

Bottom Ash Data

2020 Week 43

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on November 17, 2020. The data represents bottom ash composite results for week 43 of 2020 (October 18, 2020 to October 24, 2020).

The bottom ash meets the requirements of Metro Vancouver's Bottom Ash Management Plan and is suitable for disposal.



Environmental

CERTIFICATE OF ANALYSIS

Work Order : **VA20B9313**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 26
No. of samples analysed : 26

Page : 1 of 12
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 28-Oct-2020 11:20
Date Analysis Commenced : 02-Nov-2020
Issue Date : 16-Nov-2020 11:36

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>
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
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Dee Lee	Analyst	Metals, Burnaby, British Columbia
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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	BA2043-A-1	BA2043-A-2	BA2043-A-3	BA2043-A-4	BA2043-A-5
(Matrix: Soil/Solid)					Client sampling date / time	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-001	VA20B9313-002	VA20B9313-003	VA20B9313-004	VA20B9313-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.0	21.1	20.6	23.6	20.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.4	10.2	10.2	10.3	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36100	37600	44800	33000	35700	
antimony	7440-36-0	E440	0.10	mg/kg	138	151	152	208	158	
arsenic	7440-38-2	E440	0.10	mg/kg	26.4	37.2	35.4	38.1	36.9	
barium	7440-39-3	E440	0.50	mg/kg	589	476	445	396	404	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.43	0.43	0.38	0.44	
bismuth	7440-69-9	E440	0.20	mg/kg	5.75	11.6	9.58	9.85	12.9	
boron	7440-42-8	E440	5.0	mg/kg	250	237	164	213	188	
cadmium	7440-43-9	E440	0.020	mg/kg	11.5	17.3	19.1	35.3	20.7	
calcium	7440-70-2	E440	50	mg/kg	133000	147000	138000	141000	144000	
chromium	7440-47-3	E440	0.50	mg/kg	152	168	155	158	175	
cobalt	7440-48-4	E440	0.10	mg/kg	23.4	72.0	98.0	32.0	38.2	
copper	7440-50-8	E440	0.50	mg/kg	1300	2810	2050	3790	2290	
iron	7439-89-6	E440	50	mg/kg	64200	55100	67800	63000	65500	
lead	7439-92-1	E440	0.50	mg/kg	449	1110	1140	1920	666	
lithium	7439-93-2	E440	2.0	mg/kg	17.8	20.5	21.2	18.2	25.8	
magnesium	7439-95-4	E440	20	mg/kg	12800	11200	10900	10300	10600	
manganese	7439-96-5	E440	1.0	mg/kg	768	799	1580	792	815	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0.0568	<0.0500	0.0622	
molybdenum	7439-98-7	E440	0.10	mg/kg	28.8	20.6	18.3	22.0	25.0	
nickel	7440-02-0	E440	0.50	mg/kg	91.6	131	171	123	178	
phosphorus	7723-14-0	E440	50	mg/kg	9620	13800	11300	12000	11400	
potassium	7440-09-7	E440	100	mg/kg	5090	5940	5740	6090	6240	
selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.42	0.48	0.55	0.49	
silver	7440-22-4	E440	0.10	mg/kg	5.77	6.40	8.09	6.13	5.42	
sodium	7440-23-5	E440	50	mg/kg	14700	15200	14900	14700	15200	
strontium	7440-24-6	E440	0.50	mg/kg	326	339	313	337	335	
sulfur	7704-34-9	E440	1000	mg/kg	10800	15200	13700	15800	15100	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-1	BA2043-A-2	BA2043-A-3	BA2043-A-4	BA2043-A-5
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-001	VA20B9313-002	VA20B9313-003	VA20B9313-004	VA20B9313-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.069	0.060	0.065	0.066	
tin	7440-31-5	E440	2.0	mg/kg	149	188	147	469	159	
titanium	7440-32-6	E440	1.0	mg/kg	633	422	450	384	319	
tungsten	7440-33-7	E440	0.50	mg/kg	4.58	6.52	5.78	5.82	6.08	
uranium	7440-61-1	E440	0.050	mg/kg	4.87	6.81	5.61	6.32	6.66	
vanadium	7440-62-2	E440	0.20	mg/kg	55.2	60.0	49.4	56.0	58.1	
zinc	7440-66-6	E440	2.0	mg/kg	4250	5170	5280	5740	6670	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.9	3.4	2.0	2.5	
Speciated Metals										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	----	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.2	11.2	11.2	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.09	8.41	8.43	8.16	8.09	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	4.93	4.99	4.90	5.01	5.01	
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	2.81	2.82	2.88	2.70	2.76	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.286	3.59	0.407	1.27	0.360	
calcium, TCLP	7440-70-2	E444	10	mg/L	2100	2260	2110	2290	2360	
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	1.15	0.620	1.42	0.872	0.628	
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.24	1.24	1.77	2.19	3.49	
iron, TCLP	7439-89-6	E444	5.0	mg/L	51.2	28.8	36.2	33.6	27.3	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.28	1.08	2.08	0.60	1.68	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	138	148	132	148	151	
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	0.76	1.24	0.91	0.88	
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-1	BA2043-A-2	BA2043-A-3	BA2043-A-4	BA2043-A-5
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-001	VA20B9313-002	VA20B9313-003	VA20B9313-004	VA20B9313-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<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	<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	146	75.6	99.2	122	102	

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)					BA2043-A-6	BA2043-A-7	BA2043-A-8	BA2043-A-9	BA2043-A-10
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-006	VA20B9313-007	VA20B9313-008	VA20B9313-009	VA20B9313-010
					Result	Result	Result	Result	Result
Physical Tests									
moisture	----	E144	0.25	%	20.9	22.0	23.0	21.7	22.5
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.2	10.1	10.3	10.2
Metals									
aluminum	7429-90-5	E440	50	mg/kg	37300	29700	32400	33500	29200
antimony	7440-36-0	E440	0.10	mg/kg	167	136	162	196	187
arsenic	7440-38-2	E440	0.10	mg/kg	42.1	33.7	37.6	38.9	45.9
barium	7440-39-3	E440	0.50	mg/kg	404	504	429	468	395
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.43	0.50	0.43	0.37
bismuth	7440-69-9	E440	0.20	mg/kg	11.7	27.5	9.65	11.1	11.8
boron	7440-42-8	E440	5.0	mg/kg	194	211	164	211	182
cadmium	7440-43-9	E440	0.020	mg/kg	24.1	14.2	24.2	24.2	19.9
calcium	7440-70-2	E440	50	mg/kg	144000	140000	129000	140000	145000
chromium	7440-47-3	E440	0.50	mg/kg	161	145	171	166	497
cobalt	7440-48-4	E440	0.10	mg/kg	46.0	69.4	73.1	213	51.8
copper	7440-50-8	E440	0.50	mg/kg	1330	1580	2450	2240	2610
iron	7439-89-6	E440	50	mg/kg	54600	43400	64400	72500	68000
lead	7439-92-1	E440	0.50	mg/kg	740	338	484	681	678
lithium	7439-93-2	E440	2.0	mg/kg	19.5	32.1	19.4	25.9	17.1
magnesium	7439-95-4	E440	20	mg/kg	11200	10700	9730	11300	11200
manganese	7439-96-5	E440	1.0	mg/kg	717	756	788	821	848
mercury	7439-97-6	E510	0.0500	mg/kg	0.0652	<0.0500	0.129	0.0662	<0.0500
molybdenum	7439-98-7	E440	0.10	mg/kg	23.8	18.2	19.9	21.3	26.4
nickel	7440-02-0	E440	0.50	mg/kg	118	278	134	209	194
phosphorus	7723-14-0	E440	50	mg/kg	10500	11900	10500	10800	11900
potassium	7440-09-7	E440	100	mg/kg	7060	5770	6780	6480	5990
selenium	7782-49-2	E440	0.20	mg/kg	0.61	0.41	0.62	0.59	0.54
silver	7440-22-4	E440	0.10	mg/kg	6.77	5.82	5.76	8.90	6.52
sodium	7440-23-5	E440	50	mg/kg	16900	15100	15500	15600	14700
strontium	7440-24-6	E440	0.50	mg/kg	342	394	316	350	328
sulfur	7704-34-9	E440	1000	mg/kg	15900	12700	15700	16400	16400
thallium	7440-28-0	E440	0.050	mg/kg	0.068	0.066	0.072	0.074	0.071



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2043-A-6	BA2043-A-7	BA2043-A-8	BA2043-A-9	BA2043-A-10
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-006	VA20B9313-007	VA20B9313-008	VA20B9313-009	VA20B9313-010
					Result	Result	Result	Result	Result
Metals									
tin	7440-31-5	E440	2.0	mg/kg	158	120	196	1520	218
titanium	7440-32-6	E440	1.0	mg/kg	311	188	440	482	449
tungsten	7440-33-7	E440	0.50	mg/kg	6.30	4.14	6.09	7.15	10.9
uranium	7440-61-1	E440	0.050	mg/kg	6.23	5.96	5.93	6.16	7.04
vanadium	7440-62-2	E440	0.20	mg/kg	56.6	57.8	55.3	58.0	60.7
zinc	7440-66-6	E440	2.0	mg/kg	5340	5600	5580	5260	7460
zirconium	7440-67-7	E440	1.0	mg/kg	3.0	2.8	1.6	1.6	1.2
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.2	11.2	11.2	11.3
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.76	8.51	8.74	8.60	8.66
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88
pH, TCLP final	----	EPP444	0.010	pH units	5.00	5.00	5.02	5.97	5.86
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.78	2.37	2.55	2.36	2.26
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.445	0.315	0.630	0.382	0.251
calcium, TCLP	7440-70-2	E444	10	mg/L	2340	2200	2250	1920	1870
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	0.557	0.709	0.699	0.870	0.766
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.78	2.04	1.40	1.33	1.26
iron, TCLP	7439-89-6	E444	5.0	mg/L	30.2	41.3	23.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.60	0.31	0.68	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	147	141	151	123	121
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	0.76	0.92	0.76	0.50	0.68
selenium, TCLP	7782-49-2	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-6	BA2043-A-7	BA2043-A-8	BA2043-A-9	BA2043-A-10
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00	21-Oct-2020 09:00
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-006	VA20B9313-007	VA20B9313-008	VA20B9313-009	VA20B9313-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	84.7	79.6	83.8	56.4	86.6	

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-11	BA2043-A-12	BA2043-A-2 REP1	BA2043-A-2 REP 2	BA2043-A-2 REP 3
Client sampling date / time						21-Oct-2020 09:00	21-Oct-2020 09:00	06-Nov-2020	06-Nov-2020	06-Nov-2020
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-011	VA20B9313-012	VA20B9313-013	VA20B9313-014	VA20B9313-015	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	22.2	21.2	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	36600	35300	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	162	152	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	40.7	37.4	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	430	527	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.33	8.27	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	189	234	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	19.2	19.6	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	139000	132000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	196	170	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	25.8	886	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1940	2000	----	----	----	
iron	7439-89-6	E440	50	mg/kg	50300	64500	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	706	884	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	19.2	43.4	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10700	10500	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	656	884	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0533	0.0525	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	31.9	24.5	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	239	339	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11300	10200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	6300	6030	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.49	0.44	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.70	4.94	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	16500	15900	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	335	345	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	14900	13100	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.062	0.058	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-11	BA2043-A-12	BA2043-A-2 REP1	BA2043-A-2 REP 2	BA2043-A-2 REP 3
Client sampling date / time						21-Oct-2020 09:00	21-Oct-2020 09:00	06-Nov-2020	06-Nov-2020	06-Nov-2020
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-011	VA20B9313-012	VA20B9313-013	VA20B9313-014	VA20B9313-015	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	313	157	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	376	503	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	26.2	7.35	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	6.15	5.19	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	58.1	50.4	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	6690	4980	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	1.7	----	----	----	
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	8.68	8.72	8.41	8.41	8.41	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	4.97	5.94	5.57	5.93	5.90	
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	2.71	2.14	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.425	0.313	0.320	0.229	0.240	
calcium, TCLP	7440-70-2	E444	10	mg/L	2210	1810	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.544	0.604	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.54	0.570	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	23.4	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.40	0.67	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	143	119	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.84	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	----	----	----	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-11	BA2043-A-12	BA2043-A-2 REP1	BA2043-A-2 REP 2	BA2043-A-2 REP 3
Client sampling date / time					21-Oct-2020 09:00	21-Oct-2020 09:00	06-Nov-2020	06-Nov-2020	06-Nov-2020	
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-011	VA20B9313-012	VA20B9313-013	VA20B9313-014	VA20B9313-015	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	100	65.0	----	----	----	

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

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-2 REP 4	BA2043-A-2 REP5	BA2043-A-2 REP 6	BA2043-A-4 REP 1	BA2043-A-4 REP 2
Client sampling date / time					06-Nov-2020	06-Nov-2020	06-Nov-2020	06-Nov-2020	06-Nov-2020	
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-016	VA20B9313-017	VA20B9313-018	VA20B9313-019	VA20B9313-020	
					Result	Result	Result	Result	Result	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.3	11.3	11.2	11.2	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.41	8.41	8.41	8.16	8.16	
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	5.84	5.88	5.91	5.65	5.86	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.254	0.259	0.258	0.362	0.308	

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-4 REP3	BA2043-A-4 REP 4	BA2043-A-4 REP 5	BA2043-A-4 REP 6	BA2043-A-8 REP 1
Client sampling date / time					06-Nov-2020	06-Nov-2020	06-Nov-2020	06-Nov-2020	06-Nov-2020	
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-021	VA20B9313-022	VA20B9313-023	VA20B9313-024	VA20B9313-025	
					Result	Result	Result	Result	Result	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	11.2	11.2	11.2	11.2	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.16	8.16	8.16	8.16	8.74	
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	5.76	5.77	5.84	5.70	5.78	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.295	0.486	0.313	0.405	0.406	

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

Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2043-A-8 REP 2	----	----	----	----
Client sampling date / time					06-Nov-2020	----	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA20B9313-026	-----	-----	-----	-----	
					Result	----	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.2	----	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.74	----	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	----	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.90	----	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.400	----	----	----	----	

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

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA20B9313	Page	: 1 of 19
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	: 28-Oct-2020 11:20
PO	: VANCO 0000049378	Issue Date	: 16-Nov-2020 11:36
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 26		
No. of samples analysed	: 26		

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	VA20B9313-001	BA2043-A-1	arsenic	7440-38-2	E440	46.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	bismuth	7440-69-9	E440	58.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	cadmium	7440-43-9	E440	52.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	cobalt	7440-48-4	E440	163 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	copper	7440-50-8	E440	36.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	lead	7439-92-1	E440	113 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	lithium	7439-93-2	E440	35.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	nickel	7440-02-0	E440	156 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	sulfur	7704-34-9	E440	41.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	titanium	7440-32-6	E440	45.9 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	tungsten	7440-33-7	E440	32.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	uranium	7440-61-1	E440	42.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA20B9313-001	BA2043-A-1	zinc	7440-66-6	E440	54.5 % 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 BA2043-A-1	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-10	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-11	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-12	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-2	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-3	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-2020	13 days	0 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-4	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✓	05-Nov-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 BA2043-A-5	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✔	05-Nov-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-6	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✔	05-Nov-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-7	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✔	05-Nov-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-8	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✔	05-Nov-2020	13 days	0 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2043-A-9	E510	21-Oct-2020	05-Nov-2020	28 days	14 days	✔	05-Nov-2020	13 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2043-A-1	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2043-A-10	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2043-A-11	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2043-A-12	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-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 BA2043-A-2	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-3	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-4	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-5	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-6	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-7	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-8	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2043-A-9	E440	21-Oct-2020	05-Nov-2020	180 days	14 days	✔	05-Nov-2020	165 days	0 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2043-A-1	E144	21-Oct-2020	----	----	----		02-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 BA2043-A-10	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-11	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-12	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-2	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-3	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-4	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-5	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-6	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2043-A-7	E144	21-Oct-2020	----	----	----		02-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 BA2043-A-8	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2043-A-9	E144	21-Oct-2020	----	----	----		02-Nov-2020	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-1	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-10	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-11	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-12	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-2	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-3	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-4	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-5	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-6	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-7	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-8	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2043-A-9	E108	21-Oct-2020	05-Nov-2020	30 days	14 days	✔	05-Nov-2020	15 days	0 days	✔	
Speciated Metals : Hexavalent Chromium (Cr VI) by IC											
Glass soil jar/Teflon lined cap BA2043-A-1	E532	21-Oct-2020	02-Nov-2020	30 days	11 days	✔	02-Nov-2020	7 days	0 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
FLPE - total (lab preserved) BA2043-A-1	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
FLPE - total (lab preserved) BA2043-A-10	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
FLPE - total (lab preserved) BA2043-A-11	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-12	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-2	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-3	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-4	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-5	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-6	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-7	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-8	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
FLPE - total (lab preserved) BA2043-A-9	E512	03-Nov-2020	----	----	----		05-Nov-2020	40 days	15 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-1	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-10	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-11	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-12	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-2	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-3	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-4	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-5	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-6	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-7	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-8	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2043-A-9	E444	03-Nov-2020	----	----	----		05-Nov-2020	192 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP 2	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP 3	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP 4	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP 6	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP1	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-2 REP5	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 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 (nitric acid) BA2043-A-4 REP 1	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-4 REP 2	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-4 REP 4	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-4 REP 5	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-4 REP 6	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-4 REP3	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-8 REP 1	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE total (nitric acid) BA2043-A-8 REP 2	E444	12-Nov-2020	----	----	----		13-Nov-2020	195 days	7 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-1	EPP444	21-Oct-2020	03-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: 28 day HT (e.g. Hg, CrVI) BA2043-A-10	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-11	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-12	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-2	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-2 REP 2	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-2 REP 3	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-2 REP 4	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-2 REP 6	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-2 REP 1	EPP444	06-Nov-2020	12-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) BA2043-A-2 REP5	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-3	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-4	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP 1	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP 2	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP 4	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP 5	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP 6	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-4 REP3	EPP444	06-Nov-2020	12-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: 28 day HT (e.g. Hg, CrVI) BA2043-A-5	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-6	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-7	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-8	EPP444	21-Oct-2020	03-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-8 REP 1	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2043-A-8 REP 2	EPP444	06-Nov-2020	12-Nov-2020	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2043-A-9	EPP444	21-Oct-2020	03-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)							
Hexavalent Chromium (Cr VI) by IC	E532	111844	1	7	14.2	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	111981	1	12	8.3	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	111982	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	111984	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	111983	1	12	8.3	5.0	✓
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	111844	2	7	28.5	10.0	✓
Mercury in Soil/Solid by CVAAS	E510	111981	2	12	16.6	10.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	111982	2	12	16.6	10.0	✓
Moisture Content by Gravimetry	E144	111984	1	12	8.3	5.0	✓
pH by Meter (1:2 Soil:Water Extraction)	E108	111983	1	12	8.3	5.0	✓
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	111844	1	7	14.2	5.0	✓
Mercury by CVAAS (TCLP)	E512	113551	1	12	8.3	5.0	✓
Mercury in Soil/Solid by CVAAS	E510	111981	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	116828	2	26	7.6	5.0	✓
Metals in Soil/Solid by CRC ICPMS	E440	111982	1	12	8.3	5.0	✓
Moisture Content by Gravimetry	E144	111984	1	12	8.3	5.0	✓
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	113551	1	12	8.3	5.0	✓
Metals by CRC ICPMS (TCLP)	E444	116828	2	26	7.6	5.0	✓



Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C . Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Hexavalent Chromium (Cr VI) by IC	E532 Edmonton - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^\circ\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . This method is intended to liberate metals that may be environmentally available.



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 Edmonton - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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 : **VA20B9313**

Page : 1 of 13

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : VANCO 0000049378
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 26
No. of samples analysed : 26

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 : 28-Oct-2020 11:20
Date Analysis Commenced : 02-Nov-2020
Issue Date : 16-Nov-2020 11:36

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.

Signatories	Position	Laboratory Department
Alex Drake	Lab Analyst	Inorganics, Edmonton, Alberta
Brianna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia

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Work Order : VA20B9313
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: 111983)											
VA20B9313-001	BA2043-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.3	0.193%	5%	----
Physical Tests (QC Lot: 111984)											
VA20B9313-001	BA2043-A-1	moisture	----	E144	0.25	%	24.0	24.7	2.90%	20%	----
Metals (QC Lot: 111981)											
VA20B9313-001	BA2043-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 111982)											
VA20B9313-001	BA2043-A-1	aluminum	7429-90-5	E440	50	mg/kg	36100	35300	2.19%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	138	180	26.6%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	26.4	42.4	46.4%	30%	DUP-H
		barium	7440-39-3	E440	0.50	mg/kg	589	418	34.0%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.43	0.004	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	5.75	10.5	58.2%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	250	204	20.0%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	11.5	19.7	52.1%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	133000	148000	10.8%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	152	197	25.7%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	23.4	232	163%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1300	1890	36.9%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	64200	51000	23.0%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	449	1610	113%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	17.8	25.6	35.9%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	12800	11200	13.5%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	768	810	5.37%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	28.8	28.6	0.808%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	91.6	750	156%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	9620	12800	28.3%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5090	6130	18.5%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.33	0.46	0.13	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.77	5.68	1.60%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14700	15000	2.10%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	326	365	11.4%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	10800	16500	41.7%	30%	DUP-H



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: 111982) - continued											
VA20B9313-001	BA2043-A-1	thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.076	0.026	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	149	165	10.6%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	633	397	45.9%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	4.58	6.33	32.2%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	4.87	7.51	42.7%	30%	DUP-H
		vanadium	7440-62-2	E440	0.20	mg/kg	55.2	67.5	20.0%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4250	7440	54.5%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.6	0.4	Diff <2x LOR	----
Speciated Metals (QC Lot: 111844)											
VA20B9191-003	Anonymous	chromium, hexavalent [Cr VI]	18540-29-9	E532	1.00	mg/kg	<1.00	<1.00	0	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

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

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 111984)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 111981)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 111982)						
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: 111982) - 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	---
Speciated Metals (QCLot: 111844)						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	---
TCLP Metals (QCLot: 113551)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 113552)						
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: 116828)						
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	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
TCLP Metals (QCLot: 116828) - continued						
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----



Laboratory Control Sample (LCS) Report

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

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 111983)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 111984)									
moisture	----	E144	0.25	%	50 %	98.5	90.0	110	----
Metals (QCLot: 111981)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	100	80.0	120	----
Metals (QCLot: 111982)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	98.9	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	108	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	97.3	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	100	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	106	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	101	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	99.1	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	100	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	97.1	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	96.4	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	112	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	105	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.0	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	105	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	97.2	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	96.6	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	98.0	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.6	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	99.8	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	99.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.1	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 111982) - 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	100	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	105	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	102	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	106	80.0	120	----
Speciated Metals (QCLot: 111844)									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	16 mg/kg	91.8	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: 113551)										
VA20B9313-001	BA2043-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	90.0	50.0	140	----
TCLP Metals (QCLot: 113552)										
VA20B9313-001	BA2043-A-1	antimony, TCLP	7440-36-0	E444	5.2 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.0 mg/L	5 mg/L	99.9	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.4 mg/L	12.5 mg/L	91.4	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.252 mg/L	0.25 mg/L	101	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.39 mg/L	10 mg/L	93.9	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	1.25 mg/L	1.25 mg/L	99.7	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	2.49 mg/L	2.5 mg/L	99.5	50.0	140	----
		iron, TCLP	7439-89-6	E444	234 mg/L	250 mg/L	93.5	50.0	140	----
		lead, TCLP	7439-92-1	E444	9.71 mg/L	10 mg/L	97.1	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	266 mg/L	250 mg/L	106	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.38 mg/L	2.5 mg/L	95.3	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.27 mg/L	5 mg/L	105	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.115 mg/L	0.1 mg/L	115	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	98.0	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.76 mg/L	0.75 mg/L	101	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
TCLP Metals (QCLot: 116828)										
VA20B9313-013	BA2043-A-2 REP1	antimony, TCLP	7440-36-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	94.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.9 mg/L	12.5 mg/L	104	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.229 mg/L	0.25 mg/L	91.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.77 mg/L	10 mg/L	87.7	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.18 mg/L	1.25 mg/L	94.2	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----



Sub-Matrix: **Soil/Solid**

					<i>Matrix Spike (MS) Report</i>					
					<i>Spike</i>		<i>Recovery (%)</i>	<i>Recovery Limits (%)</i>		
<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>Concentration</i>	<i>Target</i>	<i>MS</i>	<i>Low</i>	<i>High</i>	<i>Qualifier</i>
TCLP Metals (QCLot: 116828) - continued										
VA20B9313-013	BA2043-A-2 REP1	copper, TCLP	7440-50-8	E444	2.20 mg/L	2.5 mg/L	88.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	229 mg/L	250 mg/L	91.7	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	254 mg/L	250 mg/L	102	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.36 mg/L	2.5 mg/L	94.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.82 mg/L	5 mg/L	96.4	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.111 mg/L	0.1 mg/L	111	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	93.9	50.0	140	----
		vanadium, TCLP	7440-62-2	E444	0.71 mg/L	0.75 mg/L	94.3	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: 111981)									
QC-111981-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	70.0	130	----
Metals (QCLot: 111982)									
QC-111982-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	105	70.0	130	----
QC-111982-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	110	70.0	130	----
QC-111982-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	99.7	70.0	130	----
QC-111982-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	102	70.0	130	----
QC-111982-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	108	70.0	130	----
QC-111982-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	119	40.0	160	----
QC-111982-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	106	70.0	130	----
QC-111982-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	102	70.0	130	----
QC-111982-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
QC-111982-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
QC-111982-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	99.0	70.0	130	----
QC-111982-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	103	70.0	130	----
QC-111982-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	107	70.0	130	----
QC-111982-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
QC-111982-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	110	70.0	130	----
QC-111982-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	105	70.0	130	----
QC-111982-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
QC-111982-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
QC-111982-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	95.5	70.0	130	----
QC-111982-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	110	70.0	130	----
QC-111982-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	103	70.0	130	----
QC-111982-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
QC-111982-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	97.8	40.0	160	----
QC-111982-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	100	70.0	130	----
QC-111982-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	118	70.0	130	----
QC-111982-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	106	70.0	130	----
QC-111982-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	107	70.0	130	----

Page : 13 of 13
 Work Order : VA20B9313
 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: 111982) - continued									
QC-111982-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
QC-111982-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	109	70.0	130	----
Speciated Metals (QCLot: 111844)									
QC-111844-003	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	220 mg/kg	98.3	80.0	120	----




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		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT									
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com			<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT													
Phone:	604-521-1025	Fax:				<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT													
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dkrypnik@covanta.com			Analysis Request													
			brent.kirkpatrick@metrovancover.org																
			Sarah.Wellman@metrovancover.org																

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

Lab Work Order # (lab use only)		ALS Contact:	Sampler:								Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)			
	BA2043-A-1		9:00	Soil	X	X	X	X		1	
	BA2043-A-2		9:00	Soil	X	X		X		1	
	BA2043-A-3		9:00	Soil	X	X		X		1	
	BA2043-A-4		9:00	Soil	X	X		X		1	
	BA2043-A-5		9:00	Soil	X	X		X		1	
	BA2043-A-6		9:00	Soil	X	X		X		1	
	BA2043-A-7		9:00	Soil	X	X		X		1	
	BA2043-A-8		9:00	Soil	X	X		X		1	
	BA2043-A-9		9:00	Soil	X	X		X		1	
	BA2043-A-10		9:00	Soil	X	X		X		1	
	BA2043-A-11		9:00	Soil	X	X		X		1	
	BA2043-A-12		9:00	Soil	X	X		X		1	

Environmental Division
 Vancouver
 Work Order Reference
VA20B9313



Telephone : + 1 604 253 4188

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
<i>[Signature]</i>	28-Oct-20	0800	Rk	28/10/20	11:20am	21.4 °C				Yes / No ? If Yes add SIF