

Bottom Ash Data

2020 Week 37

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on September 30, 2020. The data represents bottom ash composite results for week 37 of 2020 (September 6, 2020 to September 12, 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 : **VA20B5220**
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 : 15-Sep-2020 11:35
Date Analysis Commenced : 23-Sep-2020
Issue Date : 29-Sep-2020 13:51

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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2037-A-1	BA2037-A-2	BA2037-A-3	BA2037-A-4	BA2037-A-5
(Matrix: Soil/Solid)					Client sampling date / time	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-001	VA20B5220-002	VA20B5220-003	VA20B5220-004	VA20B5220-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	19.5	19.9	19.6	16.8	19.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.9	11.2	11.0	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	45500	39500	37600	41100	30700	
antimony	7440-36-0	E440	0.10	mg/kg	92.7	86.9	98.8	106	120	
arsenic	7440-38-2	E440	0.10	mg/kg	25.5	40.7	33.9	39.1	38.0	
barium	7440-39-3	E440	0.50	mg/kg	809	715	664	771	863	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.38	0.43	0.41	0.42	
bismuth	7440-69-9	E440	0.20	mg/kg	7.72	6.02	6.84	8.24	6.49	
boron	7440-42-8	E440	5.0	mg/kg	182	161	222	231	228	
cadmium	7440-43-9	E440	0.020	mg/kg	13.0	10.0	10.7	13.0	14.9	
calcium	7440-70-2	E440	50	mg/kg	133000	120000	121000	129000	125000	
chromium	7440-47-3	E440	0.50	mg/kg	146	163	153	156	190	
cobalt	7440-48-4	E440	0.10	mg/kg	156	195	535	242	53.9	
copper	7440-50-8	E440	0.50	mg/kg	9600	3500	1700	2960	4820	
iron	7439-89-6	E440	50	mg/kg	74300	84400	80900	83100	99400	
lead	7439-92-1	E440	0.50	mg/kg	873	442	508	671	1240	
lithium	7439-93-2	E440	2.0	mg/kg	25.8	22.6	23.7	30.7	19.3	
magnesium	7439-95-4	E440	20	mg/kg	11100	10500	10600	10500	11100	
manganese	7439-96-5	E440	1.0	mg/kg	984	994	851	897	1160	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.0574	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.5	20.4	17.0	18.4	18.5	
nickel	7440-02-0	E440	0.50	mg/kg	317	200	91.0	200	119	
phosphorus	7723-14-0	E440	50	mg/kg	11000	11200	10400	12300	11400	
potassium	7440-09-7	E440	100	mg/kg	4490	3850	3790	4520	4460	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.31	0.26	0.36	0.35	
silver	7440-22-4	E440	0.10	mg/kg	3.22	6.65	3.82	7.12	7.90	
sodium	7440-23-5	E440	50	mg/kg	13700	14400	13400	13900	13000	
strontium	7440-24-6	E440	0.50	mg/kg	320	287	317	307	300	
sulfur	7704-34-9	E440	1000	mg/kg	9600	8400	9300	9600	8900	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2037-A-1	BA2037-A-2	BA2037-A-3	BA2037-A-4	BA2037-A-5
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-001	VA20B5220-002	VA20B5220-003	VA20B5220-004	VA20B5220-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.084	0.079	0.081	0.094	0.084	
tin	7440-31-5	E440	2.0	mg/kg	120	129	90.0	152	340	
titanium	7440-32-6	E440	1.0	mg/kg	1130	857	544	638	659	
tungsten	7440-33-7	E440	0.50	mg/kg	6.23	7.22	9.09	7.01	10.2	
uranium	7440-61-1	E440	0.050	mg/kg	6.70	6.75	6.53	7.69	6.86	
vanadium	7440-62-2	E440	0.20	mg/kg	54.2	52.6	49.5	58.0	56.4	
zinc	7440-66-6	E440	2.0	mg/kg	5920	4160	5220	3890	8990	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.2	1.3	1.4	<1.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	11.8	11.6	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.92	9.62	9.50	9.05	8.81	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	5.96	5.85	5.88	5.38	5.86	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.26	2.02	2.52	2.08	2.06	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.273	0.186	0.268	0.335	0.187	
calcium, TCLP	7440-70-2	E444	10	mg/L	2020	1980	1970	1780	1950	
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	0.997	0.668	1.85	1.19	1.34	
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.22	1.64	1.14	5.03	1.14	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	9.5	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.38	<0.25	0.44	<0.25	0.40	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	131	136	117	135	
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	0.60	0.62	0.62	0.95	0.62	
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)					Client sample ID	BA2037-A-1	BA2037-A-2	BA2037-A-3	BA2037-A-4	BA2037-A-5
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-001	VA20B5220-002	VA20B5220-003	VA20B5220-004	VA20B5220-005	
					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	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	49.4	78.3	78.7	52.7	43.8	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2037-A-6	BA2037-A-7	BA2037-A-8	BA2037-A-9	BA2037-A-10
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-006	VA20B5220-007	VA20B5220-008	VA20B5220-009	VA20B5220-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	19.2	18.6	19.5	18.4	17.8
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.2	11.1	11.3	11.2
Metals									
aluminum	7429-90-5	E440	50	mg/kg	45100	37700	40400	39200	38500
antimony	7440-36-0	E440	0.10	mg/kg	102	101	85.5	96.7	137
arsenic	7440-38-2	E440	0.10	mg/kg	36.2	32.1	35.9	45.0	31.2
barium	7440-39-3	E440	0.50	mg/kg	775	781	758	741	755
beryllium	7440-41-7	E440	0.10	mg/kg	0.43	0.43	0.37	0.42	0.43
bismuth	7440-69-9	E440	0.20	mg/kg	8.50	14.0	5.54	6.64	7.04
boron	7440-42-8	E440	5.0	mg/kg	196	246	182	208	167
cadmium	7440-43-9	E440	0.020	mg/kg	27.4	10.6	11.1	24.5	12.7
calcium	7440-70-2	E440	50	mg/kg	135000	128000	119000	123000	136000
chromium	7440-47-3	E440	0.50	mg/kg	215	170	147	189	141
cobalt	7440-48-4	E440	0.10	mg/kg	26.9	23.9	89.7	75.7	40.4
copper	7440-50-8	E440	0.50	mg/kg	5780	3050	7680	7390	7600
iron	7439-89-6	E440	50	mg/kg	64300	82400	68700	71000	54800
lead	7439-92-1	E440	0.50	mg/kg	896	646	573	961	2390
lithium	7439-93-2	E440	2.0	mg/kg	20.4	18.8	16.8	20.8	18.1
magnesium	7439-95-4	E440	20	mg/kg	11700	12000	12000	9970	10900
manganese	7439-96-5	E440	1.0	mg/kg	1000	1400	879	907	836
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	25.7	18.1	17.9	16.0	14.9
nickel	7440-02-0	E440	0.50	mg/kg	138	288	406	791	119
phosphorus	7723-14-0	E440	50	mg/kg	12700	11600	10300	11600	13000
potassium	7440-09-7	E440	100	mg/kg	4730	4150	3760	4070	4640
selenium	7782-49-2	E440	0.20	mg/kg	0.29	0.37	0.37	0.34	0.35
silver	7440-22-4	E440	0.10	mg/kg	3.98	5.77	6.25	4.82	4.69
sodium	7440-23-5	E440	50	mg/kg	14600	13300	13100	12700	14000
strontium	7440-24-6	E440	0.50	mg/kg	372	286	294	308	300
sulfur	7704-34-9	E440	1000	mg/kg	9900	8500	8200	8400	9800
thallium	7440-28-0	E440	0.050	mg/kg	0.095	0.083	0.075	0.088	0.080



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2037-A-6	BA2037-A-7	BA2037-A-8	BA2037-A-9	BA2037-A-10
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-006	VA20B5220-007	VA20B5220-008	VA20B5220-009	VA20B5220-010
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E440	2.0	mg/kg	104	145	339	237	152
titanium	7440-32-6	E440	1.0	mg/kg	893	497	995	571	720
tungsten	7440-33-7	E440	0.50	mg/kg	8.44	8.16	7.14	7.80	8.35
uranium	7440-61-1	E440	0.050	mg/kg	7.85	7.02	6.27	7.07	7.39
vanadium	7440-62-2	E440	0.20	mg/kg	58.7	53.4	48.6	54.8	60.2
zinc	7440-66-6	E440	2.0	mg/kg	4440	14400	4100	8610	4450
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.1	1.2	1.3	2.1
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.8	11.7	11.8	11.8
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.53	10.1	9.58	10.0	9.97
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units	5.61	6.00	5.87	6.06	5.78
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.15	2.16	2.44	2.24	2.09
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.170	0.168	0.159	0.936	0.195
calcium, TCLP	7440-70-2	E444	10	mg/L	1900	1980	1990	1940	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	0.656	0.974	1.01	1.06	1.76
copper, TCLP	7440-50-8	E444	0.050	mg/L	4.05	1.07	1.81	1.35	1.41
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	0.47	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	128	138	136	140	128
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	0.63	0.73	0.47	0.96	0.73
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	BA2037-A-6	BA2037-A-7	BA2037-A-8	BA2037-A-9	BA2037-A-10
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00	09-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-006	VA20B5220-007	VA20B5220-008	VA20B5220-009	VA20B5220-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	53.4	83.2	53.2	55.4	81.0	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2037-A-11	BA2037-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-011	VA20B5220-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	---	E144	0.25	%	18.7	18.5	---	---	---	
pH (1:2 soil:water)	---	E108	0.10	pH units	11.1	11.2	---	---	---	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	35700	40600	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	87.0	86.2	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	29.4	26.5	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	672	736	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.38	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	6.23	7.02	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	184	221	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	11.0	11.3	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	124000	120000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	210	172	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	74.3	19.1	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	2860	15800	---	---	---	
iron	7439-89-6	E440	50	mg/kg	75800	63200	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	471	598	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	19.8	27.1	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	11200	10700	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	848	872	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0633	<0.0500	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	16.5	15.7	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	124	177	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	11700	9600	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	4190	3540	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.27	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	6.84	3.92	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	13300	12600	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	308	291	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	8700	8100	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	0.082	0.095	---	---	---	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2037-A-11	BA2037-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-011	VA20B5220-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	155	82.1	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	452	947	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	7.60	8.68	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	7.14	6.79	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	51.2	48.5	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	3880	17900	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.0	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.78	9.65	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.86	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	2.16	2.02	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.188	0.194	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1980	2020	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.624	0.916	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.970	2.14	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	10.4	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	128	134	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.70	0.68	----	----	----	
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	BA2037-A-11	BA2037-A-12	----	----	----
Client sampling date / time					09-Sep-2020 09:00	09-Sep-2020 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA20B5220-011	VA20B5220-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	57.5	43.4	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B5220	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	: 15-Sep-2020 11:35
PO	: VANCO 0000049378	Issue Date	: 29-Sep-2020 13:51
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

Key

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

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

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA20B5220-001	BA2037-A-1	bismuth	7440-69-9	E440	33.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	boron	7440-42-8	E440	44.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	copper	7440-50-8	E440	96.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	lead	7439-92-1	E440	83.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	nickel	7440-02-0	E440	108 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	tungsten	7440-33-7	E440	39.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B5220-001	BA2037-A-1	zinc	7440-66-6	E440	33.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-9031000 2	----	antimony	7440-36-0	E440	122 % MES	80.0-120%	Recovery greater than upper control limit
Metals	QC-MRG2-9031000 2	----	bismuth	7440-69-9	E440	121 % MES	80.0-120%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Analysis Holding Time Compliance

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

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

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 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 : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-1	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-10	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-11	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-12	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-2	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-3	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-4	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✓	24-Sep-2020	13 days	0 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-5	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✔	24-Sep-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-6	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✔	24-Sep-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-7	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✔	24-Sep-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-8	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✔	24-Sep-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2037-A-9	E510	09-Sep-2020	24-Sep-2020	28 days	14 days	✔	24-Sep-2020	13 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2037-A-1	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2037-A-10	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2037-A-11	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2037-A-12	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-2	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-3	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-4	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-5	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-6	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-7	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-8	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2037-A-9	E440	09-Sep-2020	24-Sep-2020	180 days	14 days	✔	24-Sep-2020	165 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2037-A-1	E144	09-Sep-2020	----	----	----		23-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 BA2037-A-10	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-11	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-12	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-2	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-3	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-4	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-5	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-6	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-7	E144	09-Sep-2020	----	----	----		23-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 BA2037-A-8	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2037-A-9	E144	09-Sep-2020	----	----	----		23-Sep-2020	----	----	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-1	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-10	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-11	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-12	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-2	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-3	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2037-A-4	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2037-A-5	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2037-A-6	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2037-A-7	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2037-A-8	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2037-A-9	E108	09-Sep-2020	24-Sep-2020	30 days	14 days	✔	24-Sep-2020	15 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-1	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-10	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-11	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-12	E512	23-Sep-2020	----	----	----		28-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) BA2037-A-2	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-3	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-4	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-5	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-6	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-7	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-8	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2037-A-9	E512	23-Sep-2020	----	----	----		28-Sep-2020	0 days	0 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-1	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-10	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-11	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-12	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-2	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-3	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-4	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-5	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-6	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2037-A-7	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2037-A-8	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2037-A-9	E444	23-Sep-2020	----	----	----		24-Sep-2020	194 days	15 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-1	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-10	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-11	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-12	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-2	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-3	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-4	EPP444	09-Sep-2020	23-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) BA2037-A-5	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-6	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-7	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-8	EPP444	09-Sep-2020	23-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2037-A-9	EPP444	09-Sep-2020	23-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	90310	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	90311	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	90313	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	90312	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	90310	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	90311	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	90313	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	90312	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	93228	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	90310	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	91391	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	90311	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	90313	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	93228	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	91391	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	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.
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.
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.



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



QUALITY CONTROL REPORT

Work Order : **VA20B5220**

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 : 15-Sep-2020 11:35
 Date Analysis Commenced : 23-Sep-2020
 Issue Date : 29-Sep-2020 13:51

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.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brianna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia

Page : 2 of 11
Work Order : VA20B5220
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: 90312)											
VA20B5220-001	BA2037-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.9	10.8	0.643%	5%	----
Physical Tests (QC Lot: 90313)											
KS2001807-021	Anonymous	moisture	----	E144	0.25	%	7.64	7.22	5.61%	20%	----
Metals (QC Lot: 90310)											
VA20B5220-001	BA2037-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 90311)											
VA20B5220-001	BA2037-A-1	aluminum	7429-90-5	E440	50	mg/kg	45500	35300	25.2%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	92.7	91.2	1.65%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	25.5	23.4	8.70%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	809	815	0.711%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.42	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	7.72	5.48	33.9%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	182	286	44.4%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	13.0	9.62	29.6%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	133000	131000	1.79%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	146	159	8.60%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	156	161	3.31%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	9600	3330	96.9%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	74300	73800	0.642%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	873	2120	83.1%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	25.8	20.0	25.4%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11100	12600	12.4%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	984	931	5.50%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	17.5	24.8	34.6%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	317	94.2	108%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11000	10700	2.68%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4490	4180	7.11%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.35	0.0006	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	3.22	4.13	24.7%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	13700	14600	6.66%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	320	376	16.2%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	9600	8700	9.60%	30%	----



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: 90311) - continued											
VA20B5220-001	BA2037-A-1	thallium	7440-28-0	E440	0.050	mg/kg	0.084	0.071	0.013	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	120	114	5.52%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	1130	887	23.8%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	6.23	9.30	39.6%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	6.70	6.12	9.09%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	54.2	52.5	3.25%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	5920	4230	33.2%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.2	<1.0	0.2	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 90313)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 90310)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 90311)						
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: 90311) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 91391)						
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: 93228)						
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: 90312)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 90313)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 90310)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	110	80.0	120	----
Metals (QCLot: 90311)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	108	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	# 122	80.0	120	MES
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	110	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	# 121	80.0	120	MES
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	97.2	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	102	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	101	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	112	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	101	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	114	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	114	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	108	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	113	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	101	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	111	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	100	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	115	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Metals (QCLot: 90311) - 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	99.3	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	106	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	109	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	108	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	100	80.0	120	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level $\geq 1 \times$ 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: 91391)										
VA20B5220-001	BA2037-A-1	antimony, TCLP	7440-36-0	E444	5.5 mg/L	5 mg/L	109	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.8	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.7 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.237 mg/L	0.25 mg/L	95.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.87 mg/L	10 mg/L	88.7	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	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	1.17 mg/L	1.25 mg/L	93.8	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	2.26 mg/L	2.5 mg/L	90.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	235 mg/L	250 mg/L	94.0	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.7 mg/L	10 mg/L	107	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	250 mg/L	250 mg/L	100	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.32 mg/L	2.5 mg/L	92.8	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.96 mg/L	5 mg/L	99.1	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.106 mg/L	0.1 mg/L	106	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.73 mg/L	0.75 mg/L	97.1	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 93228)										
VA20B5220-001	BA2037-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	98.3	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: 90310)									
QC-90310-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	110	70.0	130	----
Metals (QCLot: 90311)									
QC-90311-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	116	70.0	130	----
QC-90311-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
QC-90311-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	102	70.0	130	----
QC-90311-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	120	70.0	130	----
QC-90311-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	125	70.0	130	----
QC-90311-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
QC-90311-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	104	70.0	130	----
QC-90311-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	114	70.0	130	----
QC-90311-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	113	70.0	130	----
QC-90311-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	109	70.0	130	----
QC-90311-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	106	70.0	130	----
QC-90311-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	108	70.0	130	----
QC-90311-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	116	70.0	130	----
QC-90311-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	113	70.0	130	----
QC-90311-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
QC-90311-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	117	70.0	130	----
QC-90311-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	103	70.0	130	----
QC-90311-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	106	70.0	130	----
QC-90311-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	----
QC-90311-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	----
QC-90311-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	104	70.0	130	----
QC-90311-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	110	70.0	130	----
QC-90311-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	101	40.0	160	----
QC-90311-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	104	70.0	130	----
QC-90311-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	116	70.0	130	----
QC-90311-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	118	70.0	130	----
QC-90311-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	113	70.0	130	----

Page : 11 of 11
 Work Order : VA20B5220
 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: 90311) - continued									
QC-90311-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	105	70.0	130	----
QC-90311-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	104	70.0	130	----




Chain of Custody / Analytical Request Form
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COC # _____
 Page ____ of ____

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

Invoice To Same as Report ?		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)																																	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:		<table border="1"> <tr> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">MOISTURE</td> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">Chrome 6</td> <td rowspan="4" style="writing-mode: vertical-rl; transform: rotate(180deg);">MET-CSR+FULL-VA (all metals)</td> <td colspan="6">Number of Containers</td> </tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td><td> </td><td> </td></tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers																							
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)											Number of Containers																							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																			
Contact:		LSD: (includes 2:1 pH)																																			
Address:		Quote #:																																			
Phone:		Fax:																																			

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
BA2037-A-1	Environmental Division Vancouver Work Order Reference VA20B5220  Telephone : +1 604 263 4188	09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-2		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-3		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-4		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-5		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-6		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-7		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-8		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-9		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-10		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-11		09-Sep-20	9:00	Soil	X	X	X	1	
BA2037-A-12		09-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: Yes / No ? If Yes add SIF
<i>[Signature]</i>	15-Sep-20	0800				19.4 °C	RK	15/9/20	11:35am	