

Bottom Ash Data

2018 Week 50

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on January 7, 2019. The data represents bottom ash composite results for week 50 of 2018 (December 9, 2018 to December 15, 2018).

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
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 18-DEC-18
Report Date: 04-JAN-19 17:24 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2212045
Project P.O. #: VANCO-0000047506
Job Reference:
C of C Numbers:
Legal Site Desc: Weekly Bottom Ash (includes 2:1) pH

Comments: ADDITIONAL 28-DEC-18 18:55

"As per client request, certain samples were re-prepped from scratch and analyzed for TCLP Metals (TCLP Cd) in varying replicate amounts. Results are reported as samples #13-16, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-16, as per client instructions. The prep data was taken from the original samples but is reported with the re-prepped samples for informational purposes."

Brent Mack, B.Sc.
Account Manager

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ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2212045-1	L2212045-2	L2212045-3	L2212045-4	L2212045-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1850-A-1	BA1850-A-2	BA1850-A-3	BA1850-A-4	BA1850-A-5
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		22.9	22.6	23.7	23.8	23.3
	pH (1:2 soil:water) (pH)		11.69	11.67	11.58	11.77	11.81
Metals	Aluminum (Al) (mg/kg)		34300	34200	40800	40300	35800
	Antimony (Sb) (mg/kg)		119	125	128	197	150
	Arsenic (As) (mg/kg)		32.8	25.3	28.6	26.6	25.8
	Barium (Ba) (mg/kg)		582	524	625	546	740
	Beryllium (Be) (mg/kg)		0.37	0.39	0.45	0.45	0.43
	Bismuth (Bi) (mg/kg)		6.69	19.8	22.3	9.85	7.99
	Boron (B) (mg/kg)		298	238	214	278	293
	Cadmium (Cd) (mg/kg)		15.7	10.7	10.2	11.7	10.7
	Calcium (Ca) (mg/kg)		128000	131000	132000	125000	139000
	Chromium (Cr) (mg/kg)		144	144	155	140	173
	Cobalt (Co) (mg/kg)		27.6	72.9	33.2	22.5	39.6
	Copper (Cu) (mg/kg)		2630	3300	3660	1480	4980
	Iron (Fe) (mg/kg)		64300	60500	57400	52000	76900
	Lead (Pb) (mg/kg)		362	369	451	2400	855
	Lithium (Li) (mg/kg)		15.7	16.1	17.1	23.4	20.9
	Magnesium (Mg) (mg/kg)		11800	12900	12900	11700	14400
	Manganese (Mn) (mg/kg)		664	771	847	858	799
	Mercury (Hg) (mg/kg)		<0.050	<0.050	0.051	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)		74.8	41.2	62.1	40.8	66.8
	Nickel (Ni) (mg/kg)		114	139	305	191	259
	Phosphorus (P) (mg/kg)		12300	10400	10700	9890	11600
	Potassium (K) (mg/kg)		5210	5440	5790	5620	5350
	Selenium (Se) (mg/kg)		0.39	0.33	0.57	2.17	0.42
	Silver (Ag) (mg/kg)		3.87	6.30	3.95	4.19	19.4
	Sodium (Na) (mg/kg)		13300	13300	15300	13800	14500
	Strontium (Sr) (mg/kg)		322	304	302	340	527
Sulfur (S) (mg/kg)		11700	11400	11800	10900	11500	
Thallium (Tl) (mg/kg)		0.069	0.068	0.070	0.068	0.066	
Tin (Sn) (mg/kg)		114	232	124	99.3	133	
Titanium (Ti) (mg/kg)		940	721	1660	1140	1200	
Tungsten (W) (mg/kg)		5.00	3.70	6.12	5.78	5.50	
Uranium (U) (mg/kg)		4.28	4.37	4.86	4.44	4.38	
Vanadium (V) (mg/kg)		41.9	42.7	46.3	39.8	41.2	
Zinc (Zn) (mg/kg)		2910	10700	3020	3200	3700	
Zirconium (Zr) (mg/kg)		1.3	1.6	2.7	1.8	1.3	

* 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	L2212045-6 soil 12-DEC-18 09:00 BA1850-A-6	L2212045-7 soil 12-DEC-18 09:00 BA1850-A-7	L2212045-8 soil 12-DEC-18 09:00 BA1850-A-8	L2212045-9 soil 12-DEC-18 09:00 BA1850-A-9	L2212045-10 soil 12-DEC-18 09:00 BA1850-A-10	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	23.1	23.3	24.6	22.3	22.9
	pH (1:2 soil:water) (pH)	11.83	11.84	11.63	11.75	11.44
Metals	Aluminum (Al) (mg/kg)	45600	41500	42400	40900	36400
	Antimony (Sb) (mg/kg)	110	148	126	118	128
	Arsenic (As) (mg/kg)	29.3	28.7	31.8	24.7	25.0
	Barium (Ba) (mg/kg)	524	502	555	531	556
	Beryllium (Be) (mg/kg)	0.39	0.41	0.40	0.38	0.40
	Bismuth (Bi) (mg/kg)	9.58	7.63	8.07	10.3	18.5
	Boron (B) (mg/kg)	320	322	261	203	202
	Cadmium (Cd) (mg/kg)	10.2	9.31	10.4	9.62	11.8
	Calcium (Ca) (mg/kg)	131000	126000	138000	127000	121000
	Chromium (Cr) (mg/kg)	137	115	253	352	145
	Cobalt (Co) (mg/kg)	20.0	90.1	420	22.3	120
	Copper (Cu) (mg/kg)	2220	3450	2050	10000	3780
	Iron (Fe) (mg/kg)	45900	37600	57700	59600	73900
	Lead (Pb) (mg/kg)	365	952	653	473	2340
	Lithium (Li) (mg/kg)	15.0	16.7	18.3	14.7	23.5
	Magnesium (Mg) (mg/kg)	11800	10700	13300	10900	10400
	Manganese (Mn) (mg/kg)	621	720	820	692	894
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	33.6	40.4	106	47.3	493
	Nickel (Ni) (mg/kg)	72.4	73.9	122	164	94.2
	Phosphorus (P) (mg/kg)	9400	11300	12900	10500	10000
	Potassium (K) (mg/kg)	5560	5420	5360	6070	5400
	Selenium (Se) (mg/kg)	0.33	0.34	0.48	0.43	0.43
	Silver (Ag) (mg/kg)	4.38	6.42	6.26	4.16	4.84
	Sodium (Na) (mg/kg)	14300	14300	14100	14000	14100
	Strontium (Sr) (mg/kg)	309	309	347	289	288
	Sulfur (S) (mg/kg)	11100	11200	12800	12200	13700
	Thallium (Tl) (mg/kg)	0.058	0.068	0.067	0.069	0.078
	Tin (Sn) (mg/kg)	922	1290	100	148	115
	Titanium (Ti) (mg/kg)	1150	505	1170	1070	1310
	Tungsten (W) (mg/kg)	4.48	4.22	6.70	4.83	4.71
	Uranium (U) (mg/kg)	4.25	4.47	4.68	4.48	4.52
	Vanadium (V) (mg/kg)	48.3	41.7	76.9	41.9	43.2
	Zinc (Zn) (mg/kg)	2830	3550	3220	2930	3330
	Zirconium (Zr) (mg/kg)	2.4	1.8	1.8	2.2	1.5

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2212045-11	L2212045-12	L2212045-13	L2212045-14	L2212045-15
		Description	soil	soil			
		Sampled Date	12-DEC-18	12-DEC-18			
		Sampled Time	09:00	09:00			
		Client ID	BA1850-A-11	BA1850-A-12	BA1850-A-11 REP 1	BA1850-A-11 REP 2	BA1850-A-11 REP 3
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		23.5	23.3			
	pH (1:2 soil:water) (pH)		11.42	11.67			
Metals	Aluminum (Al) (mg/kg)		34400	29400			
	Antimony (Sb) (mg/kg)		127	130			
	Arsenic (As) (mg/kg)		24.2	45.5			
	Barium (Ba) (mg/kg)		629	643			
	Beryllium (Be) (mg/kg)		0.37	0.41			
	Bismuth (Bi) (mg/kg)		11.2	8.35			
	Boron (B) (mg/kg)		205	365			
	Cadmium (Cd) (mg/kg)		12.8	10.6			
	Calcium (Ca) (mg/kg)		134000	134000			
	Chromium (Cr) (mg/kg)		552	127			
	Cobalt (Co) (mg/kg)		22.6	22.7			
	Copper (Cu) (mg/kg)		4850	15000			
	Iron (Fe) (mg/kg)		59000	54600			
	Lead (Pb) (mg/kg)		346	10400			
	Lithium (Li) (mg/kg)		14.7	44.2			
	Magnesium (Mg) (mg/kg)		13000	11400			
	Manganese (Mn) (mg/kg)		827	1390			
	Mercury (Hg) (mg/kg)		0.090	<0.050			
	Molybdenum (Mo) (mg/kg)		59.6	43.0			
	Nickel (Ni) (mg/kg)		308	162			
	Phosphorus (P) (mg/kg)		11300	9910			
	Potassium (K) (mg/kg)		5370	5680			
	Selenium (Se) (mg/kg)		0.32	0.38			
	Silver (Ag) (mg/kg)		5.00	5.88			
	Sodium (Na) (mg/kg)		13500	14000			
	Strontium (Sr) (mg/kg)		406	315			
	Sulfur (S) (mg/kg)		11700	12500			
	Thallium (Tl) (mg/kg)		0.063	0.131			
	Tin (Sn) (mg/kg)		111	327			
	Titanium (Ti) (mg/kg)		1000	931			
	Tungsten (W) (mg/kg)		7.46	7.35			
	Uranium (U) (mg/kg)		4.55	4.57			
Vanadium (V) (mg/kg)		41.8	42.9				
Zinc (Zn) (mg/kg)		5030	3290				
Zirconium (Zr) (mg/kg)		1.3	1.1				

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID Description Sampled Date Sampled Time Client ID				
		L2212045-16 BA1850-A-11 REP 4				
SOIL						
Physical Tests	Moisture (%) pH (1:2 soil:water) (pH)					
Metals	Aluminum (Al) (mg/kg) Antimony (Sb) (mg/kg) Arsenic (As) (mg/kg) Barium (Ba) (mg/kg) Beryllium (Be) (mg/kg) Bismuth (Bi) (mg/kg) Boron (B) (mg/kg) Cadmium (Cd) (mg/kg) Calcium (Ca) (mg/kg) Chromium (Cr) (mg/kg) Cobalt (Co) (mg/kg) Copper (Cu) (mg/kg) Iron (Fe) (mg/kg) Lead (Pb) (mg/kg) Lithium (Li) (mg/kg) Magnesium (Mg) (mg/kg) Manganese (Mn) (mg/kg) Mercury (Hg) (mg/kg) Molybdenum (Mo) (mg/kg) Nickel (Ni) (mg/kg) Phosphorus (P) (mg/kg) Potassium (K) (mg/kg) Selenium (Se) (mg/kg) Silver (Ag) (mg/kg) Sodium (Na) (mg/kg) Strontium (Sr) (mg/kg) Sulfur (S) (mg/kg) Thallium (Tl) (mg/kg) Tin (Sn) (mg/kg) Titanium (Ti) (mg/kg) Tungsten (W) (mg/kg) Uranium (U) (mg/kg) Vanadium (V) (mg/kg) Zinc (Zn) (mg/kg) Zirconium (Zr) (mg/kg)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2212045-1	L2212045-2	L2212045-3	L2212045-4	L2212045-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1850-A-1	BA1850-A-2	BA1850-A-3	BA1850-A-4	BA1850-A-5
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.66	11.71	11.61	11.79	11.76
	2nd Preliminary pH (pH)		9.71	9.86	9.73	9.99	10.02
	Final pH (pH)		6.19	6.13	6.16	6.21	6.02
	Extraction Solution Initial pH (pH)		2.88	2.88	2.88	2.88	2.88
	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)		3.51	2.90	3.11	3.41	3.18
	Cadmium (Cd)-Leachable (mg/L)		0.174	0.215	0.192	0.153	0.179
	Calcium (Ca)-Leachable (mg/L)		1990	2040	2060	2020	1930
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.373	0.300	0.335	0.297	0.204
	Copper (Cu)-Leachable (mg/L)		1.07	2.74	1.21	1.41	1.61
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25	0.36	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)		124	128	127	128	132
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.50	0.70	0.44	0.52	0.40
	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)		38.4	51.8	53.0	46.7	75.0

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2212045-6	L2212045-7	L2212045-8	L2212045-9	L2212045-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18	12-DEC-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1850-A-6	BA1850-A-7	BA1850-A-8	BA1850-A-9	BA1850-A-10
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.64	11.67	11.73	11.68	11.80
	2nd Preliminary pH (pH)		9.62	9.81	9.92	9.86	10.18
	Final pH (pH)		6.11	6.28	6.09	6.41	6.04
	Extraction Solution Initial pH (pH)		2.88	2.88	2.88	2.88	2.88
	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)		3.90	2.95	2.68	5.99	2.73
	Cadmium (Cd)-Leachable (mg/L)		0.222	0.154	0.168	0.317	0.185
	Calcium (Ca)-Leachable (mg/L)		2170	2070	2040	2110	2000
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.555	0.434	0.696	0.214	0.358
	Copper (Cu)-Leachable (mg/L)		1.31	0.951	1.92	0.766	1.96
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		0.31	<0.25	<0.25	<0.25	0.88
	Magnesium (Mg)-Leachable (mg/L)		118	119	115	118	108
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.36	0.32	0.45	0.34	0.40
	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)		89.3	28.5	35.5	32.7	36.9

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2212045-11	L2212045-12	L2212045-13	L2212045-14	L2212045-15
		Description	soil	soil			
		Sampled Date	12-DEC-18	12-DEC-18			
		Sampled Time	09:00	09:00			
		Client ID	BA1850-A-11	BA1850-A-12	BA1850-A-11 REP 1	BA1850-A-11 REP 2	BA1850-A-11 REP 3
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.72	11.79	11.72	11.72	11.72
	2nd Preliminary pH (pH)		9.84	9.93	9.84	9.84	9.84
	Final pH (pH)		6.42	6.46	6.34	6.16	6.17
	Extraction Solution Initial pH (pH)		2.88	2.88	2.89	2.89	2.89
	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)		3.37	3.06			
	Cadmium (Cd)-Leachable (mg/L)		0.755	0.600	0.178	0.180	0.173
	Calcium (Ca)-Leachable (mg/L)		2020	1990			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.340	0.225			
	Copper (Cu)-Leachable (mg/L)		1.31	0.833			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		<0.25	0.34			
	Magnesium (Mg)-Leachable (mg/L)		120	118			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.51	0.43			
	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)		32.4	32.2			

* 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				
	L2212045-16				
	BA1850-A-11 REP 4				
Grouping	Analyte				
SOIL					
TCLP Metals	1st Preliminary pH (pH)	11.72			
	2nd Preliminary pH (pH)	9.84			
	Final pH (pH)	6.19			
	Extraction Solution Initial pH (pH)	2.89			
	Antimony (Sb)-Leachable (mg/L)				
	Arsenic (As)-Leachable (mg/L)				
	Barium (Ba)-Leachable (mg/L)				
	Beryllium (Be)-Leachable (mg/L)				
	Boron (B)-Leachable (mg/L)				
	Cadmium (Cd)-Leachable (mg/L)	0.463			
	Calcium (Ca)-Leachable (mg/L)				
	Chromium (Cr)-Leachable (mg/L)				
	Cobalt (Co)-Leachable (mg/L)				
	Copper (Cu)-Leachable (mg/L)				
	Iron (Fe)-Leachable (mg/L)				
	Lead (Pb)-Leachable (mg/L)				
	Magnesium (Mg)-Leachable (mg/L)				
	Mercury (Hg)-Leachable (mg/L)				
	Nickel (Ni)-Leachable (mg/L)				
	Selenium (Se)-Leachable (mg/L)				
	Silver (Ag)-Leachable (mg/L)				
	Thallium (Tl)-Leachable (mg/L)				
	Vanadium (V)-Leachable (mg/L)				
	Zinc (Zn)-Leachable (mg/L)				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Duplicate	Silver (Ag)	DUP-H	L2212045-11, -7
Duplicate	Arsenic (As)	DUP-H	L2212045-10, -11, -12
Duplicate	Bismuth (Bi)	DUP-H	L2212045-10, -11, -12
Duplicate	Boron (B)	DUP-H	L2212045-10, -11, -12
Duplicate	Cobalt (Co)	DUP-H	L2212045-1, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)	DUP-H	L2212045-10, -11, -12
Duplicate	Lead (Pb)	DUP-H	L2212045-10, -11, -12
Duplicate	Lithium (Li)	DUP-H	L2212045-10, -11, -12
Duplicate	Manganese (Mn)	DUP-H	L2212045-10, -11, -12
Duplicate	Nickel (Ni)	DUP-H	L2212045-10, -11, -12
Duplicate	Silver (Ag)	DUP-H	L2212045-10, -11, -12
Duplicate	Strontium (Sr)	DUP-H	L2212045-10, -11, -12
Duplicate	Tin (Sn)	DUP-H	L2212045-10, -11, -12
Duplicate	Titanium (Ti)	DUP-H	L2212045-10, -11, -12
Duplicate	Zinc (Zn)	DUP-H	L2212045-10, -11, -12
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2212045-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2212045-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2212045-1, -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.
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**
AG-200.2-A-CCMS-VA	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.			
HG-200.2-CVAF-VA	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.			
HG-TCLP-CVAFS-VA	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).			
MET-200.2-CCMS-VA	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, Ti, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H ₂ S) may be excluded if lost during sampling, storage, or digestion.			
MET-TCLP-ICP-VA	Soil	Metals by ICPOES (TCLP)	EPA 1311/6010B
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 inductively coupled plasma - optical emission spectrophotometry (EPA Method 6010B).			
MOISTURE-VA	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.			
PH-1:2-VA	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.

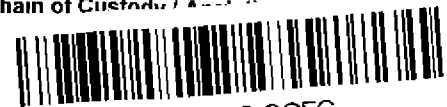
Test results reported relate only to the samples as received by the laboratory.

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.



Chain of Custody / Analysis



L2212045-COFC

COC # _____

Page ____ of ____

Report To		Report		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Stand-	(Standard Turnaround Times - Business Days)		
Contact:	Steve McKinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax	Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT		
	Burnaby BC	Email 2:	Same Day or Weekend Emergency - Contact ALS to Confirm TAT		
Phone:	604-521-1025	Email 3:			
	<input type="checkbox"/> Yes <input type="checkbox"/> No				

Invoice To		Client / Project Information		Analysis Request	
Same as Report?	<input type="checkbox"/> Yes <input type="checkbox"/> No	Job #:	Please indicate below Filtered, Preserved or both (F, P, F/P)		
Hardcopy of Invoice with Report?	<input type="checkbox"/> Yes <input type="checkbox"/> No	PO / AFE:	MET-TCLP-VA (all metals, Hg)		
Company:		PO# 46693 Weekly Bottom Ash - Suite	MOISTURE		
Contact:		LSD: (includes 2:1 pH)	Chrome 6		
Address:			MET-CSR+FULL-VA (all metals)		
Phone:		Quote #:	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)	Number of Containers
BA1850-A-1		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-2		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-3		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-4		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-5		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-6		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-7		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-8		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-9		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-10		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-11		12-Dec-18	9:00	Soil	X	X		X	1
BA1850-A-12		12-Dec-18	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:
	18-Dec-18	08:00	HA	12/18	12:22P	19 °C				Yes / No ? If Yes add SIF