

Bottom Ash Data

2020 Week 46

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on November 25, 2020. The data represents bottom ash composite results for week 46 of 2020 (November 8, 2020 to November 14, 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 : **VA20C0939**
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 : 17-Nov-2020 11:10
Date Analysis Commenced : 23-Nov-2020
Issue Date : 25-Nov-2020 09:12

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Organics, 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	BA2046-A-1	BA2046-A-2	BA2046-A-3	BA2046-A-4	BA2046-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-001	VA20C0939-002	VA20C0939-003	VA20C0939-004	VA20C0939-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	22.9	22.1	23.2	22.0	21.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.1	11.1	11.2	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38800	35500	38000	31200	38000	
antimony	7440-36-0	E440	0.10	mg/kg	177	132	150	146	138	
arsenic	7440-38-2	E440	0.10	mg/kg	31.1	51.9	27.7	33.1	26.7	
barium	7440-39-3	E440	0.50	mg/kg	658	531	437	534	670	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.36	0.38	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	13.6	13.4	16.7	15.2	12.4	
boron	7440-42-8	E440	5.0	mg/kg	259	203	141	199	167	
cadmium	7440-43-9	E440	0.020	mg/kg	11.6	11.4	12.4	14.2	12.5	
calcium	7440-70-2	E440	50	mg/kg	129000	124000	128000	131000	130000	
chromium	7440-47-3	E440	0.50	mg/kg	150	123	134	213	146	
cobalt	7440-48-4	E440	0.10	mg/kg	27.6	29.0	42.9	118	21.2	
copper	7440-50-8	E440	0.50	mg/kg	2270	1080	5190	1560	1490	
iron	7439-89-6	E440	50	mg/kg	56600	51200	59800	55600	55200	
lead	7439-92-1	E440	0.50	mg/kg	914	427	485	938	598	
lithium	7439-93-2	E440	2.0	mg/kg	17.9	15.6	15.7	74.4	15.6	
magnesium	7439-95-4	E440	20	mg/kg	11800	11300	11500	10600	13100	
manganese	7439-96-5	E440	1.0	mg/kg	664	735	862	755	695	
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	20.2	14.4	14.1	14.2	25.6	
nickel	7440-02-0	E440	0.50	mg/kg	82.9	125	80.4	365	103	
phosphorus	7723-14-0	E440	50	mg/kg	9390	9540	10000	12400	11400	
potassium	7440-09-7	E440	100	mg/kg	5380	5270	5110	5180	5440	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.35	0.38	0.91	0.41	
silver	7440-22-4	E440	0.10	mg/kg	3.76	6.36	5.34	4.23	3.46	
sodium	7440-23-5	E440	50	mg/kg	16000	14200	14600	14100	14600	
strontium	7440-24-6	E440	0.50	mg/kg	291	275	362	271	289	
sulfur	7704-34-9	E440	1000	mg/kg	14200	11900	13300	13500	11600	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2046-A-1	BA2046-A-2	BA2046-A-3	BA2046-A-4	BA2046-A-5
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-001	VA20C0939-002	VA20C0939-003	VA20C0939-004	VA20C0939-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	140	105	135	128	103	
titanium	7440-32-6	E440	1.0	mg/kg	715	442	343	513	687	
tungsten	7440-33-7	E440	0.50	mg/kg	3.63	4.69	3.06	3.63	4.17	
uranium	7440-61-1	E440	0.050	mg/kg	3.62	3.33	3.30	3.30	3.04	
vanadium	7440-62-2	E440	0.20	mg/kg	40.3	38.7	40.5	38.7	36.3	
zinc	7440-66-6	E440	2.0	mg/kg	4240	4970	4230	6020	4160	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.8	2.2	1.3	1.4	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.5	11.4	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.86	8.11	8.75	8.38	9.63	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.09	6.08	6.06	6.05	6.11	
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	2.08	2.12	1.99	2.03	2.11	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.210	0.253	0.194	0.221	0.235	
calcium, TCLP	7440-70-2	E444	10	mg/L	2020	2050	2080	2030	2100	
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	1.26	1.03	0.469	0.830	2.53	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.52	0.914	0.841	0.647	0.882	
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	0.37	0.39	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	131	150	146	148	147	
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	0.57	0.59	0.54	0.53	0.65	
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	BA2046-A-1	BA2046-A-2	BA2046-A-3	BA2046-A-4	BA2046-A-5
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-001	VA20C0939-002	VA20C0939-003	VA20C0939-004	VA20C0939-005	
					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	67.1	100	61.5	61.8	49.8	

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	BA2046-A-6	BA2046-A-7	BA2046-A-8	BA2046-A-9	BA2046-A-10
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-006	VA20C0939-007	VA20C0939-008	VA20C0939-009	VA20C0939-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	21.7	21.2	21.7	21.5	22.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.3	11.2	11.2	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	29000	32200	32200	28400	25200	
antimony	7440-36-0	E440	0.10	mg/kg	145	176	173	187	182	
arsenic	7440-38-2	E440	0.10	mg/kg	28.9	42.3	32.0	34.2	29.7	
barium	7440-39-3	E440	0.50	mg/kg	591	497	498	419	420	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.44	0.34	0.35	0.32	
bismuth	7440-69-9	E440	0.20	mg/kg	15.1	21.0	18.6	17.7	19.9	
boron	7440-42-8	E440	5.0	mg/kg	183	212	195	137	131	
cadmium	7440-43-9	E440	0.020	mg/kg	16.9	35.6	12.9	14.2	12.1	
calcium	7440-70-2	E440	50	mg/kg	124000	146000	131000	127000	121000	
chromium	7440-47-3	E440	0.50	mg/kg	146	249	179	188	161	
cobalt	7440-48-4	E440	0.10	mg/kg	22.5	123	32.8	52.8	18.9	
copper	7440-50-8	E440	0.50	mg/kg	1720	2860	4950	2880	1270	
iron	7439-89-6	E440	50	mg/kg	56100	60600	48100	58500	48200	
lead	7439-92-1	E440	0.50	mg/kg	538	888	444	1250	961	
lithium	7439-93-2	E440	2.0	mg/kg	15.7	18.7	18.5	18.2	16.0	
magnesium	7439-95-4	E440	20	mg/kg	12000	11200	11400	11000	10200	
manganese	7439-96-5	E440	1.0	mg/kg	694	1110	1210	760	654	
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	16.2	19.7	15.0	15.6	12.2	
nickel	7440-02-0	E440	0.50	mg/kg	442	172	122	120	82.1	
phosphorus	7723-14-0	E440	50	mg/kg	9020	12100	11600	9880	10500	
potassium	7440-09-7	E440	100	mg/kg	4860	5820	5910	5130	5310	
selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.51	0.50	0.43	0.36	
silver	7440-22-4	E440	0.10	mg/kg	14.0	6.16	4.50	3.77	5.18	
sodium	7440-23-5	E440	50	mg/kg	13300	16200	16100	13800	14000	
strontium	7440-24-6	E440	0.50	mg/kg	270	324	293	284	247	
sulfur	7704-34-9	E440	1000	mg/kg	12700	15900	14800	14100	12400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.093	<0.050	<0.050	0.052	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2046-A-6	BA2046-A-7	BA2046-A-8	BA2046-A-9	BA2046-A-10
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-006	VA20C0939-007	VA20C0939-008	VA20C0939-009	VA20C0939-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	164	174	131	133	137	
titanium	7440-32-6	E440	1.0	mg/kg	478	294	274	229	176	
tungsten	7440-33-7	E440	0.50	mg/kg	3.75	3.92	4.54	3.25	3.15	
uranium	7440-61-1	E440	0.050	mg/kg	3.21	4.09	3.52	3.33	3.08	
vanadium	7440-62-2	E440	0.20	mg/kg	36.3	43.0	42.0	37.9	36.6	
zinc	7440-66-6	E440	2.0	mg/kg	6820	6060	5960	7560	6200	
zirconium	7440-67-7	E440	1.0	mg/kg	1.0	1.3	1.3	1.5	2.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	11.6	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.15	9.36	9.30	9.72	9.83	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	5.94	5.95	6.02	6.07	6.13	
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	2.09	2.04	2.23	2.07	2.26	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.274	0.201	0.331	0.240	0.268	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	2060	2080	2100	2120	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.896	0.584	0.980	0.713	3.07	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.01	1.44	1.28	1.55	1.50	
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	0.34	<0.25	0.40	0.34	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	133	135	137	149	
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	0.66	0.45	0.74	0.54	0.41	
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	BA2046-A-6	BA2046-A-7	BA2046-A-8	BA2046-A-9	BA2046-A-10
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00	11-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-006	VA20C0939-007	VA20C0939-008	VA20C0939-009	VA20C0939-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	52.8	67.0	51.6	73.8	51.3	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2046-A-11	BA2046-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-011	VA20C0939-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	22.6	21.4	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31900	28300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	162	180	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	34.4	34.0	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	440	407	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	19.1	19.0	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	170	161	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	19.4	14.2	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	136000	141000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	145	137	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	33.2	520	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2210	1820	----	----	----	
iron	7439-89-6	E440	50	mg/kg	46700	39800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	1060	1440	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	17.7	90.9	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11200	11300	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	654	1580	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	15.5	14.7	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	152	123	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	12200	12600	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5400	5750	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.55	0.48	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.77	5.27	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15000	15300	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	282	329	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14300	15200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.051	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2046-A-11	BA2046-A-12	----	----	----
Client sampling date / time					11-Nov-2020 09:00	11-Nov-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-011	VA20C0939-012	-----	-----	-----
					Result	Result	---	---	---
Metals									
tin	7440-31-5	E440	2.0	mg/kg	163	200	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	280	242	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	4.86	3.29	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	3.62	3.66	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	39.8	37.3	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	4780	7960	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	1.4	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.6	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.05	9.72	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.15	6.13	----	----	----
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	2.07	2.01	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.219	0.209	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	2170	2070	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.618	1.40	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.677	0.463	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	153	140	----	----	----
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.57	0.63	----	----	----
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					Client sample ID		BA2046-A-11	BA2046-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		11-Nov-2020 09:00	11-Nov-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C0939-011	VA20C0939-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	84.4	65.8	----	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20C0939	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	: 17-Nov-2020 11:10
PO	: VANCO 0000049378	Issue Date	: 25-Nov-2020 09:12
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	VA20C0939-001	BA2046-A-1	boron	7440-42-8	E440	37.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C0939-001	BA2046-A-1	lead	7439-92-1	E440	76.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C0939-001	BA2046-A-1	nickel	7440-02-0	E440	39.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C0939-001	BA2046-A-1	titanium	7440-32-6	E440	84.1 % DUP-H	40%	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 : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-1	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-10	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-11	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-12	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-2	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-3	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-4	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✓	24-Nov-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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-5	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✔	24-Nov-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-6	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✔	24-Nov-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-7	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✔	24-Nov-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-8	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✔	24-Nov-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2046-A-9	E510	11-Nov-2020	24-Nov-2020	28 days	12 days	✔	24-Nov-2020	15 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2046-A-1	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2046-A-10	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2046-A-11	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2046-A-12	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 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 BA2046-A-2	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-3	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-4	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-5	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-6	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-7	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-8	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2046-A-9	E440	11-Nov-2020	24-Nov-2020	180 days	12 days	✔	24-Nov-2020	167 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2046-A-1	E144	11-Nov-2020	----	----	----		23-Nov-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 BA2046-A-10	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-11	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-12	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-2	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-3	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-4	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-5	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-6	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2046-A-7	E144	11-Nov-2020	----	----	----		23-Nov-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 BA2046-A-8	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2046-A-9	E144	11-Nov-2020	----	----	----		23-Nov-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-1	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-10	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-11	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-12	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-2	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-3	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-4	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 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 BA2046-A-5	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-6	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-7	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-8	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2046-A-9	E108	11-Nov-2020	24-Nov-2020	30 days	12 days	✔	24-Nov-2020	17 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-1	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-10	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-11	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-12	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 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) BA2046-A-2	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-3	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-4	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-5	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-6	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-7	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-8	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2046-A-9	E512	23-Nov-2020	----	----	----		24-Nov-2020	40 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-1	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 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) BA2046-A-10	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-11	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-12	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-2	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-3	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-4	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-5	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-6	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2046-A-7	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 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) BA2046-A-8	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2046-A-9	E444	23-Nov-2020	----	----	----		24-Nov-2020	192 days	13 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-1	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-10	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-11	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-12	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-2	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-3	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-4	EPP444	11-Nov-2020	23-Nov-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: 180 Day HT (e.g. metals ex. Hg) BA2046-A-5	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-6	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-7	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-8	EPP444	11-Nov-2020	23-Nov-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2046-A-9	EPP444	11-Nov-2020	23-Nov-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	121222	1	19	5.2	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	121223	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	121230	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	121224	1	19	5.2	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	121222	2	19	10.5	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	121223	2	19	10.5	10.0	✔
Moisture Content by Gravimetry	E144	121230	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	121224	1	19	5.2	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	121554	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	121222	1	19	5.2	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	121555	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	121223	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	121230	1	19	5.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	121554	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	121555	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 $20 \pm 5^{\circ}\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) 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/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) 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 : VA20C0939

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 : 17-Nov-2020 11:10
Date Analysis Commenced : 23-Nov-2020
Issue Date : 25-Nov-2020 09:12

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Dee Lee (Analyst, Metals), Kinny Wu (Lab Analyst, Metals), Robin Weeks (Team Leader - Metals, Metals), and Robin Weeks (Team Leader - Metals, Organics).

Page : 2 of 11
Work Order : VA20C0939
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: 121224)											
VA20C0939-001	BA2046-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.0	0.455%	5%	----
Physical Tests (QC Lot: 121230)											
VA20C0939-001	BA2046-A-1	moisture	----	E144	0.25	%	22.9	23.1	0.699%	20%	----
Metals (QC Lot: 121222)											
VA20C0939-001	BA2046-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 121223)											
VA20C0939-001	BA2046-A-1	aluminum	7429-90-5	E440	50	mg/kg	38800	31200	21.8%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	177	132	28.7%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	31.1	26.1	17.4%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	658	532	21.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.38	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	13.6	13.1	4.09%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	259	178	37.2%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	11.6	10.5	10.4%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	129000	130000	0.574%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	150	138	8.05%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	27.6	36.2	27.0%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	2270	1840	20.8%	30%	----
		iron	7439-89-6	E440	50	mg/kg	56600	59500	5.09%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	914	407	76.8%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	17.9	19.4	7.99%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11800	11800	0.0535%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	664	679	2.30%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	20.2	15.6	25.2%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	82.9	124	39.5%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	9390	8900	5.28%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5380	4930	8.72%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.35	0.08	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	3.76	4.86	25.6%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	16000	14000	13.6%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	291	275	5.50%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	14200	12600	12.0%	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: 121223) - continued											
VA20C0939-001	BA2046-A-1	thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	140	168	18.0%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	715	292	84.1%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	3.63	2.94	0.69	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	3.62	3.23	11.4%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	40.3	37.1	8.08%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4240	3910	8.24%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.7	0.07	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: 121230)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 121222)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 121223)						
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: 121223) - 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: 121554)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 121555)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 121224)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 121230)									
moisture	----	E144	0.25	%	50 %	101	90.0	110	----
Metals (QCLot: 121222)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.4	80.0	120	----
Metals (QCLot: 121223)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.8	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	96.7	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	99.4	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.6	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	89.9	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	96.5	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	94.4	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.4	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.7	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	93.4	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.7	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	106	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	91.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.2	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	93.6	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	107	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	102	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	97.9	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.4	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	108	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: 121223) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.0	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.6	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.1	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	99.7	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.3	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.2	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 121554)										
VA20C0939-001	BA2046-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	97.3	50.0	140	----
TCLP Metals (QCLot: 121555)										
VA20C0939-001	BA2046-A-1	antimony, TCLP	7440-36-0	E444	4.8 mg/L	5 mg/L	95.4	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.1 mg/L	5 mg/L	82.5	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.0 mg/L	12.5 mg/L	96.0	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.198 mg/L	0.25 mg/L	79.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.19 mg/L	10 mg/L	81.9	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.207 mg/L	0.25 mg/L	82.7	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	1.05 mg/L	1.25 mg/L	84.0	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	1.92 mg/L	2.5 mg/L	76.6	50.0	140	----
		iron, TCLP	7439-89-6	E444	200 mg/L	250 mg/L	79.8	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.54 mg/L	10 mg/L	95.4	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	230 mg/L	250 mg/L	92.0	50.0	140	----
		nickel, TCLP	7440-02-0	E444	1.96 mg/L	2.5 mg/L	78.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.31 mg/L	5 mg/L	86.2	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.103 mg/L	0.1 mg/L	103	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.5 mg/L	5 mg/L	89.4	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.63 mg/L	0.75 mg/L	84.1	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----



Reference Material (RM) Report

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

Sub-Matrix: **Soil/Solid**

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: 121222)									
QC-121222-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	98.9	70.0	130	----
Metals (QCLot: 121223)									
QC-121223-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
QC-121223-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	109	70.0	130	----
QC-121223-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
QC-121223-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	104	70.0	130	----
QC-121223-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	115	70.0	130	----
QC-121223-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
QC-121223-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	99.0	70.0	130	----
QC-121223-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	110	70.0	130	----
QC-121223-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
QC-121223-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	106	70.0	130	----
QC-121223-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	104	70.0	130	----
QC-121223-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	107	70.0	130	----
QC-121223-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	112	70.0	130	----
QC-121223-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	102	70.0	130	----
QC-121223-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	112	70.0	130	----
QC-121223-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	109	70.0	130	----
QC-121223-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	110	70.0	130	----
QC-121223-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	106	70.0	130	----
QC-121223-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	108	70.0	130	----
QC-121223-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
QC-121223-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	112	70.0	130	----
QC-121223-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	107	70.0	130	----
QC-121223-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	100	40.0	160	----
QC-121223-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
QC-121223-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	122	70.0	130	----
QC-121223-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	114	70.0	130	----
QC-121223-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	113	70.0	130	----

Page : 11 of 11
 Work Order : VA20C0939
 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: 121223) - continued									
QC-121223-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
QC-121223-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	111	70.0	130	----



Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypynk	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypynk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
			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 #:									
Company:		PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite								
Contact:		LSD:	(includes 2:1 pH)								
Address:		Quote #:									
Phone:											

Lab Work Order # (lab use only)		ALS Contact:	Sampler:								Number of Containers
Sample #	Sample Identification (This description will appear on the report)		Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)		
1	BA2046-A-1		11-Nov-20	9:00	Soil	X	X		X		1
2	BA2046-A-2		11-Nov-20	9:00	Soil	X	X		X		1
3	BA2046-A-3		11-Nov-20	9:00	Soil	X	X		X		1
4	BA2046-A-4		11-Nov-20	9:00	Soil	X	X		X		1
5	BA2046-A-5		11-Nov-20	9:00	Soil	X	X		X		1
6	BA2046-A-6		11-Nov-20	9:00	Soil	X	X		X		1
7	BA2046-A-7		11-Nov-20	9:00	Soil	X	X		X		1
8	BA2046-A-8		11-Nov-20	9:00	Soil	X	X		X		1
9	BA2046-A-9		11-Nov-20	9:00	Soil	X	X		X		1
10	BA2046-A-10		11-Nov-20	9:00	Soil	X	X		X		1
11	BA2046-A-11		11-Nov-20	9:00	Soil	X	X		X		1
12	BA2046-A-12		11-Nov-20	9:00	Soil	X	X		X		1

Environmental Division
Vancouver
 Work Order Reference
VA20C0939



Telephone: +1 604 253 4188

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
<i>[Signature]</i>	17-Nov-20	0900	<i>[Signature]</i>	17/11/20	11:10am	18.4 °C				Yes / No ? If Yes add SIF