

Bottom Ash Data

2018 Week 4

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on February 14, 2018. The data represents bottom ash composite results for week 4 of 2018 (January 21, 2018 to January 27, 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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Date Received: 30-JAN-18
Report Date: 13-FEB-18 11:47 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2050667
Project P.O. #: VANCO-0000040506
Job Reference:
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 #13-16, 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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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2050667-1	L2050667-2	L2050667-3	L2050667-4	L2050667-5
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1804-A-1	BA1804-A-2	BA1804-A-3	BA1804-A-4	BA1804-A-5
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		26.2	24.0	26.2	26.9	26.7
	pH (1:2 soil:water) (pH)		10.59	10.70	10.95	10.75	10.80
Metals	Aluminum (Al) (mg/kg)		42600	40900	38200	45100	33800
	Antimony (Sb) (mg/kg)		129	163	164	155	145
	Arsenic (As) (mg/kg)		16.5	24.4	25.0	19.0	18.0
	Barium (Ba) (mg/kg)		469	519	624	618	551
	Beryllium (Be) (mg/kg)		0.41	0.41	0.44	0.40	0.42
	Bismuth (Bi) (mg/kg)		19.5	47.7	27.3	30.0	23.1
	Boron (B) (mg/kg)		288	222	256	273	254
	Cadmium (Cd) (mg/kg)		14.9	14.2	16.8	21.3	12.0
	Calcium (Ca) (mg/kg)		131000	139000	153000	142000	147000
	Chromium (Cr) (mg/kg)		287	158	242	218	171
	Cobalt (Co) (mg/kg)		37.6	57.9	78.8	78.8	54.5
	Copper (Cu) (mg/kg)		7430	6770	15600	3620	3880
	Iron (Fe) (mg/kg)		72100	59200	67300	85300	67300
	Lead (Pb) (mg/kg)		320	660	461	464	893
	Lithium (Li) (mg/kg)		24.6	20.7	27.1	21.2	18.4
	Magnesium (Mg) (mg/kg)		11000	11100	13000	12600	12400
	Manganese (Mn) (mg/kg)		953	832	1220	1050	727
	Mercury (Hg) (mg/kg)		0.157	0.060	0.109	0.372	0.065
	Molybdenum (Mo) (mg/kg)		27.7	21.0	35.2	30.3	20.6
	Nickel (Ni) (mg/kg)		144	383	379	832	161
	Phosphorus (P) (mg/kg)		12000	12100	15600	11900	12000
	Potassium (K) (mg/kg)		6490	6490	8180	6080	6050
	Selenium (Se) (mg/kg)		0.31	0.46	0.80	0.42	0.44
	Silver (Ag) (mg/kg)		8.29	9.22	22.9	7.02	8.52
	Sodium (Na) (mg/kg)		17500	18200	21600	16700	16900
	Strontium (Sr) (mg/kg)		370	353	394	410	354
	Sulfur (S) (mg/kg)		14900	16600	17800	16700	15900
Thallium (Tl) (mg/kg)		0.079	0.066	0.081	0.079	0.075	
Tin (Sn) (mg/kg)		131	194	153	176	211	
Titanium (Ti) (mg/kg)		676	686	718	1120	603	
Tungsten (W) (mg/kg)		37.0	15.6	29.6	23.8	28.0	
Uranium (U) (mg/kg)		5.27	4.99	5.49	4.95	5.15	
Vanadium (V) (mg/kg)		46.9	47.0	56.2	47.0	43.6	
Zinc (Zn) (mg/kg)		3890	4780	8250	5410	5830	
Zirconium (Zr) (mg/kg)		3.2	2.5	1.8	3.1	1.6	

* 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	L2050667-6 Soil 24-JAN-18 09:00 BA1804-A-6	L2050667-7 Soil 24-JAN-18 09:00 BA1804-A-7	L2050667-8 Soil 24-JAN-18 09:00 BA1804-A-8	L2050667-9 Soil 24-JAN-18 09:00 BA1804-A-9	L2050667-10 Soil 24-JAN-18 09:00 BA1804-A-10	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	23.6	27.1	26.8	27.8	27.5
	pH (1:2 soil:water) (pH)	10.78	10.88	10.79	11.01	10.92
Metals	Aluminum (Al) (mg/kg)	32100	39200	38700	31200	32200
	Antimony (Sb) (mg/kg)	148	168	189	138	194
	Arsenic (As) (mg/kg)	19.0	18.3	23.2	19.2	16.8
	Barium (Ba) (mg/kg)	554	568	503	444	449
	Beryllium (Be) (mg/kg)	0.50	0.46	2.80	0.40	0.40
	Bismuth (Bi) (mg/kg)	27.7	21.8	23.0	21.5	45.2
	Boron (B) (mg/kg)	279	248	354	203	185
	Cadmium (Cd) (mg/kg)	14.9	14.0	12.1	31.2	13.2
	Calcium (Ca) (mg/kg)	140000	140000	124000	135000	141000
	Chromium (Cr) (mg/kg)	147	153	239	219	152
	Cobalt (Co) (mg/kg)	50.2	32.6	260	145	37.8
	Copper (Cu) (mg/kg)	1630	2450	3280	5220	20000
	Iron (Fe) (mg/kg)	50600	72500	66300	73100	50600
	Lead (Pb) (mg/kg)	836	640	1310	442	3450
	Lithium (Li) (mg/kg)	20.2	18.2	28.2	19.7	18.2
	Magnesium (Mg) (mg/kg)	12700	10600	9830	11300	11500
	Manganese (Mn) (mg/kg)	1130	795	1590	929	656
	Mercury (Hg) (mg/kg)	<0.050	0.234	<0.050	1.02	0.088
	Molybdenum (Mo) (mg/kg)	23.6	21.5	22.2	27.6	19.3
	Nickel (Ni) (mg/kg)	149	118	158	138	116
	Phosphorus (P) (mg/kg)	12200	11900	10900	12600	12600
	Potassium (K) (mg/kg)	6210	6320	5910	5980	5750
	Selenium (Se) (mg/kg)	0.39	0.37	0.39	0.34	0.60
	Silver (Ag) (mg/kg)	6.51	7.15	4.60	14.6	13.1
	Sodium (Na) (mg/kg)	16900	17400	17300	17500	16600
	Strontium (Sr) (mg/kg)	341	356	315	356	333
	Sulfur (S) (mg/kg)	16500	15600	14700	15400	14800
	Thallium (Tl) (mg/kg)	0.070	0.075	0.081	0.069	0.063
	Tin (Sn) (mg/kg)	231	162	192	205	1870
	Titanium (Ti) (mg/kg)	702	769	969	434	455
	Tungsten (W) (mg/kg)	24.2	19.4	25.0	30.6	20.2
	Uranium (U) (mg/kg)	5.33	4.61	4.81	4.71	4.35
	Vanadium (V) (mg/kg)	42.9	40.8	47.0	40.4	41.3
	Zinc (Zn) (mg/kg)	4180	7040	8180	4040	6880
	Zirconium (Zr) (mg/kg)	1.5	2.1	4.3	2.0	1.9

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2050667-11	L2050667-12	L2050667-13	L2050667-14	L2050667-15
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1804-A-11	BA1804-A-12	BA1804-A-12 REP 1	BA1804-A-12 REP 2	BA1804-A-12 REP 3
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		25.7	26.9			
	pH (1:2 soil:water) (pH)		10.91	10.85			
Metals	Aluminum (Al) (mg/kg)		29700	36600			
	Antimony (Sb) (mg/kg)		139	142			
	Arsenic (As) (mg/kg)		17.0	19.7			
	Barium (Ba) (mg/kg)		512	514			
	Beryllium (Be) (mg/kg)		0.36	0.37			
	Bismuth (Bi) (mg/kg)		20.5	20.9			
	Boron (B) (mg/kg)		219	207			
	Cadmium (Cd) (mg/kg)		12.6	35.0			
	Calcium (Ca) (mg/kg)		126000	136000			
	Chromium (Cr) (mg/kg)		1160	162			
	Cobalt (Co) (mg/kg)		97.9	30.9			
	Copper (Cu) (mg/kg)		4590	1990			
	Iron (Fe) (mg/kg)		69000	66200			
	Lead (Pb) (mg/kg)		8160	370			
	Lithium (Li) (mg/kg)		15.4	16.3			
	Magnesium (Mg) (mg/kg)		8930	10400			
	Manganese (Mn) (mg/kg)		857	909			
	Mercury (Hg) (mg/kg)		0.057	0.294			
	Molybdenum (Mo) (mg/kg)		50.9	22.0			
	Nickel (Ni) (mg/kg)		1190	140			
	Phosphorus (P) (mg/kg)		11000	11000			
	Potassium (K) (mg/kg)		5570	6100			
	Selenium (Se) (mg/kg)		0.31	0.34			
	Silver (Ag) (mg/kg)		7.46	6.84			
	Sodium (Na) (mg/kg)		15500	16700			
	Strontium (Sr) (mg/kg)		319	320			
	Sulfur (S) (mg/kg)		15100	16100			
	Thallium (Tl) (mg/kg)		0.189	0.074			
	Tin (Sn) (mg/kg)		181	135			
	Titanium (Ti) (mg/kg)		814	855			
	Tungsten (W) (mg/kg)		21.0	19.0			
	Uranium (U) (mg/kg)		4.35	5.14			
Vanadium (V) (mg/kg)		49.5	46.7				
Zinc (Zn) (mg/kg)		15700	6530				
Zirconium (Zr) (mg/kg)		2.0	1.7				

* 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
		L2050667-16	Soil	24-JAN-18	09:00	BA1804-A-12 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)					

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2050667-1	L2050667-2	L2050667-3	L2050667-4	L2050667-5
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1804-A-1	BA1804-A-2	BA1804-A-3	BA1804-A-4	BA1804-A-5
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.20	11.35	11.27	11.18	11.24
	2nd Preliminary pH (pH)		8.34	8.54	8.56	8.99	8.20
	Final pH (pH)		6.03	6.25	6.09	6.15	6.36
	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)		2.91	3.25	3.59	2.86	3.05
	Cadmium (Cd)-Leachable (mg/L)		0.204	0.227	0.289	0.140	0.140
	Calcium (Ca)-Leachable (mg/L)		1940	2070	2010	1890	1980
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.602	1.34	0.672	0.371	0.365
	Copper (Cu)-Leachable (mg/L)		1.24	1.31	2.59	1.27	0.829
	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)		113	118	112	107	109
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		2.59	0.37	0.40	0.34	0.30
	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)		45.0	43.9	50.0	37.5	29.7

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2050667-6	L2050667-7	L2050667-8	L2050667-9	L2050667-10
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1804-A-6	BA1804-A-7	BA1804-A-8	BA1804-A-9	BA1804-A-10
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.25	11.23	11.32	11.25	11.29
	2nd Preliminary pH (pH)		8.22	8.26	9.20	8.84	8.94
	Final pH (pH)		6.05	6.28	6.10	6.29	6.19
	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)		2.98	3.38	2.93	3.52	2.96
	Cadmium (Cd)-Leachable (mg/L)		0.162	0.215	0.146	0.145	0.158
	Calcium (Ca)-Leachable (mg/L)		1970	2080	1940	1990	1970
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.636	0.509	1.12	0.439	0.643
	Copper (Cu)-Leachable (mg/L)		1.81	1.46	1.65	0.943	0.644
	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	1.19
	Magnesium (Mg)-Leachable (mg/L)		111	119	111	110	116
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.65	0.37	0.50	0.38	0.38
	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)		79.3	38.4	43.1	27.2	30.0

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2050667-11	L2050667-12	L2050667-13	L2050667-14	L2050667-15
		Description	Soil	Soil	Soil	Soil	Soil
		Sampled Date	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18	24-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1804-A-11	BA1804-A-12	BA1804-A-12 REP 1	BA1804-A-12 REP 2	BA1804-A-12 REP 3
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.29	11.36	11.36	11.36	11.36
	2nd Preliminary pH (pH)		8.75	9.13	9.13	9.13	9.13
	Final pH (pH)		6.09	6.31	6.11	6.26	6.30
	Extraction Solution Initial pH (pH)		2.88	2.88	2.85	2.85	2.85
	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)		3.15	3.24			
	Cadmium (Cd)-Leachable (mg/L)		0.232	2.95	0.162	0.154	0.150
	Calcium (Ca)-Leachable (mg/L)		1980	2020			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		1.92	2.16			
	Copper (Cu)-Leachable (mg/L)		1.73	1.27			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25			
	Magnesium (Mg)-Leachable (mg/L)		113	110			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.33	0.37			
	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)		47.4	33.8			

* 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	L2050667-16 Soil 24-JAN-18 09:00 BA1804-A-12 REP 4			
Grouping	Analyte				
SOIL					
TCLP Metals	1st Preliminary pH (pH)	11.36			
	2nd Preliminary pH (pH)	9.13			
	Final pH (pH)	6.11			
	Extraction Solution Initial pH (pH)	2.85			
	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)	0.172			
	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	Cadmium (Cd)-Leachable	MS-B	L2050667-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2050667-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2050667-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2050667-1, -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.



L2050667-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

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 #:

Analysis Request

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	Analysis Request				Number of Containers
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	
BA1804-A-1		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-2		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-3		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-4		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-5		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-6		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-7		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-8		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-9		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-10		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-11		24-Jan-18	9:00	Soil	X	X		X	1
BA1804-A-12		24-Jan-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: Yes / No ? If Yes add SIF
<i>[Signature]</i>	30/1/18	8:25	(2) JC	JAN 30 2018	11:15 AM	21 ± 21 °C				