

Bottom Ash Data

2020 Week 47

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on December 3, 2020. The data represents bottom ash composite results for week 47 of 2020 (November 15, 2020 to November 21, 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 : **VA20C1550**
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 : 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 : 24-Nov-2020 10:10
Date Analysis Commenced : 26-Nov-2020
Issue Date : 02-Dec-2020 15:33

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

Signatories

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brieanna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Kinny Wu	Lab Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Organics, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2047-A-1	BA2047-A-2	BA2047-A-3	BA2047-A-4	BA2047-A-5
(Matrix: Soil/Solid)					Client sampling date / time	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-001	VA20C1550-002	VA20C1550-003	VA20C1550-004	VA20C1550-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	23.4	23.6	22.3	22.9	21.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.5	11.6	11.6	11.6	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37000	29900	36400	33600	32800	
antimony	7440-36-0	E440	0.10	mg/kg	140	125	112	147	137	
arsenic	7440-38-2	E440	0.10	mg/kg	27.3	28.1	20.6	23.6	29.4	
barium	7440-39-3	E440	0.50	mg/kg	501	570	568	515	396	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.40	0.43	0.38	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	13.7	14.6	10.2	11.2	13.1	
boron	7440-42-8	E440	5.0	mg/kg	197	232	165	244	194	
cadmium	7440-43-9	E440	0.020	mg/kg	18.1	10.6	10.2	15.7	13.0	
calcium	7440-70-2	E440	50	mg/kg	146000	126000	137000	132000	145000	
chromium	7440-47-3	E440	0.50	mg/kg	146	155	145	452	155	
cobalt	7440-48-4	E440	0.10	mg/kg	100	94.0	23.8	82.8	25.2	
copper	7440-50-8	E440	0.50	mg/kg	1610	6440	1700	2780	2250	
iron	7439-89-6	E440	50	mg/kg	47400	43600	51800	57400	44700	
lead	7439-92-1	E440	0.50	mg/kg	498	553	331	680	1250	
lithium	7439-93-2	E440	2.0	mg/kg	23.9	20.8	19.8	22.0	18.0	
magnesium	7439-95-4	E440	20	mg/kg	12000	10700	12600	12100	12200	
manganese	7439-96-5	E440	1.0	mg/kg	708	660	5910	856	752	
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	18.0	17.2	15.2	60.7	20.3	
nickel	7440-02-0	E440	0.50	mg/kg	104	173	160	293	113	
phosphorus	7723-14-0	E440	50	mg/kg	11800	11400	9370	10200	13000	
potassium	7440-09-7	E440	100	mg/kg	4770	4500	4700	4480	4820	
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.38	0.31	0.38	0.38	
silver	7440-22-4	E440	0.10	mg/kg	8.33	9.10	5.16	11.3	9.41	
sodium	7440-23-5	E440	50	mg/kg	13500	13600	13400	13500	13500	
strontium	7440-24-6	E440	0.50	mg/kg	327	384	559	294	325	
sulfur	7704-34-9	E440	1000	mg/kg	15000	11800	12000	11600	14500	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2047-A-1	BA2047-A-2	BA2047-A-3	BA2047-A-4	BA2047-A-5
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-001	VA20C1550-002	VA20C1550-003	VA20C1550-004	VA20C1550-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	160	347	169	263	134	
titanium	7440-32-6	E440	1.0	mg/kg	515	504	649	458	278	
tungsten	7440-33-7	E440	0.50	mg/kg	53.4	19.0	11.0	12.1	14.5	
uranium	7440-61-1	E440	0.050	mg/kg	4.02	3.50	3.50	3.50	3.86	
vanadium	7440-62-2	E440	0.20	mg/kg	35.7	36.2	35.5	36.8	34.2	
zinc	7440-66-6	E440	2.0	mg/kg	3990	5820	2980	3380	3820	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.1	1.5	1.6	1.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.0	11.9	11.9	11.9	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.27	9.96	8.27	8.83	9.18	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.35	6.25	5.93	5.91	6.25	
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	2.19	2.04	1.85	1.94	1.95	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.488	0.483	0.171	0.182	0.387	
calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2020	1970	1970	1960	
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	0.673	1.18	0.751	1.08	0.737	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.926	0.968	1.50	0.981	0.691	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	0.72	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	132	142	138	138	138	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.36	0.51	0.53	0.46	0.56	
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	BA2047-A-1	BA2047-A-2	BA2047-A-3	BA2047-A-4	BA2047-A-5
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-001	VA20C1550-002	VA20C1550-003	VA20C1550-004	VA20C1550-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	44.6	46.7	55.3	51.3	39.4	

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)					BA2047-A-6	BA2047-A-7	BA2047-A-8	BA2047-A-9	BA2047-A-10
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-006	VA20C1550-007	VA20C1550-008	VA20C1550-009	VA20C1550-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	22.8	23.3	24.1	23.6	22.1
pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.6	11.7	11.8	11.6
Metals									
aluminum	7429-90-5	E440	50	mg/kg	34000	44800	34000	31500	33500
antimony	7440-36-0	E440	0.10	mg/kg	144	123	124	132	123
arsenic	7440-38-2	E440	0.10	mg/kg	28.2	23.1	25.4	26.2	24.7
barium	7440-39-3	E440	0.50	mg/kg	421	550	558	484	473
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.40	0.38	0.35	0.36
bismuth	7440-69-9	E440	0.20	mg/kg	14.1	13.5	13.6	14.7	13.0
boron	7440-42-8	E440	5.0	mg/kg	203	236	182	170	174
cadmium	7440-43-9	E440	0.020	mg/kg	13.1	9.99	35.8	36.7	51.7
calcium	7440-70-2	E440	50	mg/kg	146000	139000	140000	138000	134000
chromium	7440-47-3	E440	0.50	mg/kg	170	157	168	147	150
cobalt	7440-48-4	E440	0.10	mg/kg	46.6	113	41.5	72.9	53.7
copper	7440-50-8	E440	0.50	mg/kg	2200	3160	3200	2200	1520
iron	7439-89-6	E440	50	mg/kg	44700	50300	56800	53400	67200
lead	7439-92-1	E440	0.50	mg/kg	516	532	469	549	537
lithium	7439-93-2	E440	2.0	mg/kg	31.1	33.9	20.4	18.0	18.2
magnesium	7439-95-4	E440	20	mg/kg	12100	10800	12200	11500	10800
manganese	7439-96-5	E440	1.0	mg/kg	1200	856	836	803	809
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	18.2	15.2	17.9	17.2	22.6
nickel	7440-02-0	E440	0.50	mg/kg	104	171	522	103	128
phosphorus	7723-14-0	E440	50	mg/kg	11800	11400	11100	12500	10100
potassium	7440-09-7	E440	100	mg/kg	4960	4710	4620	4830	4510
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.32	0.38	0.42	0.38
silver	7440-22-4	E440	0.10	mg/kg	9.71	6.87	5.86	6.15	5.25
sodium	7440-23-5	E440	50	mg/kg	13200	13300	14100	13200	13300
strontium	7440-24-6	E440	0.50	mg/kg	359	344	350	343	320
sulfur	7704-34-9	E440	1000	mg/kg	15700	12800	13100	15200	13200
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2047-A-6	BA2047-A-7	BA2047-A-8	BA2047-A-9	BA2047-A-10
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-006	VA20C1550-007	VA20C1550-008	VA20C1550-009	VA20C1550-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	264	126	133	178	573	
titanium	7440-32-6	E440	1.0	mg/kg	365	518	382	466	472	
tungsten	7440-33-7	E440	0.50	mg/kg	16.4	12.1	13.6	18.2	14.1	
uranium	7440-61-1	E440	0.050	mg/kg	3.99	3.46	3.59	3.86	3.52	
vanadium	7440-62-2	E440	0.20	mg/kg	39.5	36.8	36.3	34.6	33.4	
zinc	7440-66-6	E440	2.0	mg/kg	4940	4420	4750	4980	4910	
zirconium	7440-67-7	E440	1.0	mg/kg	1.8	2.0	1.4	1.2	1.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	12.0	12.0	11.9	11.9	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.98	8.86	8.50	8.09	8.07	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	5.89	5.87	5.81	6.06	6.04	
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	2.10	2.08	2.04	1.98	1.97	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.234	0.182	0.349	0.151	0.240	
calcium, TCLP	7440-70-2	E444	10	mg/L	2160	2150	2170	2020	2070	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.26	0.659	0.589	1.21	1.05	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.45	1.28	1.81	1.12	1.22	
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	2.60	0.30	0.49	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	154	156	152	142	147	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.58	0.67	0.62	0.73	0.69	
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2047-A-6	BA2047-A-7	BA2047-A-8	BA2047-A-9	BA2047-A-10
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00	18-Nov-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-006	VA20C1550-007	VA20C1550-008	VA20C1550-009	VA20C1550-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	54.4	51.0	60.5	43.7	75.5	

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2047-A-11	BA2047-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	18-Nov-2020 09:00	18-Nov-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-011	VA20C1550-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	---	E144	0.25	%	22.5	23.1	---	---	---	
pH (1:2 soil:water)	---	E108	0.10	pH units	11.9	11.6	---	---	---	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34400	31400	---	---	---	
antimony	7440-36-0	E440	0.10	mg/kg	118	124	---	---	---	
arsenic	7440-38-2	E440	0.10	mg/kg	30.7	36.0	---	---	---	
barium	7440-39-3	E440	0.50	mg/kg	542	415	---	---	---	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.36	---	---	---	
bismuth	7440-69-9	E440	0.20	mg/kg	13.5	11.4	---	---	---	
boron	7440-42-8	E440	5.0	mg/kg	210	189	---	---	---	
cadmium	7440-43-9	E440	0.020	mg/kg	10.0	10.5	---	---	---	
calcium	7440-70-2	E440	50	mg/kg	140000	126000	---	---	---	
chromium	7440-47-3	E440	0.50	mg/kg	137	124	---	---	---	
cobalt	7440-48-4	E440	0.10	mg/kg	46.3	37.4	---	---	---	
copper	7440-50-8	E440	0.50	mg/kg	3730	1150	---	---	---	
iron	7439-89-6	E440	50	mg/kg	38600	53800	---	---	---	
lead	7439-92-1	E440	0.50	mg/kg	372	393	---	---	---	
lithium	7439-93-2	E440	2.0	mg/kg	19.4	18.2	---	---	---	
magnesium	7439-95-4	E440	20	mg/kg	11300	10200	---	---	---	
manganese	7439-96-5	E440	1.0	mg/kg	988	748	---	---	---	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	---	---	---	
molybdenum	7439-98-7	E440	0.10	mg/kg	18.2	14.7	---	---	---	
nickel	7440-02-0	E440	0.50	mg/kg	126	156	---	---	---	
phosphorus	7723-14-0	E440	50	mg/kg	11400	11400	---	---	---	
potassium	7440-09-7	E440	100	mg/kg	4870	4490	---	---	---	
selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.35	---	---	---	
silver	7440-22-4	E440	0.10	mg/kg	4.94	4.93	---	---	---	
sodium	7440-23-5	E440	50	mg/kg	14700	12600	---	---	---	
strontium	7440-24-6	E440	0.50	mg/kg	360	303	---	---	---	
sulfur	7704-34-9	E440	1000	mg/kg	11900	11900	---	---	---	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2047-A-11	BA2047-A-12	----	----	----
Client sampling date / time					18-Nov-2020 09:00	18-Nov-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-011	VA20C1550-012	-----	-----	-----
					Result	Result	---	---	---
Metals									
tin	7440-31-5	E440	2.0	mg/kg	175	100	----	----	----
titanium	7440-32-6	E440	1.0	mg/kg	464	251	----	----	----
tungsten	7440-33-7	E440	0.50	mg/kg	10.6	9.89	----	----	----
uranium	7440-61-1	E440	0.050	mg/kg	3.71	3.37	----	----	----
vanadium	7440-62-2	E440	0.20	mg/kg	39.6	32.6	----	----	----
zinc	7440-66-6	E440	2.0	mg/kg	3830	2810	----	----	----
zirconium	7440-67-7	E440	1.0	mg/kg	1.4	2.4	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	12.0	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.17	8.97	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.17	6.05	----	----	----
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	2.04	2.08	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.350	0.178	----	----	----
calcium, TCLP	7440-70-2	E444	10	mg/L	2110	2140	----	----	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.667	0.672	----	----	----
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.785	1.15	----	----	----
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	144	154	----	----	----
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.52	0.55	----	----	----
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	----	----	----
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	----	----	----
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	----	----	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2047-A-11	BA2047-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	18-Nov-2020 09:00	18-Nov-2020 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA20C1550-011	VA20C1550-012	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	41.1	44.6	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20C1550	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	: PO#46693 Weekly Bottom Ash-Suite	Date Samples Received	: 24-Nov-2020 10:10
PO	: VANCO 0000049378	Issue Date	: 02-Dec-2020 15:33
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 Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Method Blank value outliers occur - please see following pages for full details.
- 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
Method Blank (MB) Values								
Metals	QC-MRG2-1226650 01	----	vanadium	7440-62-2	E440	0.23 ^B mg/kg	0.2 mg/kg	Blank result exceeds permitted value

Result Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.

Duplicate (DUP) RPDs								
Metals	VA20C1550-001	BA2047-A-1	beryllium	7440-41-7	E440	136 % ^{DUP-H}	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C1550-001	BA2047-A-1	cadmium	7440-43-9	E440	56.4 % ^{DUP-H}	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C1550-001	BA2047-A-1	cobalt	7440-48-4	E440	63.5 % ^{DUP-H}	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C1550-001	BA2047-A-1	nickel	7440-02-0	E440	101 % ^{DUP-H}	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20C1550-001	BA2047-A-1	tungsten	7440-33-7	E440	121 % ^{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 BA2047-A-1	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-10	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-11	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-12	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-2	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-3	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-4	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✓	27-Nov-2020	19 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 BA2047-A-5	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✔	27-Nov-2020	19 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-6	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✔	27-Nov-2020	19 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-7	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✔	27-Nov-2020	19 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-8	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✔	27-Nov-2020	19 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2047-A-9	E510	18-Nov-2020	27-Nov-2020	28 days	8 days	✔	27-Nov-2020	19 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2047-A-1	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2047-A-10	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2047-A-11	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2047-A-12	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-2	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-3	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-4	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-5	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-6	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-7	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-8	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2047-A-9	E440	18-Nov-2020	27-Nov-2020	180 days	8 days	✔	28-Nov-2020	171 days	1 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2047-A-1	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-10	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-11	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-12	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-2	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-3	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-4	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-5	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-6	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2047-A-7	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2047-A-8	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2047-A-9	E144	18-Nov-2020	----	----	----		26-Nov-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-1	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-10	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-11	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-12	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-2	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-3	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-4	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 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 BA2047-A-5	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-6	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-7	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-8	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2047-A-9	E108	18-Nov-2020	27-Nov-2020	30 days	8 days	✔	27-Nov-2020	21 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-1	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-10	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-11	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-12	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-2	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-3	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-4	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-5	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-6	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-7	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-8	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2047-A-9	E512	26-Nov-2020	----	----	----		27-Nov-2020	36 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-1	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-10	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-11	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-12	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-2	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-3	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-4	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-5	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-6	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2047-A-7	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2047-A-8	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2047-A-9	E444	26-Nov-2020	----	----	----		27-Nov-2020	188 days	9 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-1	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-10	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-11	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-12	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-2	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-3	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-4	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-5	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-6	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-7	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-8	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2047-A-9	EPP444	18-Nov-2020	26-Nov-2020	----	----		----	----	----	

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	122665	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	122666	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	122668	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	122667	1	14	7.1	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	122665	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	122666	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	122668	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	122667	1	14	7.1	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	123171	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	122665	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	123172	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	122666	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	122668	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	123171	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	123172	1	12	8.3	5.0	✔



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.

Page : 16 of 16
Work Order : VA20C1550
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 : VA20C1550

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : 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 : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby, British Columbia Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 24-Nov-2020 10:10
Date Analysis Commenced : 26-Nov-2020
Issue Date : 02-Dec-2020 15:33

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

This Quality Control Report contains the following information:

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

Signatories

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

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Brianna Allen (Organics), Kim Jensen (Metals), Kinny Wu (Metals), Robin Weeks (Metals), and Robin Weeks (Organics).

Page : 2 of 11
Work Order : VA20C1550
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: 122667)											
VA20C1550-001	BA2047-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.6	11.5	0.519%	5%	----
Physical Tests (QC Lot: 122668)											
VA20C1550-001	BA2047-A-1	moisture	----	E144	0.25	%	23.4	22.8	2.43%	20%	----
Metals (QC Lot: 122665)											
VA20C1550-001	BA2047-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 122666)											
VA20C1550-001	BA2047-A-1	aluminum	7429-90-5	E440	50	mg/kg	37000	33000	11.5%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	140	126	10.4%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	27.3	25.2	7.75%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	501	589	16.1%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.39	2.07	136%	30%	DUP-H
		bismuth	7440-69-9	E440	0.20	mg/kg	13.7	11.6	16.8%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	197	248	22.7%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	18.1	10.1	56.4%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	146000	136000	6.91%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	146	150	3.02%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	100	52.0	63.5%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1610	1960	19.6%	30%	----
		iron	7439-89-6	E440	50	mg/kg	47400	53100	11.4%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	498	403	21.0%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	23.9	21.5	10.8%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12000	11300	5.46%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	708	774	8.97%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	18.0	16.0	12.0%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	104	316	101%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	11800	10800	8.43%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	4770	4790	0.294%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.36	0.02	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	8.33	8.53	2.42%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	13500	14100	4.31%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	327	333	1.69%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	15000	13600	9.84%	30%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Metals (QC Lot: 122666) - continued											
VA20C1550-001	BA2047-A-1	thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	160	147	8.41%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	515	448	13.9%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	53.4	13.1	121%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	4.02	3.67	9.22%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	35.7	34.4	3.64%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3990	4090	2.44%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.6	1.3	0.2	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

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

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 122668)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 122665)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 122666)						
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: 122666) - 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	# 0.23	B
zinc	7440-66-6	E440	2	mg/kg	<2.0	---
zirconium	7440-67-7	E440	1	mg/kg	<1.0	---
TCLP Metals (QCLot: 123171)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 123172)						
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	---

Qualifiers

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.



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: 122667)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.8	95.0	105	----
Physical Tests (QCLot: 122668)									
moisture	----	E144	0.25	%	50 %	99.6	90.0	110	----
Metals (QCLot: 122665)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	95.8	80.0	120	----
Metals (QCLot: 122666)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	110	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	95.4	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	103	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	99.4	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	99.4	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.3	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	96.5	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.2	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	98.4	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	98.3	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	113	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.1	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	94.9	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.0	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	113	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	94.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	107	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	98.5	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Metals (QCLot: 122666) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	100	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	98.5	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	103	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	112	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	98.8	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.0	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	114	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 123171)										
VA20C1550-001	BA2047-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.4	50.0	140	----
TCLP Metals (QCLot: 123172)										
VA20C1550-001	BA2047-A-1	antimony, TCLP	7440-36-0	E444	5.4 mg/L	5 mg/L	108	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	13.9 mg/L	12.5 mg/L	111	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.232 mg/L	0.25 mg/L	92.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.06 mg/L	10 mg/L	90.6	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	1.16 mg/L	1.25 mg/L	92.6	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.23 mg/L	2.5 mg/L	89.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	219 mg/L	250 mg/L	87.7	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	251 mg/L	250 mg/L	100	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.21 mg/L	2.5 mg/L	88.4	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.83 mg/L	5 mg/L	96.7	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.110 mg/L	0.1 mg/L	110	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.7	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: 122665)									
QC-122665-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----
Metals (QCLot: 122666)									
QC-122666-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
QC-122666-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	112	70.0	130	----
QC-122666-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
QC-122666-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	107	70.0	130	----
QC-122666-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	114	70.0	130	----
QC-122666-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	126	40.0	160	----
QC-122666-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	93.8	70.0	130	----
QC-122666-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-122666-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	110	70.0	130	----
QC-122666-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	100	70.0	130	----
QC-122666-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	95.9	70.0	130	----
QC-122666-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	99.1	70.0	130	----
QC-122666-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	97.8	70.0	130	----
QC-122666-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	105	70.0	130	----
QC-122666-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	99.8	70.0	130	----
QC-122666-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	104	70.0	130	----
QC-122666-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	120	70.0	130	----
QC-122666-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	98.4	70.0	130	----
QC-122666-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	92.8	70.0	130	----
QC-122666-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
QC-122666-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	99.6	70.0	130	----
QC-122666-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	109	70.0	130	----
QC-122666-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.2	40.0	160	----
QC-122666-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	103	70.0	130	----
QC-122666-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	120	70.0	130	----
QC-122666-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	116	70.0	130	----
QC-122666-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----

Page : 11 of 11
 Work Order : VA20C1550
 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: 122666) - continued									
QC-122666-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	96.8	70.0	130	----
QC-122666-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	119	70.0	130	----

