

## Bottom Ash Data

2019 Week 48

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on December 20, 2019. The data represents bottom ash composite results for week 48 of 2019 (November 24, 2019 to November 30, 2019).

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



CERTIFICATE OF ANALYSIS

Work Order : **VA19A0224**  
Client : **Covanta Burnaby R.E., ULC**  
Contact : Steve McKinney  
Address : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
Telephone : 604 521 1025  
Project : ----  
PO : VANCO-0000048466  
C-O-C number : ----  
Sampler : ----  
Site : ----  
Quote number : Standing Offer  
No. of samples received : 22  
No. of samples analysed : 22

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 : 03-Dec-2019 11:45  
Date Analysis Commenced : 04-Dec-2019  
Issue Date : 16-Dec-2019 14:28

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>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
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## 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

(Matrix: Soil)

					BA1948-A-1	BA1948-A-2	BA1948-A-3	BA1948-A-4	BA1948-A-5
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-001	VA19A0224-002	VA19A0224-003	VA19A0224-004	VA19A0224-005
					Result	Result	Result	Result	Result
<b>Physical Tests</b>									
moisture	----	E144	0.25	%	19.9	19.5	18.4	19.9	18.4
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.4	11.2	11.3	11.4
<b>Metals</b>									
aluminum	7429-90-5	E440	50	mg/kg	36800	32400	35200	37000	35200
antimony	7440-36-0	E440	0.10	mg/kg	122	117	125	129	123
arsenic	7440-38-2	E440	0.10	mg/kg	32.1	24.4	26.2	32.9	28.2
barium	7440-39-3	E440	0.50	mg/kg	459	485	545	525	497
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.42	0.41	0.39	0.44
bismuth	7440-69-9	E440	0.20	mg/kg	9.96	6.93	9.82	6.40	17.3
boron	7440-42-8	E440	5.0	mg/kg	306	251	237	296	286
cadmium	7440-43-9	E440	0.020	mg/kg	12.8	11.2	14.1	11.7	15.6
calcium	7440-70-2	E440	50	mg/kg	141000	125000	137000	130000	134000
chromium	7440-47-3	E440	0.50	mg/kg	168	230	205	166	147
cobalt	7440-48-4	E440	0.10	mg/kg	32.1	40.4	35.4	23.8	99.1
copper	7440-50-8	E440	0.50	mg/kg	3620	1570	1210	1600	3900
iron	7439-89-6	E440	50	mg/kg	60200	59600	55900	64900	56100
lead	7439-92-1	E440	0.50	mg/kg	1760	366	709	379	526
lithium	7439-93-2	E440	2.0	mg/kg	17.3	16.7	18.0	16.3	20.2
magnesium	7439-95-4	E440	20	mg/kg	12600	11100	11800	11500	11400
manganese	7439-96-5	E440	1.0	mg/kg	1730	1690	808	790	859
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	40.8	62.0	57.4	47.8	58.8
nickel	7440-02-0	E440	0.50	mg/kg	134	349	122	116	253
phosphorus	7723-14-0	E440	50	mg/kg	11100	10600	11900	12000	10800
potassium	7440-09-7	E440	100	mg/kg	5760	5190	5290	5700	5190
selenium	7782-49-2	E440	0.20	mg/kg	0.50	0.34	0.40	0.32	0.44
silver	7440-22-4	E440	0.10	mg/kg	6.45	6.36	9.10	6.64	6.57
sodium	7440-23-5	E440	50	mg/kg	15400	14900	15000	15800	14900
strontium	7440-24-6	E440	0.50	mg/kg	331	296	326	313	335
sulfur	7704-34-9	E440	1000	mg/kg	16000	13400	14100	14300	14400



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-1	BA1948-A-2	BA1948-A-3	BA1948-A-4	BA1948-A-5
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-001	VA19A0224-002	VA19A0224-003	VA19A0224-004	VA19A0224-005
					Result	Result	Result	Result	Result
<b>Metals</b>									
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.054	0.058	0.051	0.055
tin	7440-31-5	E440	2.0	mg/kg	117	101	124	104	130
titanium	7440-32-6	E440	1.0	mg/kg	307	508	600	510	360
tungsten	7440-33-7	E440	0.50	mg/kg	12.6	17.5	16.4	22.0	24.0
uranium	7440-61-1	E440	0.050	mg/kg	5.64	5.10	5.36	4.86	5.24
vanadium	7440-62-2	E440	0.20	mg/kg	72.6	51.6	67.4	48.0	51.1
zinc	7440-66-6	E440	2.0	mg/kg	5410	4820	4460	3550	5490
zirconium	7440-67-7	E440	1.0	mg/kg	3.2	2.2	1.7	1.8	1.9
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.7	11.7	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.48	9.09	8.87	8.89	8.94
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444	0.010	pH units	5.62	5.63	5.92	5.95	5.57
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
boron, TCLP	7440-42-8	E444	0.50	mg/L	3.62	6.34	3.84	4.28	4.30
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.242	0.271	0.276	2.39	0.294
calcium, TCLP	7440-70-2	E444	2.0	mg/L	2040	2130	2200	2130	2170
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	0.629	2.94	0.821	0.722	0.629
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.48	2.56	1.46	1.75	2.31
iron, TCLP	7439-89-6	E444	5.0	mg/L	10.6	6.7	<5.0	<5.0	8.4
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.60	<0.25	0.26	0.38	0.26
magnesium, TCLP	7439-95-4	E444	0.50	mg/L	151	166	162	155	166
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	0.53	0.58	0.59	0.67
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)					Client sample ID	BA1948-A-1	BA1948-A-2	BA1948-A-3	BA1948-A-4	BA1948-A-5
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-001	VA19A0224-002	VA19A0224-003	VA19A0224-004	VA19A0224-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
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	96.2	82.5	68.0	91.8	71.3	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-6	BA1948-A-7	BA1948-A-8	BA1948-A-9	BA1948-A-10
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-006	VA19A0224-007	VA19A0224-008	VA19A0224-009	VA19A0224-010
					Result	Result	Result	Result	Result
<b>Physical Tests</b>									
moisture	----	E144	0.25	%	20.4	19.7	18.0	21.0	19.8
pH (1:2 soil:water)	----	E108	0.10	pH units	11.1	11.2	11.2	11.5	11.6
<b>Metals</b>									
aluminum	7429-90-5	E440	50	mg/kg	29300	32400	34300	31100	33200
antimony	7440-36-0	E440	0.10	mg/kg	112	116	105	120	105
arsenic	7440-38-2	E440	0.10	mg/kg	24.0	26.8	24.9	27.6	24.4
barium	7440-39-3	E440	0.50	mg/kg	536	565	472	493	526
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.39	0.37	0.49	0.38
bismuth	7440-69-9	E440	0.20	mg/kg	9.59	6.50	6.65	6.81	6.26
boron	7440-42-8	E440	5.0	mg/kg	253	269	256	410	282
cadmium	7440-43-9	E440	0.020	mg/kg	11.4	10.6	10.6	11.1	10.3
calcium	7440-70-2	E440	50	mg/kg	128000	132000	125000	134000	116000
chromium	7440-47-3	E440	0.50	mg/kg	187	202	145	175	181
cobalt	7440-48-4	E440	0.10	mg/kg	108	42.7	49.0	55.3	29.9
copper	7440-50-8	E440	0.50	mg/kg	2480	2240	2280	2010	9140
iron	7439-89-6	E440	50	mg/kg	54000	60100	54000	77700	61900
lead	7439-92-1	E440	0.50	mg/kg	693	320	534	1190	852
lithium	7439-93-2	E440	2.0	mg/kg	20.7	17.2	14.6	20.3	15.0
magnesium	7439-95-4	E440	20	mg/kg	10900	11000	11400	12700	9950
manganese	7439-96-5	E440	1.0	mg/kg	725	952	859	990	755
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	40.9	37.3	40.5	45.1	33.9
nickel	7440-02-0	E440	0.50	mg/kg	173	114	340	211	163
phosphorus	7723-14-0	E440	50	mg/kg	10200	12500	9280	10500	9810
potassium	7440-09-7	E440	100	mg/kg	5550	4960	5290	5120	4630
selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.34	0.40	0.34	0.30
silver	7440-22-4	E440	0.10	mg/kg	6.25	6.23	7.42	4.96	5.34
sodium	7440-23-5	E440	50	mg/kg	15700	15000	15900	16400	13300
strontium	7440-24-6	E440	0.50	mg/kg	327	416	280	302	305
sulfur	7704-34-9	E440	1000	mg/kg	13900	13200	12900	12900	11300
thallium	7440-28-0	E440	0.050	mg/kg	0.057	0.051	0.051	<0.050	0.078



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-6	BA1948-A-7	BA1948-A-8	BA1948-A-9	BA1948-A-10
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-006	VA19A0224-007	VA19A0224-008	VA19A0224-009	VA19A0224-010
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	158	110	133	112	95.4
titanium	7440-32-6	E440	1.0	mg/kg	290	299	381	267	662
tungsten	7440-33-7	E440	0.50	mg/kg	10.4	14.3	9.21	10.5	11.5
uranium	7440-61-1	E440	0.050	mg/kg	5.19	4.73	4.65	4.80	4.23
vanadium	7440-62-2	E440	0.20	mg/kg	62.3	48.2	47.6	48.8	46.8
zinc	7440-66-6	E440	2.0	mg/kg	4790	3520	3620	3750	22400
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.7	2.2	2.6	1.5
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.8	11.8	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.85	8.64	9.38	9.68	8.61
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.93	2.93	2.93	2.93	2.93
pH, TCLP final	----	EPP444	0.010	pH units	5.73	5.70	5.98	6.01	5.98
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	3.70	4.08	3.66	3.85	3.56
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.546	0.423	0.256	0.445	1.33
calcium, TCLP	7440-70-2	E444	2.0	mg/L	2240	2260	2170	2190	2160
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	1.16	4.54	1.32	0.851	0.813
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.65	1.93	1.76	1.38	1.43
iron, TCLP	7439-89-6	E444	5.0	mg/L	7.2	9.4	<5.0	<5.0	<5.0
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	1.30	0.38	<0.25	<0.25
magnesium, TCLP	7439-95-4	E444	0.50	mg/L	165	169	160	165	166
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	0.73	0.53	0.52	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
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)					Client sample ID	BA1948-A-6	BA1948-A-7	BA1948-A-8	BA1948-A-9	BA1948-A-10
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-006	VA19A0224-007	VA19A0224-008	VA19A0224-009	VA19A0224-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	82.0	87.4	64.8	64.5	63.1	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA1948-A-11	BA1948-A-12	BA1948-A-4 REP 1	BA1948-A-4 REP 2	BA1948-A-4 REP 3
(Matrix: Soil)					Client sampling date / time	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-011	VA19A0224-012	VA19A0224-013	VA19A0224-014	VA19A0224-015	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	18.6	20.0	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	29900	37000	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	122	354	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	31.6	39.9	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	577	514	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.44	0.44	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	7.88	7.98	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	247	280	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	12.1	12.6	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	131000	126000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	174	213	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	25.0	60.7	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	3380	2240	----	----	----	
iron	7439-89-6	E440	50	mg/kg	60100	62200	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	1510	8800	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	19.3	19.4	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11100	11200	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1240	1300	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	38.7	39.7	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	131	156	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11400	10600	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5170	5260	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.41	0.40	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	8.56	9.43	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	15200	15000	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	303	287	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12300	13200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.050	0.061	----	----	----	



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-11	BA1948-A-12	BA1948-A-4 REP 1	BA1948-A-4 REP 2	BA1948-A-4 REP 3
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-011	VA19A0224-012	VA19A0224-013	VA19A0224-014	VA19A0224-015
					Result	Result	Result	Result	Result
<b>Metals</b>									
tin	7440-31-5	E440	2.0	mg/kg	134	168	---	---	---
titanium	7440-32-6	E440	1.0	mg/kg	521	487	---	---	---
tungsten	7440-33-7	E440	0.50	mg/kg	18.4	12.5	---	---	---
uranium	7440-61-1	E440	0.050	mg/kg	4.69	5.46	---	---	---
vanadium	7440-62-2	E440	0.20	mg/kg	50.5	52.3	---	---	---
zinc	7440-66-6	E440	2.0	mg/kg	4190	4010	---	---	---
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.9	---	---	---
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	---	EPP444	0.010	pH units	11.8	11.8	11.7	11.7	11.7
pH, TCLP 2nd preliminary	---	EPP444	0.010	pH units	8.49	8.89	8.89	8.89	8.89
pH, TCLP extraction fluid initial	---	EPP444	0.010	pH units	2.93	2.93	2.88	2.88	2.88
pH, TCLP final	---	EPP444	0.010	pH units	5.69	5.69	6.70	6.77	6.60
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	4.06	3.87	---	---	---
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.249	0.234	---	---	---
calcium, TCLP	7440-70-2	E444	2.0	mg/L	2130	2100	---	---	---
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.806	1.06	---	---	---
copper, TCLP	7440-50-8	E444	0.050	mg/L	2.01	2.01	---	---	---
iron, TCLP	7439-89-6	E444	5.0	mg/L	6.7	<5.0	---	---	---
lead, TCLP	7439-92-1	E444	0.25	mg/L	1.82	0.48	---	---	---
magnesium, TCLP	7439-95-4	E444	0.50	mg/L	155	153	---	---	---
mercury, TCLP	7439-97-6	E512	0.0100	mg/L	<0.0100	<0.0100	---	---	---
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.62	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					Client sample ID				
(Matrix: Soil)					BA1948-A-11	BA1948-A-12	BA1948-A-4 REP 1	BA1948-A-4 REP 2	BA1948-A-4 REP 3
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-011	VA19A0224-012	VA19A0224-013	VA19A0224-014	VA19A0224-015
TCLP Metals					Result	Result	Result	Result	Result
zinc, TCLP	7440-66-6	E444	0.50	mg/L	103	70.9	----	----	----

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

### Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-4 REP 4	BA1948-A-6 REP 1	BA1948-A-6 REP 2	BA1948-A-10 REP 1	BA1948-A-10 REP 2
Client sampling date / time					27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-016	VA19A0224-017	VA19A0224-018	VA19A0224-019	VA19A0224-020
TCLP Metals					Result	Result	Result	Result	Result
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.7	11.7	11.7	11.7
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.89	8.94	8.94	8.61	8.61
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	6.95	6.65	7.01	6.69	6.72

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



### Analytical Results

Sub-Matrix: Soil (Matrix: Soil)					Client sample ID	BA1948-A-10 REP 3	BA1948-A-10 REP 4	----	----	----
Client sampling date / time						27-Nov-2019 09:00	27-Nov-2019 09:00	---	---	---
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-021	VA19A0224-022	-----	-----	-----	
TCLP Metals					Result	Result	---	---	---	
pH, TCLP 1st preliminary	---	EPP444	0.010	pH units	11.7	11.7	----	----	----	
pH, TCLP 2nd preliminary	---	EPP444	0.010	pH units	8.61	8.61	----	----	----	
pH, TCLP extraction fluid initial	---	EPP444	0.010	pH units	2.88	2.88	----	----	----	
pH, TCLP final	---	EPP444	0.010	pH units	6.76	5.81	----	----	----	

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

### Analytical Results

Sub-Matrix: TCLP Leachate (Matrix: Soil)					Client sample ID	BA1948-A-4 REP 1	BA1948-A-4 REP 2	BA1948-A-4 REP 3	BA1948-A-4 REP 4	BA1948-A-6 REP 1
Client sampling date / time						27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-013	VA19A0224-014	VA19A0224-015	VA19A0224-016	VA19A0224-017	
TCLP Metals					Result	Result	Result	Result	Result	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.124	0.139	0.153	0.210	0.170	

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

### Analytical Results

Sub-Matrix: TCLP Leachate (Matrix: Soil)					Client sample ID	BA1948-A-6 REP 2	BA1948-A-10 REP 1	BA1948-A-10 REP 2	BA1948-A-10 REP 3	BA1948-A-10 REP 4
Client sampling date / time						27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00	27-Nov-2019 09:00
Analyte	CAS Number	Method	LOR	Unit	VA19A0224-018	VA19A0224-019	VA19A0224-020	VA19A0224-021	VA19A0224-022	
TCLP Metals					Result	Result	Result	Result	Result	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.122	0.133	0.230	0.668	0.302	

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



**CERTIFICATE OF ANALYSIS**

**Work Order** : **VA19A0690**  
**Client** : **Covanta Burnaby R.E., ULC**  
**Contact** : Steve McKinney  
**Address** : 5150 Riverbend Drive  
Burnaby BC Canada V3N 4V3  
**Telephone** : 604 521 1025  
**Project** : ----  
**PO** : VANCO-0000048466  
**C-O-C number** : ----  
**Sampler** : ----  
**Site** : ----  
**Quote number** : Standing Offer  
**No. of samples received** : 24  
**No. of samples analysed** : 2

**Page** : 1 of 3  
**Laboratory** : Vancouver - Environmental  
**Account Manager** : Brent Mack  
**Address** : 8081 Lougheed Highway  
Burnaby BC Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 17-Dec-2019 16:16  
**Date Analysis Commenced** : 18-Dec-2019  
**Issue Date** : 19-Dec-2019 18:32

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

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

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

**Signatories**

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

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Brianna Allen	Department Manager - Organics	Organics, Burnaby, British Columbia
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>
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.

## Workorder Comments

This workorder has been created to re-batch samples from VA19A0224



## Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil)					BA1948-A-4 REP 5	BA1948-A-10 REP 5	----	----	----
Client sampling date / time					27-Nov-2019	27-Nov-2019	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA19A0690-023	VA19A0690-024	-----	-----	-----
					Result	Result	---	---	---
<b>TCLP Metals</b>									
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	----	----	----
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.89	8.61	----	----	----
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	----	----	----
pH, TCLP final	----	EPP444	0.010	pH units	6.35	6.49	----	----	----
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.190	0.140	----	----	----

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