A-3	BA2036-A-4	BA2036-A-5
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-001	VA20B4647-002	VA20B4647-003	VA20B4647-004	VA20B4647-005
					Result	Result	Result	Result	Result
Metals									
sulfur	7704-34-9	E440	1000	mg/kg	9100	8300	8600	8800	9200
thallium	7440-28-0	E440	0.050	mg/kg	0.071	0.111	0.063	0.064	0.068
tin	7440-31-5	E440	2.0	mg/kg	95.0	97.3	97.8	79.6	2820
titanium	7440-32-6	E440	1.0	mg/kg	835	1620	690	565	372
tungsten	7440-33-7	E440	0.50	mg/kg	3.89	2.05	2.45	4.28	2.83
uranium	7440-61-1	E440	0.050	mg/kg	5.50	5.36	5.23	5.67	5.63
vanadium	7440-62-2	E440	0.20	mg/kg	55.2	51.4	50.6	49.1	51.0
zinc	7440-66-6	E440	2.0	mg/kg	7820	9240	4330	7100	2610
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	4.3	1.1	1.4	1.7
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.7	11.8	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.36	9.81	9.18	9.85	9.48
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444	0.010	pH units	5.61	6.10	5.90	6.20	6.34
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.93	2.17	2.18	2.27	2.28
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.167	0.183	0.173	0.218	0.199
calcium, TCLP	7440-70-2	E444	10	mg/L	1910	2040	2080	1980	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	1.31	1.66	0.499	0.959	0.872
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.894	1.16	1.13	0.377	0.820
iron, TCLP	7439-89-6	E444	5.0	mg/L	8.8	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.83	<0.25	1.66	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	128	129	134	136	138
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	0.75	0.66	0.56	0.63	0.54
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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2036-A-1	BA2036-A-2	BA2036-A-3	BA2036-A-4	BA2036-A-5
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-001	VA20B4647-002	VA20B4647-003	VA20B4647-004	VA20B4647-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	54.3	68.4	54.0	51.6	34.0	

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2036-A-6	BA2036-A-7	BA2036-A-8	BA2036-A-9	BA2036-A-10
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-006	VA20B4647-007	VA20B4647-008	VA20B4647-009	VA20B4647-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	17.1	19.1	19.4	16.9	16.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.3	11.4	11.2	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	33400	37200	40200	35600	33500	
antimony	7440-36-0	E440	0.10	mg/kg	68.4	74.9	81.8	77.0	84.9	
arsenic	7440-38-2	E440	0.10	mg/kg	24.9	36.9	26.3	27.9	35.3	
barium	7440-39-3	E440	0.50	mg/kg	595	577	546	598	679	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.61	0.38	0.40	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	7.55	4.70	4.64	3.82	56.7	
boron	7440-42-8	E440	5.0	mg/kg	205	186	178	222	196	
cadmium	7440-43-9	E440	0.020	mg/kg	8.23	10.8	8.43	9.66	8.01	
calcium	7440-70-2	E440	50	mg/kg	111000	112000	111000	117000	106000	
chromium	7440-47-3	E440	0.50	mg/kg	159	1070	358	164	167	
cobalt	7440-48-4	E440	0.10	mg/kg	24.2	58.0	49.7	24.2	51.4	
copper	7440-50-8	E440	0.50	mg/kg	6140	4720	6990	1270	1380	
iron	7439-89-6	E440	50	mg/kg	57400	75600	75200	64500	90900	
lead	7439-92-1	E440	0.50	mg/kg	249	362	516	1020	1140	
lithium	7439-93-2	E440	2.0	mg/kg	16.4	16.9	49.7	16.4	17.4	
magnesium	7439-95-4	E440	20	mg/kg	10900	9380	10200	10600	11300	
manganese	7439-96-5	E440	1.0	mg/kg	901	750	896	826	871	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.0556	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.2	403	21.2	16.6	18.7	
nickel	7440-02-0	E440	0.50	mg/kg	112	2050	283	99.0	375	
phosphorus	7723-14-0	E440	50	mg/kg	7940	8750	10300	10200	10500	
potassium	7440-09-7	E440	100	mg/kg	4070	3970	4340	4380	3980	
selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.26	0.26	0.35	0.24	
silver	7440-22-4	E440	0.10	mg/kg	2.26	4.68	6.63	3.69	2.42	
sodium	7440-23-5	E440	50	mg/kg	11500	12800	13000	12400	11900	
strontium	7440-24-6	E440	0.50	mg/kg	283	296	280	284	302	
sulfur	7704-34-9	E440	1000	mg/kg	8900	9600	9000	9100	8700	
thallium	7440-28-0	E440	0.050	mg/kg	0.234	0.072	0.066	0.074	0.062	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2036-A-6	BA2036-A-7	BA2036-A-8	BA2036-A-9	BA2036-A-10
(Matrix: Soil/Solid)										
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-006	VA20B4647-007	VA20B4647-008	VA20B4647-009	VA20B4647-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	77.8	117	107	86.3	102	
titanium	7440-32-6	E440	1.0	mg/kg	447	495	543	994	879	
tungsten	7440-33-7	E440	0.50	mg/kg	2.44	5.52	3.24	6.96	2.69	
uranium	7440-61-1	E440	0.050	mg/kg	5.43	5.36	5.99	5.91	5.66	
vanadium	7440-62-2	E440	0.20	mg/kg	48.7	57.2	54.6	67.9	51.5	
zinc	7440-66-6	E440	2.0	mg/kg	19300	11100	3510	2730	3100	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.5	1.3	1.2	1.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.8	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.64	9.62	9.79	9.40	9.79	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444	0.010	pH units	5.61	5.75	6.15	5.81	5.45	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.98	2.52	2.12	2.15	1.90	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.175	0.423	0.154	0.232	0.159	
calcium, TCLP	7440-70-2	E444	10	mg/L	1920	1980	2020	1910	1920	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.514	0.838	0.804	0.562	0.346	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.905	1.33	1.01	2.43	3.61	
iron, TCLP	7439-89-6	E444	5.0	mg/L	13.0	<5.0	<5.0	<5.0	16.8	
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	126	125	136	129	118	
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	0.99	0.50	0.52	0.73	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)					Client sample ID	BA2036-A-6	BA2036-A-7	BA2036-A-8	BA2036-A-9	BA2036-A-10
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00	02-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-006	VA20B4647-007	VA20B4647-008	VA20B4647-009	VA20B4647-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	70.5	36.5	45.4	51.7	55.2	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2036-A-11	BA2036-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-011	VA20B4647-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	17.8	18.5	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34000	40500	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	67.7	77.4	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	25.6	31.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	490	556	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.38	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	8.74	4.06	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	230	249	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	21.8	9.45	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	110000	108000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	497	164	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	35.8	72.1	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	12600	24500	----	----	----	
iron	7439-89-6	E440	50	mg/kg	59100	82000	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	398	309	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	16.0	21.6	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	9880	9510	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1920	797	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	13.6	15.9	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	430	91.8	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	8680	9800	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	3800	4250	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.27	----	----	----	
silver	7440-22-4	E440.Ag	0.10	mg/kg	3.34	----	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	2.75	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	11300	12500	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	250	262	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	8800	9600	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2036-A-11	BA2036-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-011	VA20B4647-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.063	0.092	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	91.1	117	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	416	715	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	2.96	2.10	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	5.61	5.80	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	55.1	52.9	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4880	8320	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.5	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	10.0	9.90	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.87	2.87	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.75	5.81	----	----	----	
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	2.03	1.93	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.181	0.228	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1990	1860	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.514	0.513	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.48	0.409	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	1.77	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	117	120	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.79	0.49	----	----	----	
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	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2036-A-11	BA2036-A-12	----	----	----
Client sampling date / time					02-Sep-2020 09:00	02-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B4647-011	VA20B4647-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	74.7	98.4	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B4647	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	: 08-Sep-2020 11:10
PO	: VANCO 0000049378	Issue Date	: 15-Sep-2020 14:52
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	VA20B4647-001	BA2036-A-1	cadmium	7440-43-9	E440	76.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B4647-001	BA2036-A-1	copper	7440-50-8	E440	67.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B4647-001	BA2036-A-1	lead	7439-92-1	E440	138 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B4647-001	BA2036-A-1	manganese	7439-96-5	E440	42.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B4647-001	BA2036-A-1	nickel	7440-02-0	E440	72.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B4647-001	BA2036-A-1	zinc	7440-66-6	E440	65.3 % 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-11	E440.Ag	02-Sep-2020	14-Sep-2020	180 days	12 days	✓	15-Sep-2020	167 days	0 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-2	E440.Ag	02-Sep-2020	14-Sep-2020	180 days	12 days	✓	15-Sep-2020	167 days	0 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-5	E440.Ag	02-Sep-2020	14-Sep-2020	180 days	12 days	✓	15-Sep-2020	167 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-1	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✓	13-Sep-2020	18 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-10	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✓	13-Sep-2020	18 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-11	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✓	13-Sep-2020	18 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-12	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✓	13-Sep-2020	18 days	1 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-2	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-3	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-4	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-5	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-6	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-7	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-8	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2036-A-9	E510	02-Sep-2020	12-Sep-2020	28 days	9 days	✔	13-Sep-2020	18 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-1	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-10	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-11	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-12	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-2	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-3	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-4	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-5	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-6	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2036-A-7	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-8	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2036-A-9	E440	02-Sep-2020	12-Sep-2020	180 days	9 days	✔	12-Sep-2020	170 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-1	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-10	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-11	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-12	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-2	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-3	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-4	E144	02-Sep-2020	----	----	----		11-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-5	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-6	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-7	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-8	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2036-A-9	E144	02-Sep-2020	----	----	----		11-Sep-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-1	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-10	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-11	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-12	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-2	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-3	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-4	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-5	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-6	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-7	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-8	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2036-A-9	E108	02-Sep-2020	12-Sep-2020	30 days	9 days	✔	14-Sep-2020	20 days	2 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-1	E512	10-Sep-2020	----	----	----		11-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-10	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-11	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-12	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-2	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-3	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-4	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-5	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-6	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-7	E512	10-Sep-2020	----	----	----		11-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		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-8	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2036-A-9	E512	10-Sep-2020	----	----	----		11-Sep-2020	0 days	0 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-1	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-10	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-11	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-12	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-2	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-3	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-4	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-5	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-6	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-7	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-8	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE (lab preserved) BA2036-A-9	E444	10-Sep-2020	----	----	----		11-Sep-2020	188 days	9 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-1	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-10	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-11	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-12	EPP444	02-Sep-2020	10-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		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-2	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-3	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-4	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-5	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-6	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-7	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-8	EPP444	02-Sep-2020	10-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2036-A-9	EPP444	02-Sep-2020	10-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	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	84503	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	84504	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	84506	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	84505	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	85623	1	3	33.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	84503	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	84504	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	84506	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	84505	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	85623	1	3	33.3	5.0	✔
Mercury by CVAAS (TCLP)	E512	84712	1	13	7.6	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	84503	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	84711	1	13	7.6	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	84504	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	84506	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	84712	1	13	7.6	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	84711	1	13	7.6	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60°C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ 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 HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ 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.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ 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 : VA20B4647

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 08-Sep-2020 11:10
Date Analysis Commenced : 10-Sep-2020
Issue Date : 15-Sep-2020 14:52

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
● Matrix Spike (MS) Report; Recovery and Acceptance Limits
● Reference Material (RM) Report; Recovery and Acceptance Limits
● Method Blank (MB) Report; Recovery and Acceptance Limits
● Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Brianna Allen (Department Manager - Organics), Cristina Alexandre (Supervisor - Metals ICP Instrumentation), Kim Jensen (Department Manager - Metals), and Shaneel Dayal (Analyst).

Page : 2 of 11
Work Order : VA20B4647
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Soil/Solid

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 84505)											
VA20B4647-001	BA2036-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.1	0.985%	5%	----
Physical Tests (QC Lot: 84506)											
VA20B4647-001	BA2036-A-1	moisture	----	E144	0.25	%	16.8	17.3	2.61%	20%	----
Metals (QC Lot: 84503)											
VA20B4647-001	BA2036-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 84504)											
VA20B4647-001	BA2036-A-1	aluminum	7429-90-5	E440	50	mg/kg	41100	40100	2.51%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	83.3	83.9	0.726%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	28.8	33.3	14.5%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	676	601	11.7%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.41	0.03	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	5.09	4.83	5.33%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	273	203	29.5%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	9.10	20.4	76.5%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	120000	127000	6.29%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	191	152	22.4%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	32.6	36.4	11.0%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	1210	2450	67.9%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	72700	61000	17.4%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	2880	525	138%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	16.8	17.8	5.61%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11200	10400	7.39%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	1060	694	42.1%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	16.7	12.7	27.6%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	193	90.9	72.1%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	9490	11200	16.1%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4030	4100	1.56%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.21	0.34	0.13	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	2.39	3.08	25.2%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	13800	13400	2.71%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	305	287	5.98%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	9100	9900	8.08%	30%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Metals (QC Lot: 84504) - continued											
VA20B4647-001	BA2036-A-1	thallium	7440-28-0	E440	0.050	mg/kg	0.071	0.067	0.004	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	95.0	78.0	19.7%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	835	616	30.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	3.89	3.40	13.4%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.50	6.42	15.4%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	55.2	55.4	0.317%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	7820	3970	65.3%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.8	0.2	Diff <2x LOR	----

Qualifiers

<i>Qualifier</i>	<i>Description</i>
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: 84506)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 84503)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 84504)						
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: 84504) - 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: 85623)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 84711)						
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: 84712)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 84505)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 84506)									
moisture	----	E144	0.25	%	50 %	104	90.0	110	----
Metals (QCLot: 84503)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	90.5	80.0	120	----
Metals (QCLot: 84504)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.3	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	98.7	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.2	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	99.8	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	99.6	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	98.4	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.4	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	98.4	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	101	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	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	102	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	95.3	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	105	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	110	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.8	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: 84504) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	96.3	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	107	80.0	120	----
Metals (QCLot: 85623)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	92.3	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ 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: 84711)										
VA20B4647-001	BA2036-A-1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	97.9	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	93.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.4 mg/L	12.5 mg/L	107	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.248 mg/L	0.25 mg/L	99.1	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.98 mg/L	10 mg/L	99.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.253 mg/L	0.25 mg/L	101	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	1.16 mg/L	1.25 mg/L	92.6	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.23 mg/L	2.5 mg/L	89.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	239 mg/L	250 mg/L	95.6	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.99 mg/L	10 mg/L	99.9	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	246 mg/L	250 mg/L	98.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.33 mg/L	2.5 mg/L	93.2	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.71 mg/L	5 mg/L	94.2	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.110 mg/L	0.1 mg/L	110	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	97.9	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.8	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 84712)										
VA20B4647-001	BA2036-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.8	50.0	140	----



Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 84503)									
QC-84503-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----
Metals (QCLot: 84504)									
QC-84504-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
QC-84504-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	101	70.0	130	----
QC-84504-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	103	70.0	130	----
QC-84504-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	105	70.0	130	----
QC-84504-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	118	40.0	160	----
QC-84504-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	100	70.0	130	----
QC-84504-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	----
QC-84504-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
QC-84504-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	98.0	70.0	130	----
QC-84504-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	95.9	70.0	130	----
QC-84504-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
QC-84504-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
QC-84504-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
QC-84504-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	112	70.0	130	----
QC-84504-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
QC-84504-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	105	70.0	130	----
QC-84504-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	114	70.0	130	----
QC-84504-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	96.8	40.0	160	----
QC-84504-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	99.2	70.0	130	----
QC-84504-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	115	70.0	130	----
QC-84504-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-84504-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----

Page : 11 of 11
 Work Order : VA20B4647
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite




Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 84504) - continued									
QC-84504-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
QC-84504-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	119	70.0	130	----



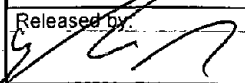
Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard <input type="checkbox"/> Other <input checked="" type="checkbox"/> PDF <input type="checkbox"/> Excel <input type="checkbox"/> Digital <input type="checkbox"/> Fax		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days) <input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT <input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
Contact:	Steve Mckinney / Dan Skrypnik	Email 1:	smckinney@covanta.com		
Address:	5150 Riverbend Drive Burnaby BC	Email 2:	riohanson4@covanta.com		
Phone:	604-521-1025	Fax:			
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com brent.kirkpatrick@metrovancover.org Sarah.Wellman@metrovancover.org		

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

Lab Work Order # (lab use only)		ALS Contact:	Sampler:	Analysis Request												Number of Containers		
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)										
BA2036-A-1	Environmental Division Vancouver Work Order Reference VA20B4647  Telephone : +1 604 253 4188	02-Sep-20	9:00	Soil	X	X		X									1	
BA2036-A-2		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-3		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-4		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-5		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-6		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-7		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-8		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-9		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-10		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-11		02-Sep-20	9:00	Soil	X	X		X										1
BA2036-A-12		02-Sep-20	9:00	Soil	X	X		X										1

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:
	8-Sep-20	0800				23.7 °C	RK	8/9/20	11:10am	Yes / No ? Yes add SIF