

Bottom Ash Data

2020 Week 40

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on October 20, 2020. The data represents bottom ash composite results for week 40 of 2020 (September 27, 2020 to October 3, 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 : **VA20B7466**
Contact : **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 : 07-Oct-2020 11:35
Date Analysis Commenced : 14-Oct-2020
Issue Date : 20-Oct-2020 14:10

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>
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



General Comments

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

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

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

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

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

<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	BA2040-A-1	BA2040-A-2	BA2040-A-3	BA2040-A-4	BA2040-A-5
(Matrix: Soil/Solid)					Client sampling date / time	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-001	VA20B7466-002	VA20B7466-003	VA20B7466-004	VA20B7466-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	23.3	22.9	22.3	23.0	22.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.7	10.7	10.6	10.7	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	30100	53600	49600	29800	30900	
antimony	7440-36-0	E440	0.10	mg/kg	119	121	105	105	92.1	
arsenic	7440-38-2	E440	0.10	mg/kg	30.6	53.2	30.6	27.3	31.3	
barium	7440-39-3	E440	0.50	mg/kg	672	656	550	642	740	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.47	0.34	0.34	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	8.43	12.0	6.59	8.19	23.7	
boron	7440-42-8	E440	5.0	mg/kg	203	200	175	291	171	
cadmium	7440-43-9	E440	0.020	mg/kg	34.1	50.3	13.9	12.7	12.4	
calcium	7440-70-2	E440	50	mg/kg	122000	114000	118000	120000	118000	
chromium	7440-47-3	E440	0.50	mg/kg	190	153	129	505	326	
cobalt	7440-48-4	E440	0.10	mg/kg	30.2	37.7	23.7	20.4	44.8	
copper	7440-50-8	E440	0.50	mg/kg	1950	5340	2800	1740	2320	
iron	7439-89-6	E440	50	mg/kg	63400	60200	55900	63400	91000	
lead	7439-92-1	E440	0.50	mg/kg	457	1900	436	1800	393	
lithium	7439-93-2	E440	2.0	mg/kg	22.5	20.1	16.6	14.2	14.8	
magnesium	7439-95-4	E440	20	mg/kg	10400	10300	9940	8810	9130	
manganese	7439-96-5	E440	1.0	mg/kg	845	972	855	739	1340	
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	19.0	18.4	29.7	172	33.9	
nickel	7440-02-0	E440	0.50	mg/kg	185	278	244	1540	390	
phosphorus	7723-14-0	E440	50	mg/kg	10300	9870	9380	10400	9060	
potassium	7440-09-7	E440	100	mg/kg	5210	5390	4620	4770	4630	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.40	0.40	0.35	0.38	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	3.67	----	----	
silver	7440-22-4	E440	0.10	mg/kg	3.34	4.17	----	3.57	6.65	
sodium	7440-23-5	E440	50	mg/kg	13000	12600	11500	12700	11900	
strontium	7440-24-6	E440	0.50	mg/kg	335	267	271	282	283	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2040-A-1	BA2040-A-2	BA2040-A-3	BA2040-A-4	BA2040-A-5
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-001	VA20B7466-002	VA20B7466-003	VA20B7466-004	VA20B7466-005
					Result	Result	Result	Result	Result
Metals									
sulfur	7704-34-9	E440	1000	mg/kg	11400	10200	11300	10500	10000
thallium	7440-28-0	E440	0.050	mg/kg	0.063	0.087	0.068	0.069	0.061
tin	7440-31-5	E440	2.0	mg/kg	99.0	102	94.8	106	86.9
titanium	7440-32-6	E440	1.0	mg/kg	1170	2040	1450	892	848
tungsten	7440-33-7	E440	0.50	mg/kg	8.44	8.54	34.1	25.3	8.35
uranium	7440-61-1	E440	0.050	mg/kg	4.66	4.60	4.58	4.35	4.63
vanadium	7440-62-2	E440	0.20	mg/kg	53.1	54.2	51.7	47.2	52.1
zinc	7440-66-6	E440	2.0	mg/kg	9120	5490	4430	8210	3520
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	6.8	6.5	1.3	1.1
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.3	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.46	8.52	9.03	8.88	7.56
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444	0.010	pH units	5.75	5.89	5.99	5.61	5.57
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.94	2.12	1.89	2.07	2.01
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.279	0.249	0.303	0.266	0.282
calcium, TCLP	7440-70-2	E444	10	mg/L	1890	1890	1950	1980	1910
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	0.900	1.08	0.485	1.21	1.05
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.84	1.72	1.33	1.93	2.46
iron, TCLP	7439-89-6	E444	5.0	mg/L	6.2	<5.0	<5.0	12.4	10.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	1.20	0.66	<0.25	0.28	1.10
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	130	121	125	134	132
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.75	0.57	0.50	0.56	0.57
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2040-A-1	BA2040-A-2	BA2040-A-3	BA2040-A-4	BA2040-A-5
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-001	VA20B7466-002	VA20B7466-003	VA20B7466-004	VA20B7466-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	66.9	78.0	85.9	94.9	90.8	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2040-A-6	BA2040-A-7	BA2040-A-8	BA2040-A-9	BA2040-A-10
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-006	VA20B7466-007	VA20B7466-008	VA20B7466-009	VA20B7466-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	22.9	22.0	23.7	22.1	22.4
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	10.8	10.8	10.8
Metals									
aluminum	7429-90-5	E440	50	mg/kg	32800	35600	30300	37100	35600
antimony	7440-36-0	E440	0.10	mg/kg	102	115	101	90.7	130
arsenic	7440-38-2	E440	0.10	mg/kg	27.0	26.3	29.7	34.6	26.1
barium	7440-39-3	E440	0.50	mg/kg	700	801	652	680	670
beryllium	7440-41-7	E440	0.10	mg/kg	0.34	0.36	0.33	0.32	0.34
bismuth	7440-69-9	E440	0.20	mg/kg	7.94	8.32	7.60	7.56	7.62
boron	7440-42-8	E440	5.0	mg/kg	161	187	158	146	203
cadmium	7440-43-9	E440	0.020	mg/kg	16.3	13.4	13.2	11.8	12.2
calcium	7440-70-2	E440	50	mg/kg	118000	126000	123000	110000	114000
chromium	7440-47-3	E440	0.50	mg/kg	166	149	221	163	1030
cobalt	7440-48-4	E440	0.10	mg/kg	22.0	20.0	79.4	72.4	48.9
copper	7440-50-8	E440	0.50	mg/kg	4240	2230	5170	31800	35000
iron	7439-89-6	E440	50	mg/kg	83600	75100	70900	65700	72800
lead	7439-92-1	E440	0.50	mg/kg	648	558	376	793	339
lithium	7439-93-2	E440	2.0	mg/kg	15.6	17.8	15.5	13.9	15.4
magnesium	7439-95-4	E440	20	mg/kg	12100	11000	10800	9670	9620
manganese	7439-96-5	E440	1.0	mg/kg	826	990	1270	808	858
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	22.8	20.2	21.4	16.4	19.0
nickel	7440-02-0	E440	0.50	mg/kg	143	162	205	186	1210
phosphorus	7723-14-0	E440	50	mg/kg	8490	10700	11300	9390	8480
potassium	7440-09-7	E440	100	mg/kg	4600	5230	5200	4760	4590
selenium	7782-49-2	E440	0.20	mg/kg	0.28	0.36	0.40	0.32	0.35
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	----	----	3.38
silver	7440-22-4	E440	0.10	mg/kg	3.27	3.58	3.27	4.55	----
sodium	7440-23-5	E440	50	mg/kg	11600	13200	13300	11900	11800
strontium	7440-24-6	E440	0.50	mg/kg	267	286	270	257	247
sulfur	7704-34-9	E440	1000	mg/kg	10900	10200	11000	9900	9800



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2040-A-6	BA2040-A-7	BA2040-A-8	BA2040-A-9	BA2040-A-10
(Matrix: Soil/Solid)										
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-006	VA20B7466-007	VA20B7466-008	VA20B7466-009	VA20B7466-010	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.061	0.062	0.073	0.071	
tin	7440-31-5	E440	2.0	mg/kg	104	90.6	116	214	94.1	
titanium	7440-32-6	E440	1.0	mg/kg	1150	846	672	1420	1830	
tungsten	7440-33-7	E440	0.50	mg/kg	15.5	7.28	7.08	23.1	9.35	
uranium	7440-61-1	E440	0.050	mg/kg	4.71	4.75	4.78	4.48	4.21	
vanadium	7440-62-2	E440	0.20	mg/kg	49.6	53.6	111	48.2	48.9	
zinc	7440-66-6	E440	2.0	mg/kg	3760	4440	4730	15300	10100	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.0	<1.0	1.4	3.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.3	11.4	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	7.92	8.74	8.66	8.75	8.57	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93	
pH, TCLP final	----	EPP444	0.010	pH units	5.76	5.89	5.80	5.84	5.78	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.20	2.17	2.27	2.15	2.08	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.369	0.304	0.290	0.268	0.305	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2200	2160	2180	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	0.952	0.799	1.01	1.33	0.646	
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.04	1.27	2.29	1.75	1.81	
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	1.06	<0.25	0.58	0.26	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	140	140	139	154	134	
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	0.72	0.58	0.68	0.65	0.74	
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	BA2040-A-6	BA2040-A-7	BA2040-A-8	BA2040-A-9	BA2040-A-10
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00	30-Sep-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-006	VA20B7466-007	VA20B7466-008	VA20B7466-009	VA20B7466-010	
					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	120	120	90.0	63.2	81.3	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2040-A-11	BA2040-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	30-Sep-2020 09:00	30-Sep-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-011	VA20B7466-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	22.6	22.0	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	28200	35000	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	128	102	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	27.5	27.4	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	398	662	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	23.7	8.06	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	149	248	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	34.8	15.2	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	111000	118000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	161	260	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	38.2	267	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	18000	1810	----	----	----	
iron	7439-89-6	E440	50	mg/kg	77300	102000	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	399	396	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	18.1	30.0	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10800	11000	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1020	959	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	19.4	17.4	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	162	261	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	7620	9690	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4540	5280	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.32	----	----	----	
silver	7440-22-4	E440.Ag	0.10	mg/kg	7.31	----	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	----	2.69	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	11400	13500	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	288	262	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	9600	10600	----	----	----	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2040-A-11	BA2040-A-12	----	----	----
(Matrix: Soil/Solid)										
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-011	VA20B7466-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.060	0.066	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	89.7	96.6	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	652	1180	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	4.47	6.87	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	4.11	4.66	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	48.9	48.2	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	4340	7340	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	1.0	1.4	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.66	8.85	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	6.11	5.92	----	----	----	
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	2.15	2.03	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.252	0.537	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	1960	2110	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.41	1.35	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.43	1.57	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	1.26	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	133	129	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.59	0.64	----	----	----	
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	----	----	----	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2040-A-11	BA2040-A-12	----	----	----
Client sampling date / time					30-Sep-2020 09:00	30-Sep-2020 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA20B7466-011	VA20B7466-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	55.4	63.5	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B7466	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	: 07-Oct-2020 11:35
PO	: VANCO 0000049378	Issue Date	: 20-Oct-2020 14:10
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	VA20B7466-001	BA2040-A-1	lead	7439-92-1	E440	86.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B7466-001	BA2040-A-1	zinc	7440-66-6	E440	44.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-10	E440.Ag	30-Sep-2020	16-Oct-2020	180 days	16 days	✓	17-Oct-2020	163 days	0 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-11	E440.Ag	30-Sep-2020	16-Oct-2020	180 days	16 days	✓	17-Oct-2020	163 days	0 days	✓	
Metals : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-3	E440.Ag	30-Sep-2020	16-Oct-2020	180 days	16 days	✓	17-Oct-2020	163 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-1	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✓	15-Oct-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-10	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✓	15-Oct-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-11	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✓	15-Oct-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-12	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✓	15-Oct-2020	13 days	0 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-2	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-3	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-4	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-5	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-6	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-7	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-8	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2040-A-9	E510	30-Sep-2020	15-Oct-2020	28 days	14 days	✔	15-Oct-2020	13 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-1	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-10	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-11	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-12	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-2	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-3	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-4	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-5	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-6	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2040-A-7	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-8	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2040-A-9	E440	30-Sep-2020	15-Oct-2020	180 days	14 days	✔	15-Oct-2020	165 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-1	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-10	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-11	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-12	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-2	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-3	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-4	E144	30-Sep-2020	----	----	----		14-Oct-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 BA2040-A-5	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-6	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-7	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-8	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2040-A-9	E144	30-Sep-2020	----	----	----		14-Oct-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-1	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-10	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-11	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-12	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-2	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-3	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-4	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-5	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-6	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-7	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-8	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2040-A-9	E108	30-Sep-2020	15-Oct-2020	30 days	14 days	✔	15-Oct-2020	15 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-1	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 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) BA2040-A-10	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-11	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-12	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-2	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-3	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-4	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-5	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-6	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-7	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 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) BA2040-A-8	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2040-A-9	E512	15-Oct-2020	----	----	----		19-Oct-2020	43 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-1	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-10	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-11	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-12	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-2	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-3	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2040-A-4	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 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) BA2040-A-5	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2040-A-6	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2040-A-7	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2040-A-8	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2040-A-9	E444	15-Oct-2020	----	----	----		19-Oct-2020	195 days	19 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-1	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-10	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-11	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-12	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-2	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-3	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-4	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-5	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-6	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-7	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-8	EPP444	30-Sep-2020	15-Oct-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2040-A-9	EPP444	30-Sep-2020	15-Oct-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	102401	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	102402	2	12	16.6	5.0	✔
Moisture Content by Gravimetry	E144	102404	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	102403	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	104017	1	3	33.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	102401	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	102402	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	102404	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	102403	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	104017	1	3	33.3	5.0	✔
Mercury by CVAAS (TCLP)	E512	104591	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	102401	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	104590	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	102402	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	102404	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	104591	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	104590	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60°C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: VA20B7466	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Oct-2020 11:35
PO	: VANCO 0000049378	Date Analysis Commenced	: 14-Oct-2020
C-O-C number	: ----	Issue Date	: 20-Oct-2020 14:10
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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

This Quality Control Report contains the following information:

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Cristina Alexandre	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Ophelia Chiu	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

Page : 2 of 11
Work Order : VA20B7466
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: 102403)											
VA20B7466-001	BA2040-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.7	10.6	0.844%	5%	----
Physical Tests (QC Lot: 102404)											
VA20B7466-001	BA2040-A-1	moisture	----	E144	0.25	%	23.3	22.4	3.76%	20%	----
Metals (QC Lot: 102401)											
VA20B7466-001	BA2040-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 102402)											
VA20B7466-001	BA2040-A-1	lead	7439-92-1	E440	0.50	mg/kg	457	1150	86.2%	40%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	10400	10300	1.35%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	3.34	3.46	3.66%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	8.44	8.40	0.460%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	9120	5770	44.9%	30%	DUP-H
VA20B7466-001	BA2040-A-1	aluminum	7429-90-5	E440	50	mg/kg	30100	27400	9.17%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	119	103	15.1%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	30.6	27.0	12.6%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	672	797	17.0%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	8.43	6.87	20.4%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	203	192	5.52%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	122000	128000	4.43%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	190	169	11.5%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	30.2	25.5	17.0%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	1950	2030	4.08%	30%	----
		iron	7439-89-6	E440	50	mg/kg	63400	83900	27.8%	30%	----
		lithium	7439-93-2	E440	2.0	mg/kg	22.5	22.9	1.70%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	845	957	12.4%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	19.0	16.1	16.2%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	185	161	13.9%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10300	10800	5.03%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5210	4960	4.92%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.34	0.007	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	13000	12300	5.37%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	335	362	7.79%	40%	----



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: 102402) - continued											
VA20B7466-001	BA2040-A-1	sulfur	7704-34-9	E440	1000	mg/kg	11400	10600	6.79%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.063	0.062	0.0007	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	99.0	89.1	10.6%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	1170	1050	11.4%	40%	----
		uranium	7440-61-1	E440	0.050	mg/kg	4.66	4.63	0.666%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	53.1	48.4	9.14%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.1	0.03	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: 102404)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 102401)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 102402)						
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: 102402) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
Metals (QCLot: 104017)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 104590)						
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: 104591)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 102403)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
Physical Tests (QCLot: 102404)									
moisture	----	E144	0.25	%	50 %	98.4	90.0	110	----
Metals (QCLot: 102401)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	80.0	120	----
Metals (QCLot: 102402)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	99.0	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	100	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.4	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	94.8	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	92.9	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	101	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	97.3	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	95.2	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.6	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	97.5	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.3	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	95.1	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	85.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	101	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.6	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	97.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	109	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	100	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	95.3	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	98.6	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.8	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	104	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	96.2	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: 102402) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	89.8	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.2	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	101	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	101	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	96.2	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	100	80.0	120	----
Metals (QCLot: 104017)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	101	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: 104590)										
VA20B7466-001	BA2040-A-1	antimony, TCLP	7440-36-0	E444	4.8 mg/L	5 mg/L	96.0	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.6 mg/L	5 mg/L	92.2	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.1 mg/L	12.5 mg/L	104	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.224 mg/L	0.25 mg/L	89.7	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.90 mg/L	10 mg/L	89.0	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	94.6	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.14 mg/L	2.5 mg/L	85.8	50.0	140	----
		iron, TCLP	7439-89-6	E444	228 mg/L	250 mg/L	91.1	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.4	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.30 mg/L	2.5 mg/L	92.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.54 mg/L	5 mg/L	90.7	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	4.9 mg/L	5 mg/L	97.7	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.8	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 104591)										
VA20B7466-001	BA2040-A-1	mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.7	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: 102401)									
QC-102401-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----
Metals (QCLot: 102402)									
QC-102402-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	106	70.0	130	----
QC-102402-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	113	70.0	130	----
QC-102402-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
QC-102402-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	111	70.0	130	----
QC-102402-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	95.3	70.0	130	----
QC-102402-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	110	40.0	160	----
QC-102402-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-102402-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-102402-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	108	70.0	130	----
QC-102402-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
QC-102402-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	100	70.0	130	----
QC-102402-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
QC-102402-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	99.9	70.0	130	----
QC-102402-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	93.0	70.0	130	----
QC-102402-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	105	70.0	130	----
QC-102402-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
QC-102402-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
QC-102402-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	105	70.0	130	----
QC-102402-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	106	70.0	130	----
QC-102402-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
QC-102402-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	102	70.0	130	----
QC-102402-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	99.7	70.0	130	----
QC-102402-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	94.7	40.0	160	----
QC-102402-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
QC-102402-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	110	70.0	130	----
QC-102402-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	111	70.0	130	----
QC-102402-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	108	70.0	130	----

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 Work Order : VA20B7466
 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: 102402) - continued									
QC-102402-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	100	70.0	130	----
QC-102402-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	104	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

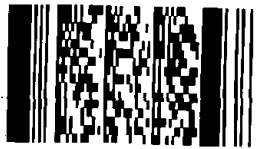
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COC # _____

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 Skrypnik	<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:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
				Analysis Request	

Invoice To Same as Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		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:		Fax:			

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+FUL-VA (all metals)	
	BA2040-A-1	Environmental Division Vancouver Work Order Reference VA20B7466  Telephone : +1 604 253 4188	30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-2		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-3		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-4		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-5		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-6		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-7		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-8		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-9		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-10		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-11		30-Sep-20	9:00	Soil	X	X		X	1
	BA2040-A-12		30-Sep-20	9:00	Soil	X	X		X	1

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			Observations: Yes / No ? If Yes add SIF
Released by:	Date (dd-mmm-yy):	Time (hh-mm):	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	
<i>[Signature]</i>	7-Oct-20	0900	<i>em</i>	OCT 07 2020	11:35 am	9.4 °C			