

Bottom Ash Data

2018 Week 20

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on June 6, 2018. The data represents bottom ash composite results for week 20 of 2018 (May 13, 2018 to May 19, 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
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5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 23-MAY-18
Report Date: 06-JUN-18 14:15 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2099055
Project P.O. #: VANCO-0000047506
Job Reference: 46693 WEEKLY BOTTOM ASH-SUITE
C of C Numbers:
Legal Site Desc:

Comments: 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 #13-22, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-22, 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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ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L2099055-1 soil 16-MAY-18 09:00 BA1820-A-1	L2099055-2 soil 16-MAY-18 09:00 BA1820-A-2	L2099055-3 soil 16-MAY-18 09:00 BA1820-A-3	L2099055-4 soil 16-MAY-18 09:00 BA1820-A-4	L2099055-5 soil 16-MAY-18 09:00 BA1820-A-5	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	16.9	17.0	16.4	17.1	15.7
	pH (1:2 soil:water) (pH)	11.54	11.90	11.70	11.77	11.85
Metals	Aluminum (Al) (mg/kg)	38400	37900	38200	30000	31000
	Antimony (Sb) (mg/kg)	148	159	124	131	145
	Arsenic (As) (mg/kg)	31.1	37.4	32.3	33.1	38.9
	Barium (Ba) (mg/kg)	619	592	580	548	592
	Beryllium (Be) (mg/kg)	0.40	0.46	0.42	0.43	0.42
	Bismuth (Bi) (mg/kg)	10.3	10.6	8.28	9.46	10.4
	Boron (B) (mg/kg)	631	598	999	491	569
	Cadmium (Cd) (mg/kg)	12.9	11.6	11.7	17.4	14.8
	Calcium (Ca) (mg/kg)	124000	128000	125000	132000	134000
	Chromium (Cr) (mg/kg)	138	324	164	337	154
	Cobalt (Co) (mg/kg)	74.4	27.2	39.8	53.9	32.7
	Copper (Cu) (mg/kg)	52700	1780	1330	2170	1470
	Iron (Fe) (mg/kg)	47500	49400	50600	64300	54200
	Lead (Pb) (mg/kg)	663	796	595	637	734
	Lithium (Li) (mg/kg)	17.7	19.1	19.9	21.5	15.4
	Magnesium (Mg) (mg/kg)	11000	10800	11100	12300	11600
	Manganese (Mn) (mg/kg)	850	951	901	873	827
	Mercury (Hg) (mg/kg)	<0.050	0.051	0.055	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	51.8	37.4	41.9	37.2	36.7
	Nickel (Ni) (mg/kg)	170	168	116	156	125
	Phosphorus (P) (mg/kg)	10400	9640	9040	9530	11200
	Potassium (K) (mg/kg)	4960	4830	4890	5130	4960
	Selenium (Se) (mg/kg)	0.59	0.41	0.45	0.43	0.35
	Silver (Ag) (mg/kg)	7.25	6.77	14.4	8.17	7.38
	Sodium (Na) (mg/kg)	15600	15900	17200	16200	16200
	Strontium (Sr) (mg/kg)	311	329	333	402	329
	Sulfur (S) (mg/kg)	10900	11200	11400	12200	11600
	Thallium (Tl) (mg/kg)	0.067	0.085	0.064	0.072	0.066
	Tin (Sn) (mg/kg)	143	120	116	125	109
	Titanium (Ti) (mg/kg)	1010	1080	1450	856	862
	Tungsten (W) (mg/kg)	6.16	5.43	4.98	5.40	6.24
	Uranium (U) (mg/kg)	4.30	4.80	4.60	4.92	4.94
	Vanadium (V) (mg/kg)	74.5	53.5	48.4	53.7	49.3
	Zinc (Zn) (mg/kg)	14400	6030	4580	6400	4640
	Zirconium (Zr) (mg/kg)	1.3	1.1	1.8	1.1	1.1

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2099055-6	L2099055-7	L2099055-8	L2099055-9	L2099055-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-6	BA1820-A-7	BA1820-A-8	BA1820-A-9	BA1820-A-10
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		18.3	17.4	17.2	16.9	15.3
	pH (1:2 soil:water) (pH)		11.86	11.83	11.81	11.76	11.76
Metals	Aluminum (Al) (mg/kg)		31600	36100	26900	27700	33400
	Antimony (Sb) (mg/kg)		155	142	177	139	168
	Arsenic (As) (mg/kg)		35.4	29.0	36.2	35.1	38.0
	Barium (Ba) (mg/kg)		552	600	562	601	544
	Beryllium (Be) (mg/kg)		0.42	0.38	0.37	0.39	0.39
	Bismuth (Bi) (mg/kg)		11.5	11.6	32.0	17.2	10.7
	Boron (B) (mg/kg)		639	704	596	530	537
	Cadmium (Cd) (mg/kg)		18.2	28.9	13.1	87.4	17.9
	Calcium (Ca) (mg/kg)		131000	117000	128000	128000	129000
	Chromium (Cr) (mg/kg)		206	159	138	158	156
	Cobalt (Co) (mg/kg)		35.5	20.0	31.0	38.4	33.1
	Copper (Cu) (mg/kg)		4310	1620	2430	2310	2490
	Iron (Fe) (mg/kg)		51600	54700	45800	55800	65300
	Lead (Pb) (mg/kg)		650	509	1010	1640	690
	Lithium (Li) (mg/kg)		16.3	15.3	15.2	15.6	17.4
	Magnesium (Mg) (mg/kg)		11900	10700	13100	10600	10800
	Manganese (Mn) (mg/kg)		902	770	756	840	863
	Mercury (Hg) (mg/kg)		0.051	<0.050	<0.050	0.051	0.091
	Molybdenum (Mo) (mg/kg)		32.9	34.4	34.8	33.2	44.1
	Nickel (Ni) (mg/kg)		286	152	104	127	140
	Phosphorus (P) (mg/kg)		10200	10500	9690	9240	11900
	Potassium (K) (mg/kg)		5180	5060	5310	4610	4950
	Selenium (Se) (mg/kg)		0.45	0.49	0.50	0.37	0.42
	Silver (Ag) (mg/kg)		8.40	7.49	12.9	11.5	10.8
	Sodium (Na) (mg/kg)		15600	16800	15900	14600	15800
	Strontium (Sr) (mg/kg)		332	307	317	354	327
Sulfur (S) (mg/kg)		12300	11200	11500	11700	12800	
Thallium (Tl) (mg/kg)		0.079	0.065	0.064	0.074	0.066	
Tin (Sn) (mg/kg)		131	113	129	244	172	
Titanium (Ti) (mg/kg)		779	1050	771	906	676	
Tungsten (W) (mg/kg)		10.2	5.15	3.97	11.4	6.03	
Uranium (U) (mg/kg)		4.91	4.62	4.81	4.49	4.85	
Vanadium (V) (mg/kg)		51.3	49.0	46.4	49.4	51.5	
Zinc (Zn) (mg/kg)		5900	5880	5510	4830	5690	
Zirconium (Zr) (mg/kg)		1.1	1.2	<1.0	<1.0	1.1	

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2099055-11	L2099055-12	L2099055-13	L2099055-14	L2099055-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-11	BA1820-A-12	BA1820-A-5 REP 1	BA1820-A-5 REP 2	BA1820-A-5 REP 3
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		17.7	19.3			
	pH (1:2 soil:water) (pH)		11.74	11.96			
Metals	Aluminum (Al) (mg/kg)		30500	36700			
	Antimony (Sb) (mg/kg)		158	131			
	Arsenic (As) (mg/kg)		44.4	32.3			
	Barium (Ba) (mg/kg)		593	587			
	Beryllium (Be) (mg/kg)		0.39	0.47			
	Bismuth (Bi) (mg/kg)		46.3	13.0			
	Boron (B) (mg/kg)		487	517			
	Cadmium (Cd) (mg/kg)		14.4	13.0			
	Calcium (Ca) (mg/kg)		131000	128000			
	Chromium (Cr) (mg/kg)		316	140			
	Cobalt (Co) (mg/kg)		93.8	31.6			
	Copper (Cu) (mg/kg)		2360	4820			
	Iron (Fe) (mg/kg)		69700	48900			
	Lead (Pb) (mg/kg)		3460	774			
	Lithium (Li) (mg/kg)		16.8	20.2			
	Magnesium (Mg) (mg/kg)		11400	11800			
	Manganese (Mn) (mg/kg)		828	754			
	Mercury (Hg) (mg/kg)		<0.050	<0.050			
	Molybdenum (Mo) (mg/kg)		38.7	50.8			
	Nickel (Ni) (mg/kg)		310	123			
	Phosphorus (P) (mg/kg)		11300	9440			
	Potassium (K) (mg/kg)		4900	5390			
	Selenium (Se) (mg/kg)		0.89	0.31			
	Silver (Ag) (mg/kg)		15.5	9.14			
	Sodium (Na) (mg/kg)		15500	17900			
	Strontium (Sr) (mg/kg)		326	353			
	Sulfur (S) (mg/kg)		11800	11300			
	Thallium (Tl) (mg/kg)		0.077	0.079			
Tin (Sn) (mg/kg)		130	130				
Titanium (Ti) (mg/kg)		615	908				
Tungsten (W) (mg/kg)		5.31	4.51				
Uranium (U) (mg/kg)		4.57	5.05				
Vanadium (V) (mg/kg)		48.2	51.4				
Zinc (Zn) (mg/kg)		5270	5250				
Zirconium (Zr) (mg/kg)		<1.0	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	L2099055-16 soil 16-MAY-18 09:00 BA1820-A-5 REP 4	L2099055-17 soil 16-MAY-18 09:00 BA1820-A-5 REP 5	L2099055-18 soil 16-MAY-18 09:00 BA1820-A-5 REP 6	L2099055-19 soil 16-MAY-18 09:00 BA1820-A-7 REP 1	L2099055-20 soil 16-MAY-18 09:00 BA1820-A-7 REP 2
Grouping	Analyte				
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	L2099055-21	L2099055-22			
Description	soil	soil			
Sampled Date	16-MAY-18	16-MAY-18			
Sampled Time	09:00	09:00			
Client ID	BA1820-A-7 REP 3	BA1820-A-7 REP 4			
Grouping	Analyte				
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	L2099055-1	L2099055-2	L2099055-3	L2099055-4	L2099055-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-1	BA1820-A-2	BA1820-A-3	BA1820-A-4	BA1820-A-5
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.73	11.74	11.74	11.71	11.68
	2nd Preliminary pH (pH)		10.22	10.26	10.31	10.04	9.65
	Final pH (pH)		6.09	6.40	6.03	5.50	5.63
	Extraction Solution Initial pH (pH)		2.86	2.86	2.86	2.86	2.86
	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)		7.71	8.60	8.39	6.57	7.72
	Cadmium (Cd)-Leachable (mg/L)		0.234	0.159	0.298	0.214	5.04
	Calcium (Ca)-Leachable (mg/L)		1950	2050	2020	1920	1930
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.389	0.546	0.394	1.39	0.507
	Copper (Cu)-Leachable (mg/L)		0.945	0.393	1.21	2.45	2.36
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)		118	122	122	129	111
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.52	0.84	0.55	0.62	0.57
	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)		51.3	62.4	63.5	74.5	62.3

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2099055-6	L2099055-7	L2099055-8	L2099055-9	L2099055-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-6	BA1820-A-7	BA1820-A-8	BA1820-A-9	BA1820-A-10
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.67	11.71	11.76	11.74	11.68
	2nd Preliminary pH (pH)		10.00	10.27	10.05	10.17	10.06
	Final pH (pH)		5.81	5.85	5.79	5.60	5.81
	Extraction Solution Initial pH (pH)		2.86	2.86	2.86	2.86	2.86
	Antimony (Sb)-Leachable (mg/L)		<1.0	<1.0	<1.0	2.0	<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)		7.87	7.94	6.82	8.58	10.6
	Cadmium (Cd)-Leachable (mg/L)		0.264	0.877	0.332	0.282	0.204
	Calcium (Ca)-Leachable (mg/L)		2060	2090	2000	1960	2090
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.406	0.674	0.453	0.482	0.676
	Copper (Cu)-Leachable (mg/L)		1.48	1.44	2.00	1.40	1.44
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	0.88	0.38	1.82	<0.25
	Magnesium (Mg)-Leachable (mg/L)		123	128	123	124	125
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.59	0.52	0.86	0.56	0.76
	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)		69.4	63.7	66.6	59.3	98.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2099055-11	L2099055-12	L2099055-13	L2099055-14	L2099055-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-11	BA1820-A-12	BA1820-A-5 REP 1	BA1820-A-5 REP 2	BA1820-A-5 REP 3
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.73	11.78	11.68	11.68	11.68
	2nd Preliminary pH (pH)		10.00	10.47	9.65	9.65	9.65
	Final pH (pH)		5.79	6.10	6.17	6.18	5.93
	Extraction Solution Initial pH (pH)		2.86	2.86	2.86	2.86	2.86
	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)		8.05	9.32			
	Cadmium (Cd)-Leachable (mg/L)		0.217	0.208	0.348	0.278	0.702
	Calcium (Ca)-Leachable (mg/L)		1970	2140			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.445	0.718			
	Copper (Cu)-Leachable (mg/L)		1.62	0.474			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		0.99	1.02			
	Magnesium (Mg)-Leachable (mg/L)		121	133			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.61	0.48			
	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)		62.7	54.9			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2099055-16	L2099055-17	L2099055-18	L2099055-19	L2099055-20
		Description	soil	soil	soil	soil	soil
		Sampled Date	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18	16-MAY-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1820-A-5 REP 4	BA1820-A-5 REP 5	BA1820-A-5 REP 6	BA1820-A-7 REP 1	BA1820-A-7 REP 2
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.68	11.68	11.68	11.71	11.71
	2nd Preliminary pH (pH)		9.65	9.65	9.65	10.27	10.27
	Final pH (pH)		6.07	6.04	6.09	6.05	5.96
	Extraction Solution Initial pH (pH)		2.86	2.86	2.86	2.86	2.86
	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)		0.181	0.187	0.199	0.218	0.273
	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.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID Description Sampled Date Sampled Time Client ID	L2099055-21 soil 16-MAY-18 09:00 BA1820-A-7 REP 3	L2099055-22 soil 16-MAY-18 09:00 BA1820-A-7 REP 4		
Grouping	Analyte				
SOIL					
TCLP Metals	1st Preliminary pH (pH)	11.71	11.71		
	2nd Preliminary pH (pH)	10.27	10.27		
	Final pH (pH)	5.97	5.87		
	Extraction Solution Initial pH (pH)	2.86	2.86		
	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)	0.203	0.189		
	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)
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2099055-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2099055-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2099055-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
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
This method uses a heated strong acid digestion with HNO ₃ and HCl and 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. 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)
This method uses a heated strong acid digestion with HNO ₃ and HCl and 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.			
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	CWS for PHC in Soil - Tier 1
This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
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:

Reference Information

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.



L2099055-COFC

Chain of Custody / Analytical Request Form
Canada Toll Free: 1 800 668 9878
www.alsglobal.com

COC # _____

Page ____ of ____

Report To

Company: Covanta Energy
 Contact: Steve Mckinney / Dan Skrypnik
 Address: 5150 Riverbend Drive
 Burnaby BC
 Phone: 604-521-1025 Fax: _____
 Yes No

Report Format / Distribution

Standard Other
 PDF Excel Digital Fax
 Email 1: smckinney@covanta.com
 Email 2: rjohnson4@covanta.com
 Email 3: dskrypnik@covanta.com
 brent.kirkpatrick@metrovancover.org
 Sarah.Wellman@metrovancover.org

Service Requested (Rush for routine analysis subject to availability)

Regular (Standard Turnaround Times - Business Days)
 Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
 Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
 Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request

Invoice To: Same as Report ?
 Hardcopy of Invoice with Report? Yes No
 Company: _____
 Contact: _____
 Address: _____
 Phone: _____ Fax: _____

Client / Project Information
 Job #: _____
 PO / AFE: PO# 46693 Weekly Bottom Ash - Suite
 LSD: (includes 2:1 pH)
 Quote #: _____

Please indicate below Filtered, Preserved or both (F, P, F/P)

Lab Work Order # (lab use only)

ALS Contact: _____
 Sampler: _____

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
BA1820-A-1		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-2		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-3		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-4		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-5		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-6		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-7		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-8		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-9		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-10		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-11		16-May-18	9:00	Soil	X	X			X		1
BA1820-A-12		16-May-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: <i>[Signature]</i>	Date (dd-mmm-yy): 23-May-18	Time (hh-mm): 08:00	Received by: JC	Date: 5/23/18	Time: 1:20pm	Temperature: 23 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF