

Bottom Ash Data

2020 Week 34

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on September 4, 2020. The data represents bottom ash composite results for week 34 of 2020 (August 16, 2020 to August 22, 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 : **VA20B3589**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
 Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : PO#46693 Weekly Bottom Ash-Suite
PO : VANCO 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 16
No. of samples analysed : 16

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 : 25-Aug-2020 11:20
Date Analysis Commenced : 28-Aug-2020
Issue Date : 03-Sep-2020 16:24

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>
Brianna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Ian Cronshaw	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Extractions	Organics, 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.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
RRV	Reported result verified by repeat analysis.



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2034-A-7 REP 1	BA2034-A-7 REP 2	BA2034-A-7 REP 3	BA2034-A-7 REP 4	----
Client sampling date / time					19-Aug-2020	19-Aug-2020	19-Aug-2020	19-Aug-2020	----
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-013	VA20B3589-014	VA20B3589-015	VA20B3589-016	-----
					Result	Result	Result	Result	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.7	11.7	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.71	9.71	9.71	9.71	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.90	2.90	2.90	2.90	----
pH, TCLP final	----	EPP444	0.010	pH units	5.80	5.67	5.24	5.60	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.657 ^{RRV}	0.248	0.287	0.138	----

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

Analytical Results

Sub-Matrix: Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2034-A-1	BA2034-A-2	BA2034-A-3	BA2034-A-4	BA2034-A-5
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-001	VA20B3589-002	VA20B3589-003	VA20B3589-004	VA20B3589-005
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	15.2	15.0	16.6	14.1	17.9
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.3	11.3	11.1	11.4
Metals									
aluminum	7429-90-5	E440	50	mg/kg	36400	31300	27400	43100	31400
antimony	7440-36-0	E440	0.10	mg/kg	97.8	110	89.0	86.6	88.7
arsenic	7440-38-2	E440	0.10	mg/kg	47.1	38.5	39.7	41.3	31.5
barium	7440-39-3	E440	0.50	mg/kg	777	720	504	656	643
beryllium	7440-41-7	E440	0.10	mg/kg	0.46	0.43	0.38	0.39	0.40
bismuth	7440-69-9	E440	0.20	mg/kg	4.70	6.66	8.33	4.83	5.62
boron	7440-42-8	E440	5.0	mg/kg	200	229	207	220	192
cadmium	7440-43-9	E440	0.020	mg/kg	9.74	10.6	9.98	8.86	11.3
calcium	7440-70-2	E440	50	mg/kg	116000	134000	126000	120000	123000
chromium	7440-47-3	E440	0.50	mg/kg	352	152	273	158	202
cobalt	7440-48-4	E440	0.10	mg/kg	114	25.6	36.8	18.7	36.8



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2034-A-1	BA2034-A-2	BA2034-A-3	BA2034-A-4	BA2034-A-5
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-001	VA20B3589-002	VA20B3589-003	VA20B3589-004	VA20B3589-005	
					Result	Result	Result	Result	Result	
Metals										
copper	7440-50-8	E440	0.50	mg/kg	9450	4400	2770	7170	2860	
iron	7439-89-6	E440	50	mg/kg	99700	46800	62200	66400	56700	
lead	7439-92-1	E440	0.50	mg/kg	914	751	802	545	1340	
lithium	7439-93-2	E440	2.0	mg/kg	17.9	27.5	27.4	18.3	18.3	
magnesium	7439-95-4	E440	20	mg/kg	12100	11300	11300	11000	11800	
manganese	7439-96-5	E440	1.0	mg/kg	1490	830	946	708	881	
mercury	7439-97-6	E510	0.0500	mg/kg	0.133	0.260	0.160	0.166	0.305	
molybdenum	7439-98-7	E440	0.10	mg/kg	60.4	42.3	62.4	41.3	28.0	
nickel	7440-02-0	E440	0.50	mg/kg	238	136	240	194	131	
phosphorus	7723-14-0	E440	50	mg/kg	9980	12400	10400	9910	8870	
potassium	7440-09-7	E440	100	mg/kg	4330	4910	4500	4280	5060	
selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.42	0.29	0.70	0.35	
silver	7440-22-4	E440	0.10	mg/kg	7.04	8.26	3.73	4.13	16.0	
sodium	7440-23-5	E440	50	mg/kg	12100	13200	12400	12700	13000	
strontium	7440-24-6	E440	0.50	mg/kg	296	308	299	362	283	
sulfur	7704-34-9	E440	1000	mg/kg	9000	10100	10300	8600	9100	
thallium	7440-28-0	E440	0.050	mg/kg	0.079	0.086	0.079	0.069	0.064	
tin	7440-31-5	E440	2.0	mg/kg	280	117	133	190	105	
titanium	7440-32-6	E440	1.0	mg/kg	839	601	292	613	437	
tungsten	7440-33-7	E440	0.50	mg/kg	6.43	7.50	6.15	4.96	6.19	
uranium	7440-61-1	E440	0.050	mg/kg	4.95	5.66	5.59	4.96	4.61	
vanadium	7440-62-2	E440	0.20	mg/kg	55.0	58.7	52.7	48.3	52.5	
zinc	7440-66-6	E440	2.0	mg/kg	3580	4280	4250	3600	3210	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	<1.0	1.5	1.5	1.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.8	11.7	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.95	9.72	9.71	9.50	9.46	
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	5.60	5.50	5.88	5.80	4.37	
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	



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID				
					BA2034-A-1	BA2034-A-2	BA2034-A-3	BA2034-A-4	BA2034-A-5
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-001	VA20B3589-002	VA20B3589-003	VA20B3589-004	VA20B3589-005
					Result	Result	Result	Result	Result
TCLP Metals									
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.80	1.76	1.98	2.18	0.75
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.208	0.181	0.154	0.162	0.100
calcium, TCLP	7440-70-2	E444	10	mg/L	1770	1690	1850	1660	593
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	0.781	0.705	0.793	0.810	1.34
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.53	2.11	1.91	1.62	4.21
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	6.5
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	0.38	<0.25	<0.25	0.61
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	129	128	134	123	48.8
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	0.56	0.64	0.43	0.71	<0.25
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
zinc, TCLP	7440-66-6	E444	0.50	mg/L	108	81.4	53.4	109	20.4

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



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2034-A-6	BA2034-A-7	BA2034-A-8	BA2034-A-9	BA2034-A-10
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-006	VA20B3589-007	VA20B3589-008	VA20B3589-009	VA20B3589-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.9	16.2	13.9	14.3	14.8	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.3	11.2	11.2	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	28300	46100	31000	37200	27800	
antimony	7440-36-0	E440	0.10	mg/kg	91.6	80.4	84.9	66.3	85.2	
arsenic	7440-38-2	E440	0.10	mg/kg	32.9	30.0	59.8	34.0	39.0	
barium	7440-39-3	E440	0.50	mg/kg	634	634	690	702	710	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.51	0.43	0.41	0.46	
bismuth	7440-69-9	E440	0.20	mg/kg	4.23	3.54	4.44	6.53	5.59	
boron	7440-42-8	E440	5.0	mg/kg	202	162	159	160	249	
cadmium	7440-43-9	E440	0.020	mg/kg	11.4	6.96	8.21	7.96	13.5	
calcium	7440-70-2	E440	50	mg/kg	113000	107000	118000	123000	128000	
chromium	7440-47-3	E440	0.50	mg/kg	210	138	186	139	211	
cobalt	7440-48-4	E440	0.10	mg/kg	81.0	20.4	36.4	18.4	27.4	
copper	7440-50-8	E440	0.50	mg/kg	2840	956	6240	1370	1800	
iron	7439-89-6	E440	50	mg/kg	81600	55600	55000	69100	72400	
lead	7439-92-1	E440	0.50	mg/kg	920	572	687	403	530	
lithium	7439-93-2	E440	2.0	mg/kg	27.1	17.2	21.1	16.9	32.4	
magnesium	7439-95-4	E440	20	mg/kg	11100	11700	12800	11400	10600	
manganese	7439-96-5	E440	1.0	mg/kg	772	713	973	686	790	
mercury	7439-97-6	E510	0.0500	mg/kg	0.204	0.332	0.329	0.113	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	40.8	37.5	26.8	29.1	45.5	
nickel	7440-02-0	E440	0.50	mg/kg	188	113	169	92.4	154	
phosphorus	7723-14-0	E440	50	mg/kg	8320	9470	9630	9520	10900	
potassium	7440-09-7	E440	100	mg/kg	4200	4380	4930	3800	3730	
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.24	0.32	0.32	0.29	
silver	7440-22-4	E440	0.10	mg/kg	9.45	6.32	3.24	3.19	3.38	
sodium	7440-23-5	E440	50	mg/kg	11300	11600	12800	13000	13200	
strontium	7440-24-6	E440	0.50	mg/kg	361	254	279	255	311	
sulfur	7704-34-9	E440	1000	mg/kg	8700	8900	8600	8000	9200	
thallium	7440-28-0	E440	0.050	mg/kg	0.058	0.056	0.065	0.063	0.086	



Analytical Results

Sub-Matrix: Solid (Matrix: Soil/Solid)					Client sample ID	BA2034-A-6	BA2034-A-7	BA2034-A-8	BA2034-A-9	BA2034-A-10
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-006	VA20B3589-007	VA20B3589-008	VA20B3589-009	VA20B3589-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	366	127	161	84.5	91.2	
titanium	7440-32-6	E440	1.0	mg/kg	345	1190	762	1240	618	
tungsten	7440-33-7	E440	0.50	mg/kg	15.2	6.06	12.0	13.6	5.55	
uranium	7440-61-1	E440	0.050	mg/kg	4.45	3.70	4.06	4.48	5.49	
vanadium	7440-62-2	E440	0.20	mg/kg	47.6	47.8	44.4	48.5	51.1	
zinc	7440-66-6	E440	2.0	mg/kg	5950	3920	4010	5700	5230	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	2.1	<1.0	1.3	1.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.8	11.7	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.70	9.71	9.72	9.83	9.23	
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	5.90	5.72	5.75	5.61	5.50	
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	2.05	2.10	1.63	1.68	1.90	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.306	1.86	0.166	0.167	0.315	
calcium, TCLP	7440-70-2	E444	10	mg/L	1820	1770	1620	1620	1690	
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	0.820	0.411	1.83	0.686	1.39	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.43	0.854	0.889	1.54	1.42	
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	0.30	0.82	0.80	<0.25	0.72	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	143	130	127	120	126	
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	0.52	0.54	1.21	0.62	0.68	
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: Solid (Matrix: Soil/Solid)					Client sample ID	BA2034-A-6	BA2034-A-7	BA2034-A-8	BA2034-A-9	BA2034-A-10
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00	19-Aug-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-006	VA20B3589-007	VA20B3589-008	VA20B3589-009	VA20B3589-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	41.5	55.0	125	43.8	46.9	

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



Analytical Results

Sub-Matrix: Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2034-A-11	BA2034-A-12	----	----	----
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-011	VA20B3589-012	-----	-----	-----
					Result	Result	---	---	---
Physical Tests									
moisture	----	E144	0.25	%	15.9	13.3	----	----	----
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.0	----	----	----
Metals									
aluminum	7429-90-5	E440	50	mg/kg	37000	34800	----	----	----
antimony	7440-36-0	E440	0.10	mg/kg	65.0	68.9	----	----	----
arsenic	7440-38-2	E440	0.10	mg/kg	22.4	27.9	----	----	----
barium	7440-39-3	E440	0.50	mg/kg	578	780	----	----	----
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.40	----	----	----
bismuth	7440-69-9	E440	0.20	mg/kg	3.64	3.59	----	----	----
boron	7440-42-8	E440	5.0	mg/kg	159	202	----	----	----
cadmium	7440-43-9	E440	0.020	mg/kg	6.78	7.85	----	----	----
calcium	7440-70-2	E440	50	mg/kg	102000	109000	----	----	----
chromium	7440-47-3	E440	0.50	mg/kg	146	127	----	----	----
cobalt	7440-48-4	E440	0.10	mg/kg	163	16.6	----	----	----
copper	7440-50-8	E440	0.50	mg/kg	3400	967	----	----	----
iron	7439-89-6	E440	50	mg/kg	55300	42400	----	----	----
lead	7439-92-1	E440	0.50	mg/kg	399	237	----	----	----
lithium	7439-93-2	E440	2.0	mg/kg	15.7	15.6	----	----	----
magnesium	7439-95-4	E440	20	mg/kg	10400	10800	----	----	----
manganese	7439-96-5	E440	1.0	mg/kg	732	530	----	----	----
mercury	7439-97-6	E510	0.0500	mg/kg	0.0981	0.0961	----	----	----
molybdenum	7439-98-7	E440	0.10	mg/kg	24.7	38.3	----	----	----
nickel	7440-02-0	E440	0.50	mg/kg	2280	85.1	----	----	----
phosphorus	7723-14-0	E440	50	mg/kg	7940	10000	----	----	----
potassium	7440-09-7	E440	100	mg/kg	3940	3800	----	----	----
selenium	7782-49-2	E440	0.20	mg/kg	0.24	0.23	----	----	----
silver	7440-22-4	E440	0.10	mg/kg	3.44	2.02	----	----	----
sodium	7440-23-5	E440	50	mg/kg	12100	11900	----	----	----
strontium	7440-24-6	E440	0.50	mg/kg	254	264	----	----	----
sulfur	7704-34-9	E440	1000	mg/kg	7600	7400	----	----	----
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.063	----	----	----



Analytical Results

Sub-Matrix: Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2034-A-11	BA2034-A-12	----	----	----
Client sampling date / time					19-Aug-2020 09:00	19-Aug-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B3589-011	VA20B3589-012	-----	-----	-----
					Result	Result	---	---	---
Metals									
tin	7440-31-5	E440	2.0	mg/kg	65.3	56.0	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	764	1070	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	3.66	4.05	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	3.73	4.36	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	39.9	42.1	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	3100	2480	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	1.3	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.76	9.70	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	5.62	5.47	----	----	----
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	1.72	2.12	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.164	0.174	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	1650	1680	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.556	0.334	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.33	1.22	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L	12.1	20.0	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	5.58	0.48	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	131	120	----	----	----
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.55	1.75	----	----	----
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: Solid					<i>Client sample ID</i>		BA2034-A-11	BA2034-A-12	----	----	----
(Matrix: Soil/Solid)					<i>Client sampling date / time</i>		19-Aug-2020 09:00	19-Aug-2020 09:00	---	---	---
<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	VA20B3589-011	VA20B3589-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	101	53.6	----	----	----	----	----

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B3589	Page	: 1 of 17
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	: PO#46693 Weekly Bottom Ash-Suite	Date Samples Received	: 25-Aug-2020 11:20
PO	: VANCO 0000049378	Issue Date	: 03-Sep-2020 16:24
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 16		
No. of samples analysed	: 16		

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	Anonymous	Anonymous	manganese	7439-96-5	E440	39.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

Where only the sample date without time is provided on the chain of custody, the sampling date at 15:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-1	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-10	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-11	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-12	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-2	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-3	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-Sep-2020	15 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-4	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✓	01-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		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-5	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✔	01-Sep-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-6	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✔	01-Sep-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-7	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✔	01-Sep-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-8	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✔	01-Sep-2020	15 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2034-A-9	E510	19-Aug-2020	31-Aug-2020	28 days	12 days	✔	01-Sep-2020	15 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2034-A-1	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2034-A-10	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2034-A-11	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2034-A-12	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-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 ICPCS											
LDPE bag BA2034-A-2	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-3	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-4	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-5	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-6	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-7	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-8	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2034-A-9	E440	19-Aug-2020	31-Aug-2020	180 days	12 days	✔	01-Sep-2020	167 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2034-A-1	E144	19-Aug-2020	----	----	----		31-Aug-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 BA2034-A-10	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-11	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-12	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-2	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-3	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-4	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-5	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-6	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2034-A-7	E144	19-Aug-2020	----	----	----		31-Aug-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 BA2034-A-8	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2034-A-9	E144	19-Aug-2020	----	----	----		31-Aug-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-1	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-10	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-11	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-12	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-2	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-3	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-4	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-5	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-6	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-7	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-8	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2034-A-9	E108	19-Aug-2020	31-Aug-2020	30 days	12 days	✔	01-Sep-2020	17 days	1 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-1	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-10	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-11	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-12	E512	28-Aug-2020	----	----	----		01-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) BA2034-A-2	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-3	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-4	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-5	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-6	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-7	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-8	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2034-A-9	E512	28-Aug-2020	----	----	----		01-Sep-2020	0 days	0 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2034-A-1	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 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) BA2034-A-10	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-11	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-12	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-2	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-3	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-4	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-5	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-6	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-7	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 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) BA2034-A-8	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-9	E444	28-Aug-2020	----	----	----		01-Sep-2020	189 days	13 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-7 REP 1	E444	02-Sep-2020	----	----	----		03-Sep-2020	193 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-7 REP 2	E444	02-Sep-2020	----	----	----		03-Sep-2020	193 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-7 REP 3	E444	02-Sep-2020	----	----	----		03-Sep-2020	193 days	14 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2034-A-7 REP 4	E444	02-Sep-2020	----	----	----		03-Sep-2020	193 days	14 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-1	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-10	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-11	EPP444	19-Aug-2020	28-Aug-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) BA2034-A-12	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-2	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-3	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-4	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-5	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-6	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-7	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-7 REP 1	EPP444	19-Aug-2020	02-Sep-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-7 REP 2	EPP444	19-Aug-2020	02-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: 180 Day HT (e.g. metals ex. Hg) BA2034-A-7 REP 3	EPP444	19-Aug-2020	02-Sep-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-7 REP 4	EPP444	19-Aug-2020	02-Sep-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-8	EPP444	19-Aug-2020	28-Aug-2020	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2034-A-9	EPP444	19-Aug-2020	28-Aug-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	79337	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	79338	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	79340	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	79339	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	79337	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	79338	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	79340	1	20	5.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	79339	1	20	5.0	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	79752	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	79337	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	81018	2	16	12.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	79338	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	79340	1	20	5.0	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	79752	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	81018	2	16	12.5	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	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.

Page : 17 of 17
Work Order : VA20B3589
Client : Covanta Burnaby Renewable Energy, ULC
Project : PO#46693 Weekly Bottom Ash-Suite



<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	: VA20B3589	Page	: 1 of 13
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	: PO#46693 Weekly Bottom Ash-Suite	Date Samples Received	: 25-Aug-2020 11:20
PO	: VANCO 0000049378	Date Analysis Commenced	: 28-Aug-2020
C-O-C number	: ----	Issue Date	: 03-Sep-2020 16:24
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 16		
No. of samples analysed	: 16		

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
Ian Cronshaw	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Shaneel Dayal	Analyst	Metals, Burnaby, British Columbia

Page : 2 of 13
Work Order : VA20B3589
Client : Covanta Burnaby Renewable Energy, ULC
Project : PO#46693 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: 79339)											
VA20B3572-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.05	6.10	0.823%	5%	----
Physical Tests (QC Lot: 79340)											
VA20B3572-001	Anonymous	moisture	----	E144	0.25	%	7.34	7.16	2.61%	20%	----
Metals (QC Lot: 79337)											
VA20B3572-001	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 79338)											
VA20B3572-001	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	17800	17300	2.77%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.28	0.27	0.01	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	3.99	4.17	4.39%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	200	211	5.77%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.67	0.68	0.602%	30%	----
		bismuth	7440-69-9	E440	0.20	mg/kg	0.21	0.22	0.002	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	8.2	7.5	0.7	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.171	0.175	2.27%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	2350	2510	6.63%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	15.6	15.1	3.47%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	6.83	6.98	2.19%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	9.08	9.02	0.617%	30%	----
		iron	7439-89-6	E440	50	mg/kg	22400	24300	8.31%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	12.2	13.2	7.92%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	22.7	23.3	2.96%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	3000	3180	5.82%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	368	549	39.6%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.70	0.73	4.62%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	17.3	17.6	1.98%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	853	922	7.72%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	2780	2600	6.68%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	0.20	0.004	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	58	53	5	Diff <2x LOR	----
		strontium	7440-24-6	E440	0.50	mg/kg	16.9	15.8	6.76%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 79338) - continued											
VA20B3572-001	Anonymous	thallium	7440-28-0	E440	0.050	mg/kg	0.117	0.106	0.011	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	84.3	84.2	0.0854%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	0.245	0.280	0.035	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.20	mg/kg	32.8	32.2	2.00%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	76.4	74.9	2.05%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	<1.0	0	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: 79340)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 79337)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 79338)						
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: 79338) - 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: 79751)						
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: 79752)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 81018)						
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	---



Sub-Matrix: **Soil/Solid**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
TCLP Metals (QCLot: 81018) - continued						
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Physical Tests (QCLot: 79339)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	101	95.0	105	---
Physical Tests (QCLot: 79340)									
moisture	---	E144	0.25	%	50 %	95.9	90.0	110	---
Metals (QCLot: 79337)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	91.6	80.0	120	---
Metals (QCLot: 79338)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	112	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.4	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.8	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	98.6	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	104	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	104	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.8	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	104	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	105	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	109	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	99.4	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	101	80.0	120	---



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 79338) - 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	95.2	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	101	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	99.5	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	107	80.0	120	----



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: 79751)										
VA20B3589-001	BA2034-A-1	antimony, TCLP	7440-36-0	E444	4.9 mg/L	5 mg/L	98.6	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.1	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.0 mg/L	12.5 mg/L	96.4	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.226 mg/L	0.25 mg/L	90.4	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.44 mg/L	10 mg/L	84.4	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.223 mg/L	0.25 mg/L	89.3	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.18 mg/L	1.25 mg/L	94.3	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	2.21 mg/L	2.5 mg/L	88.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	230 mg/L	250 mg/L	92.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.74 mg/L	10 mg/L	97.4	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	244 mg/L	250 mg/L	97.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.34 mg/L	2.5 mg/L	93.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.82 mg/L	5 mg/L	96.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.111 mg/L	0.1 mg/L	111	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	88.9	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.72 mg/L	0.75 mg/L	95.5	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 79752)										
VA20B3589-001	BA2034-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	89.2	50.0	140	----
TCLP Metals (QCLot: 81018)										
VA20B3589-013	BA2034-A-7 REP 1	antimony, TCLP	7440-36-0	E444	4.7 mg/L	5 mg/L	93.5	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.3 mg/L	12.5 mg/L	106	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.228 mg/L	0.25 mg/L	91.1	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	1.18 mg/L	1.25 mg/L	94.7	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----



Sub-Matrix: **Soil/Solid**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
TCLP Metals (QCLot: 81018) - continued										
VA20B3589-013	BA2034-A-7 REP 1	copper, TCLP	7440-50-8	E444	2.38 mg/L	2.5 mg/L	95.4	50.0	140	----
		iron, TCLP	7439-89-6	E444	226 mg/L	250 mg/L	90.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.80 mg/L	10 mg/L	98.0	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	270 mg/L	250 mg/L	108	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.39 mg/L	2.5 mg/L	95.5	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.71 mg/L	5 mg/L	94.3	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.113 mg/L	0.1 mg/L	113	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	91.9	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	102	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: 79337)									
QC-79337-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	90.2	70.0	130	----
Metals (QCLot: 79338)									
QC-79338-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
QC-79338-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	108	70.0	130	----
QC-79338-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	101	70.0	130	----
QC-79338-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	111	70.0	130	----
QC-79338-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	120	40.0	160	----
QC-79338-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	112	70.0	130	----
QC-79338-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	104	70.0	130	----
QC-79338-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	104	70.0	130	----
QC-79338-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	108	70.0	130	----
QC-79338-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	103	70.0	130	----
QC-79338-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	110	70.0	130	----
QC-79338-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	112	70.0	130	----
QC-79338-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
QC-79338-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	111	70.0	130	----
QC-79338-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	100.0	70.0	130	----
QC-79338-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	115	70.0	130	----
QC-79338-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
QC-79338-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	94.4	40.0	160	----
QC-79338-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	107	70.0	130	----
QC-79338-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	113	70.0	130	----
QC-79338-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	96.8	70.0	130	----
QC-79338-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----

Page : 13 of 13
 Work Order : VA20B3589
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : PO#46693 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: 79338) - continued									
QC-79338-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	102	70.0	130	----
QC-79338-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	114	70.0	130	----



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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		
	Burnaby BC	Email 2:	rjohnson4@covanta.com		
Phone:	604-521-1025	Email 3:	dskrypnyk@covanta.com		
	<input type="checkbox"/> Yes <input type="checkbox"/> No		brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
1	BA2034-A-1	19-Aug-20	9:00	Soil	X	X		X	1
2	BA2034-A-2	19-Aug-20	9:00	Soil	X	X		X	1
3	BA2034-A-3	19-Aug-20	9:00	Soil	X	X		X	1
4	BA2034-A-4	19-Aug-20	9:00	Soil	X	X		X	1
5	BA2034-A-5	19-Aug-20	9:00	Soil	X	X		X	1
6	BA2034-A-6	19-Aug-20	9:00	Soil	X	X		X	1
7	BA2034-A-7	19-Aug-20	9:00	Soil	X	X		X	1
8	BA2034-A-8	19-Aug-20	9:00	Soil	X	X		X	1
9	BA2034-A-9	19-Aug-20	9:00	Soil	X	X		X	1
10	BA2034-A-10	19-Aug-20	9:00	Soil	X	X		X	1
11	BA2034-A-11	19-Aug-20	9:00	Soil	X	X		X	1
12	BA2034-A-12	19-Aug-20	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA20B3589

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>	25-Aug-20	0800	cm	25/08/20	11:20am	21.6°C				Yes / No ? If Yes add SIF