

## Bottom Ash Data

2019 Week 21

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on June 10, 2019. The data represents bottom ash composite results for week 21 of 2019 (May 19, 2019 to May 25, 2019).

The bottom ash meets the requirements of Metro Vancouver's Bottom Ash Management Plan and is suitable for beneficial use during Coquitlam Landfill closure works.



Covanta Burnaby R.E., ULC  
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Burnaby BC V3N 4V3

Date Received: 29-MAY-19  
Report Date: 05-JUN-19 16:00 (MT)  
Version: FINAL

Client Phone: 604-521-1025

## Certificate of Analysis

Lab Work Order #: L2281722  
Project P.O. #: VANCO-0000048466  
Job Reference:  
C of C Numbers:  
Legal Site Desc:

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Brent Mack, B.Sc.  
Account Manager

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L2281722-1 Soil 22-MAY-19 09:00 BA1921-A-1	L2281722-2 Soil 22-MAY-19 09:00 BA1921-A-2	L2281722-3 Soil 22-MAY-19 09:00 BA1921-A-3	L2281722-4 Soil 22-MAY-19 09:00 BA1921-A-4	L2281722-5 Soil 22-MAY-19 09:00 BA1921-A-5	
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	17.1	16.4	16.9	15.7	16.6
	pH (1:2 soil:water) (pH)	12.28	12.35	12.36	12.34	12.39
<b>Metals</b>	Aluminum (Al) (mg/kg)	54900	34400	29100	38500	33700
	Antimony (Sb) (mg/kg)	109	183	131	112	133
	Arsenic (As) (mg/kg)	38.3	34.2	31.4	31.9	38.2
	Barium (Ba) (mg/kg)	812	759	703	781	740
	Beryllium (Be) (mg/kg)	0.46	0.41	0.38	0.42	0.41
	Bismuth (Bi) (mg/kg)	4.15	8.96	4.52	4.73	4.92
	Boron (B) (mg/kg)	286	335	241	319	326
	Cadmium (Cd) (mg/kg)	11.5	9.71	114	8.82	9.15
	Calcium (Ca) (mg/kg)	132000	134000	122000	126000	132000
	Chromium (Cr) (mg/kg)	134	185	129	280	141
	Cobalt (Co) (mg/kg)	23.8	36.2	18.1	21.3	47.9
	Copper (Cu) (mg/kg)	25600	2680	1640	1670	25700
	Iron (Fe) (mg/kg)	47800	81300	53100	58300	59700
	Lead (Pb) (mg/kg)	418	629	662	457	558
	Lithium (Li) (mg/kg)	18.0	18.9	18.4	16.9	17.9
	Magnesium (Mg) (mg/kg)	11700	13100	10800	10900	11500
	Manganese (Mn) (mg/kg)	1180	872	713	939	930
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	26.8	36.7	29.1	25.0	28.3
	Nickel (Ni) (mg/kg)	96.2	308	155	159	694
	Phosphorus (P) (mg/kg)	8240	8920	9110	8880	8310
	Potassium (K) (mg/kg)	4930	4790	5140	4790	4630
	Selenium (Se) (mg/kg)	0.40	0.33	0.32	0.31	0.72
	Silver (Ag) (mg/kg)	3.68	3.96	3.87	3.49	4.65
	Sodium (Na) (mg/kg)	14500	14900	14800	14200	14500
	Strontium (Sr) (mg/kg)	298	461	310	315	307
	Sulfur (S) (mg/kg)	10800	12500	11700	10500	11700
	Thallium (Tl) (mg/kg)	0.053	0.053	0.058	<0.050	<0.050
	Tin (Sn) (mg/kg)	95.5	111	110	95.4	149
	Titanium (Ti) (mg/kg)	2490	1600	1560	1480	1810
	Tungsten (W) (mg/kg)	5.20	5.47	9.06	6.96	5.60
	Uranium (U) (mg/kg)	4.09	4.14	4.07	3.89	3.96
	Vanadium (V) (mg/kg)	50.5	49.5	43.3	45.6	49.2
	Zinc (Zn) (mg/kg)	6090	6610	5720	2840	8460
	Zirconium (Zr) (mg/kg)	6.3	2.1	2.0	2.5	2.7

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L2281722-6 Soil 22-MAY-19 09:00 BA1921-A-6	L2281722-7 Soil 22-MAY-19 09:00 BA1921-A-7	L2281722-8 Soil 22-MAY-19 09:00 BA1921-A-8	L2281722-9 Soil 22-MAY-19 09:00 BA1921-A-9	L2281722-10 Soil 22-MAY-19 09:00 BA1921-A-10	
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	16.6	16.5	16.9	15.9	16.7
	pH (1:2 soil:water) (pH)	12.30	12.33	12.40	12.20	12.27
<b>Metals</b>	Aluminum (Al) (mg/kg)	28800	31100	33000	36400	34200
	Antimony (Sb) (mg/kg)	204	173	144	132	137
	Arsenic (As) (mg/kg)	37.7	39.3	35.2	36.1	48.9
	Barium (Ba) (mg/kg)	711	756	724	811	873
	Beryllium (Be) (mg/kg)	0.40	0.41	0.40	0.41	0.41
	Bismuth (Bi) (mg/kg)	5.69	9.98	5.39	4.69	5.28
	Boron (B) (mg/kg)	305	411	378	291	322
	Cadmium (Cd) (mg/kg)	17.9	11.3	11.5	89.4	9.77
	Calcium (Ca) (mg/kg)	134000	146000	135000	136000	133000
	Chromium (Cr) (mg/kg)	144	170	172	819	234
	Cobalt (Co) (mg/kg)	28.1	41.2	30.8	33.6	183
	Copper (Cu) (mg/kg)	2210	7760	15100	8530	2450
	Iron (Fe) (mg/kg)	56200	85900	50600	65600	67400
	Lead (Pb) (mg/kg)	3300	560	563	1830	565
	Lithium (Li) (mg/kg)	21.0	18.6	17.1	19.3	26.2
	Magnesium (Mg) (mg/kg)	11600	11900	10900	11100	12400
	Manganese (Mn) (mg/kg)	2150	982	776	846	1180
	Mercury (Hg) (mg/kg)	<0.050	0.052	0.474	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	45.2	38.3	404	145	49.0
	Nickel (Ni) (mg/kg)	150	371	179	714	215
	Phosphorus (P) (mg/kg)	10000	9500	8620	8890	9230
	Potassium (K) (mg/kg)	4810	5100	4910	4570	4760
	Selenium (Se) (mg/kg)	0.35	0.36	0.50	0.40	0.39
	Silver (Ag) (mg/kg)	6.70	3.56	6.90	3.80	3.77
	Sodium (Na) (mg/kg)	15000	14800	15700	14500	14400
	Strontium (Sr) (mg/kg)	313	334	383	310	316
	Sulfur (S) (mg/kg)	12300	13800	12400	11900	11600
	Thallium (Tl) (mg/kg)	0.051	0.056	0.061	0.065	0.054
	Tin (Sn) (mg/kg)	260	1410	105	113	274
	Titanium (Ti) (mg/kg)	826	798	1270	1500	1360
	Tungsten (W) (mg/kg)	7.07	7.42	6.17	6.76	6.02
	Uranium (U) (mg/kg)	4.26	4.56	4.61	4.19	4.16
	Vanadium (V) (mg/kg)	48.6	54.6	51.2	61.7	67.9
	Zinc (Zn) (mg/kg)	4460	5290	7140	12500	6300
	Zirconium (Zr) (mg/kg)	1.4	1.1	1.6	1.8	1.9

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2281722-11	L2281722-12		
		Description	Soil	Soil		
		Sampled Date	22-MAY-19	22-MAY-19		
		Sampled Time	09:00	09:00		
		Client ID	BA1921-A-11	BA1921-A-12		
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	16.2	17.7			
	pH (1:2 soil:water) (pH)	12.12	12.24			
<b>Metals</b>	Aluminum (Al) (mg/kg)	38000	39100			
	Antimony (Sb) (mg/kg)	130	152			
	Arsenic (As) (mg/kg)	30.2	36.7			
	Barium (Ba) (mg/kg)	730	775			
	Beryllium (Be) (mg/kg)	0.40	0.43			
	Bismuth (Bi) (mg/kg)	31.6	5.39			
	Boron (B) (mg/kg)	371	302			
	Cadmium (Cd) (mg/kg)	8.68	10.6			
	Calcium (Ca) (mg/kg)	128000	136000			
	Chromium (Cr) (mg/kg)	155	512			
	Cobalt (Co) (mg/kg)	645	42.5			
	Copper (Cu) (mg/kg)	4290	9240			
	Iron (Fe) (mg/kg)	57400	82000			
	Lead (Pb) (mg/kg)	488	4690			
	Lithium (Li) (mg/kg)	31.5	19.9			
	Magnesium (Mg) (mg/kg)	11000	12700			
	Manganese (Mn) (mg/kg)	725	1010			
	Mercury (Hg) (mg/kg)	<0.050	<0.050			
	Molybdenum (Mo) (mg/kg)	26.9	39.5			
	Nickel (Ni) (mg/kg)	128	581			
	Phosphorus (P) (mg/kg)	10100	9540			
	Potassium (K) (mg/kg)	4590	4710			
	Selenium (Se) (mg/kg)	0.97	0.38			
	Silver (Ag) (mg/kg)	7.50	11.6			
	Sodium (Na) (mg/kg)	14200	14800			
	Strontium (Sr) (mg/kg)	298	320			
	Sulfur (S) (mg/kg)	10900	12000			
	Thallium (Tl) (mg/kg)	<0.050	0.566			
	Tin (Sn) (mg/kg)	129	531			
	Titanium (Ti) (mg/kg)	1510	1070			
	Tungsten (W) (mg/kg)	5.26	8.69			
	Uranium (U) (mg/kg)	4.02	4.34			
Vanadium (V) (mg/kg)	48.7	59.7				
Zinc (Zn) (mg/kg)	4140	10600				
Zirconium (Zr) (mg/kg)	2.5	1.6				

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2281722-1	L2281722-2	L2281722-3	L2281722-4	L2281722-5
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	22-MAY-19	22-MAY-19	22-MAY-19	22-MAY-19	22-MAY-19
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1921-A-1	BA1921-A-2	BA1921-A-3	BA1921-A-4	BA1921-A-5
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.80	11.87	11.90	11.90	11.86
	2nd Preliminary pH (pH)		8.14	9.22	9.21	9.11	8.95
	Final pH (pH)		6.28	2.86	6.04	5.97	5.98
	Extraction Solution Initial pH (pH)		2.83	2.83	2.83	2.83	2.83
	Antimony (Sb)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Arsenic (As)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Barium (Ba)-Leachable (mg/L)		<2.5	<2.5	<2.5	<2.5	<2.5
	Beryllium (Be)-Leachable (mg/L)		<0.025	<0.025	<0.025	<0.025	<0.025
	Boron (B)-Leachable (mg/L)		2.92	2.96	2.71	2.90	3.66
	Cadmium (Cd)-Leachable (mg/L)		0.213	0.205	0.160	0.181	0.354
	Calcium (Ca)-Leachable (mg/L)		1940	1910	1970	1910	2070
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.389	0.820	0.403	1.69	0.764
	Copper (Cu)-Leachable (mg/L)		1.93	1.47	1.42	0.991	1.16
	Iron (Fe)-Leachable (mg/L)		5.6	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		1.66	<0.25	<0.25	0.40	0.35
	Magnesium (Mg)-Leachable (mg/L)		115	110	111	120	129
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.34	0.58	0.43	0.40	0.56
	Selenium (Se)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Silver (Ag)-Leachable (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Thallium (Tl)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Vanadium (V)-Leachable (mg/L)		<0.15	<0.15	<0.15	<0.15	<0.15
	Zinc (Zn)-Leachable (mg/L)		76.3	50.7	46.8	48.2	72.0

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2281722-6	L2281722-7	L2281722-8	L2281722-9	L2281722-10
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	22-MAY-19	22-MAY-19	22-MAY-19	22-MAY-19	22-MAY-19
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1921-A-6	BA1921-A-7	BA1921-A-8	BA1921-A-9	BA1921-A-10
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.89	11.85	11.84	11.92	11.82
	2nd Preliminary pH (pH)		8.46	8.62	8.40	8.99	8.59
	Final pH (pH)		5.88	5.90	5.87	5.90	5.89
	Extraction Solution Initial pH (pH)		2.83	2.83	2.83	2.83	2.83
	Antimony (Sb)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Arsenic (As)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Barium (Ba)-Leachable (mg/L)		<2.5	<2.5	<2.5	<2.5	<2.5
	Beryllium (Be)-Leachable (mg/L)		<0.025	<0.025	<0.025	<0.025	<0.025
	Boron (B)-Leachable (mg/L)		2.82	2.99	2.67	2.78	2.85
	Cadmium (Cd)-Leachable (mg/L)		0.248	0.235	0.195	0.196	0.177
	Calcium (Ca)-Leachable (mg/L)		2010	1980	1960	1950	1980
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.468	0.638	2.72	0.693	0.489
	Copper (Cu)-Leachable (mg/L)		1.48	1.51	1.80	1.11	1.12
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	2.24	0.51	0.53	0.34
	Magnesium (Mg)-Leachable (mg/L)		121	125	120	127	131
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.57	0.89	0.48	0.42	0.45
	Selenium (Se)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Silver (Ag)-Leachable (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Thallium (Tl)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Vanadium (V)-Leachable (mg/L)		<0.15	<0.15	<0.15	<0.15	<0.15
	Zinc (Zn)-Leachable (mg/L)		62.8	50.9	50.2	62.5	54.9

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	<b>Sample ID</b> <b>Description</b> <b>Sampled Date</b> <b>Sampled Time</b> <b>Client ID</b>	L2281722-11 Soil 22-MAY-19 09:00 BA1921-A-11	L2281722-12 Soil 22-MAY-19 09:00 BA1921-A-12		
Grouping	Analyte				
<b>SOIL</b>					
<b>TCLP Metals</b>	1st Preliminary pH (pH)	11.84	11.92		
	2nd Preliminary pH (pH)	8.90	8.83		
	Final pH (pH)	5.95	5.94		
	Extraction Solution Initial pH (pH)	2.83	2.83		
	Antimony (Sb)-Leachable (mg/L)	<1.0	<1.0		
	Arsenic (As)-Leachable (mg/L)	<1.0	<1.0		
	Barium (Ba)-Leachable (mg/L)	<2.5	<2.5		
	Beryllium (Be)-Leachable (mg/L)	<0.025	<0.025		
	Boron (B)-Leachable (mg/L)	2.89	2.86		
	Cadmium (Cd)-Leachable (mg/L)	0.182	0.178		
	Calcium (Ca)-Leachable (mg/L)	2070	1950		
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25		
	Cobalt (Co)-Leachable (mg/L)	0.842	0.609		
	Copper (Cu)-Leachable (mg/L)	1.54	1.30		
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0		
	Lead (Pb)-Leachable (mg/L)	<0.25	0.49		
	Magnesium (Mg)-Leachable (mg/L)	125	125		
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010		
	Nickel (Ni)-Leachable (mg/L)	0.79	0.41		
	Selenium (Se)-Leachable (mg/L)	<1.0	<1.0		
	Silver (Ag)-Leachable (mg/L)	<0.050	<0.050		
	Thallium (Tl)-Leachable (mg/L)	<1.0	<1.0		
	Vanadium (V)-Leachable (mg/L)	<0.15	<0.15		
	Zinc (Zn)-Leachable (mg/L)	47.9	57.8		

\* Please refer to the Reference Information section for an explanation of any qualifiers detected.



## Reference Information

## QC Samples with Qualifiers &amp; Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Silver (Ag)	DUP-H	L2281722-7
Duplicate	Chromium (Cr)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Iron (Fe)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Lead (Pb)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Manganese (Mn)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Thallium (Tl)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tungsten (W)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)	DUP-H	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Laboratory Control Sample	Antimony (Sb)	MES	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2281722-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

## Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
MS-B	Matrix Spike recovery could not be accurately calculated due to high analyte background in sample.

## Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
<b>AG-200.2-A-CCMS-VA</b>	Soil	Elevated Ag in Soil by CRC ICPMS	EPA 200.2/6020A
		Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.	
<b>HG-200.2-CVAF-VA</b>	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
		Soil samples are digested with hot nitric and hydrochloric acids, followed by CVAAS analysis. This method is fully compliant with the BC SALM strong acid leachable metals digestion method.	
<b>HG-TCLP-CVAFS-VA</b>	Soil	Mercury by CVAAS (TCLP)	EPA 1311/245.7
		This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA 245.7).	
<b>MET-200.2-CCMS-VA</b>	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
		Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.	
		Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H <sub>2</sub> S) may be excluded if lost during sampling, storage, or digestion.	
<b>MET-TCLP-CCMS-VA</b>	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A
		This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).	
<b>MOISTURE-VA</b>	Soil	Moisture content	CCME PHC in Soil - Tier 1 (mod)
		This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of two hours.	
<b>PH-1:2-VA</b>	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

## Reference Information

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

\*\* ALS test methods may incorporate modifications from specified reference methods to improve performance.

*The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:*

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

### Chain of Custody Numbers:

#### GLOSSARY OF REPORT TERMS

*Surrogate - A compound that is similar in behaviour 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.*

*mg/kg - milligrams per kilogram based on dry weight of sample.*

*mg/kg wwt - milligrams per kilogram based on wet weight of sample.*

*mg/kg lwt - milligrams per kilogram based on lipid-adjusted weight of sample.*

*mg/L - milligrams per litre.*

*< - Less than.*

*D.L. - The reported Detection Limit, also known as the Limit of Reporting (LOR).*

*N/A - Result not available. Refer to qualifier code and definition for explanation.*

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

**UNLESS OTHERWISE STATED, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.**

*Analytical results in unsigned test reports with the DRAFT watermark are subject to change, pending final QC review.*



Cha



L2281722-COFC

COC #

Page \_\_\_ of \_\_\_

<b>Report To</b>		<b>Report Format</b>		<b>Service Requested</b> (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	smckinney@covanta.com		
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		
			brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
BA1921-A-1		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-2		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-3		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-4		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-5		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-6		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-7		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-8		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-9		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-10		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-11		22-May-19	9:00	Soil	X	X		X	1
BA1921-A-12		22-May-19	9:00	Soil	X	X		X	1

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.  
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.  
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
[Signature]	29-May-19	0800	HA	5/29	12:15p	22 °C				Yes / No ? If Yes add SIF