

Bottom Ash Data

2018 Week 2

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on February 2, 2018. The data represents bottom ash composite results for week 2 of 2018 (January 7, 2018 to January 13, 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: 17-JAN-18
Report Date: 01-FEB-18 15:27 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2046161
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 #13-20, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-20, 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	L2046161-1 SOIL 10-JAN-18 09:00 BA1802-A-1	L2046161-2 SOIL 10-JAN-18 09:00 BA1802-A-2	L2046161-3 SOIL 10-JAN-18 09:00 BA1802-A-3	L2046161-4 SOIL 10-JAN-18 09:00 BA1802-A-4	L2046161-5 SOIL 10-JAN-18 09:00 BA1802-A-5	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	22.8	21.6	21.9	22.9	21.1
	pH (1:2 soil:water) (pH)	11.52	11.52	11.68	11.43	11.41
Metals	Aluminum (Al) (mg/kg)	36100	37700	30600	36100	30600
	Antimony (Sb) (mg/kg)	105	182	112	176	109
	Arsenic (As) (mg/kg)	14.9	20.0	14.8	18.4	14.6
	Barium (Ba) (mg/kg)	694	602	566	614	628
	Beryllium (Be) (mg/kg)	0.39	0.37	0.41	0.40	0.45
	Bismuth (Bi) (mg/kg)	5.92	5.62	6.97	8.29	9.47
	Boron (B) (mg/kg)	204	377	242	278	265
	Cadmium (Cd) (mg/kg)	12.1	170	11.0	14.3	22.4
	Calcium (Ca) (mg/kg)	115000	120000	131000	129000	132000
	Chromium (Cr) (mg/kg)	120	117	204	121	159
	Cobalt (Co) (mg/kg)	206	176	28.5	31.5	20.4
	Copper (Cu) (mg/kg)	8020	7710	18800	8760	8570
	Iron (Fe) (mg/kg)	66600	51300	50400	54100	46800
	Lead (Pb) (mg/kg)	284	945	3280	916	610
	Lithium (Li) (mg/kg)	21.6	23.9	18.4	14.4	14.1
	Magnesium (Mg) (mg/kg)	12300	10000	11700	11000	11600
	Manganese (Mn) (mg/kg)	737	855	680	681	680
	Mercury (Hg) (mg/kg)	0.084	<0.050	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	15.3	17.7	41.1	24.9	19.7
	Nickel (Ni) (mg/kg)	129	94.0	107	449	143
	Phosphorus (P) (mg/kg)	10900	14400	11100	11900	11300
	Potassium (K) (mg/kg)	5090	5310	5170	4900	5030
	Selenium (Se) (mg/kg)	0.27	0.35	0.37	0.33	0.26
	Silver (Ag) (mg/kg)	2.96	14.8	4.77	7.60	8.28
	Sodium (Na) (mg/kg)	16200	16500	14600	15400	16500
	Strontium (Sr) (mg/kg)	346	316	318	385	340
	Sulfur (S) (mg/kg)	10100	11100	10900	10700	11500
	Thallium (Tl) (mg/kg)	0.154	0.093	0.098	0.077	0.062
	Tin (Sn) (mg/kg)	140	8840	156	188	138
	Titanium (Ti) (mg/kg)	1100	892	639	480	428
	Tungsten (W) (mg/kg)	32.4	13.0	9.16	8.39	6.23
	Uranium (U) (mg/kg)	3.92	4.90	4.92	4.62	4.36
	Vanadium (V) (mg/kg)	42.3	43.5	63.3	42.4	40.1
	Zinc (Zn) (mg/kg)	20600	6380	4220	5500	3200
	Zirconium (Zr) (mg/kg)	1.6	2.2	1.5	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	L2046161-6 SOIL 10-JAN-18 09:00 BA1802-A-6	L2046161-7 SOIL 10-JAN-18 09:00 BA1802-A-7	L2046161-8 SOIL 10-JAN-18 09:00 BA1802-A-8	L2046161-9 SOIL 10-JAN-18 09:00 BA1802-A-9	L2046161-10 SOIL 10-JAN-18 09:00 BA1802-A-10	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	19.6	16.9	21.3	31.1	10.1
	pH (1:2 soil:water) (pH)	11.61	10.82	11.13	11.29	11.09
Metals	Aluminum (Al) (mg/kg)	42600	44400	36400	38400	41200
	Antimony (Sb) (mg/kg)	113	106	155	112	126
	Arsenic (As) (mg/kg)	16.8	15.1	21.0	76.9	18.7
	Barium (Ba) (mg/kg)	724	624	590	729	692
	Beryllium (Be) (mg/kg)	0.46	0.35	0.45	0.38	0.37
	Bismuth (Bi) (mg/kg)	8.59	4.64	7.68	4.95	4.88
	Boron (B) (mg/kg)	496	181	199	195	210
	Cadmium (Cd) (mg/kg)	10.1	10.1	9.36	8.78	14.4
	Calcium (Ca) (mg/kg)	140000	129000	126000	112000	126000
	Chromium (Cr) (mg/kg)	191	130	120	280	140
	Cobalt (Co) (mg/kg)	39.8	28.9	98.9	103	23.1
	Copper (Cu) (mg/kg)	2090	1410	5100	2570	24400
	Iron (Fe) (mg/kg)	61000	51500	35900	63100	48800
	Lead (Pb) (mg/kg)	352	363	287	324	409
	Lithium (Li) (mg/kg)	17.4	15.6	18.8	16.1	14.9
	Magnesium (Mg) (mg/kg)	12100	11000	12100	10700	9910
	Manganese (Mn) (mg/kg)	786	754	626	861	781
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	23.5	20.8	28.1	40.7	18.8
	Nickel (Ni) (mg/kg)	128	126	108	205	85.2
	Phosphorus (P) (mg/kg)	14600	13700	11500	12700	14500
	Potassium (K) (mg/kg)	5670	4490	5120	5370	4880
	Selenium (Se) (mg/kg)	0.36	0.33	0.31	0.30	0.39
	Silver (Ag) (mg/kg)	5.22	3.42	6.20	4.24	3.76
	Sodium (Na) (mg/kg)	18800	12500	15400	14300	13400
	Strontium (Sr) (mg/kg)	529	338	324	317	297
	Sulfur (S) (mg/kg)	11300	9500	9900	8500	10100
	Thallium (Tl) (mg/kg)	0.076	0.077	0.070	0.099	0.080
	Tin (Sn) (mg/kg)	769	106	141	127	111
	Titanium (Ti) (mg/kg)	556	1040	678	1110	1010
	Tungsten (W) (mg/kg)	7.18	33.4	5.63	13.1	10.9
	Uranium (U) (mg/kg)	4.86	4.29	4.29	4.53	4.58
	Vanadium (V) (mg/kg)	46.2	42.0	47.6	55.5	47.8
	Zinc (Zn) (mg/kg)	15600	2990	8880	5110	4090
	Zirconium (Zr) (mg/kg)	2.2	4.0	3.0	1.9	1.9

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2046161-11	L2046161-12	L2046161-13	L2046161-14	L2046161-15
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1802-A-11	BA1802-A-12	BA1802-A-1 REP 1	BA1802-A-1 REP 2	BA1802-A-1 REP 3
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		20.7	20.7			
	pH (1:2 soil:water) (pH)		11.39	11.27			
Metals	Aluminum (Al) (mg/kg)		42800	38900			
	Antimony (Sb) (mg/kg)		83.6	104			
	Arsenic (As) (mg/kg)		15.5	12.4			
	Barium (Ba) (mg/kg)		689	684			
	Beryllium (Be) (mg/kg)		0.40	0.41			
	Bismuth (Bi) (mg/kg)		5.95	3.41			
	Boron (B) (mg/kg)		254	376			
	Cadmium (Cd) (mg/kg)		8.40	8.72			
	Calcium (Ca) (mg/kg)		125000	123000			
	Chromium (Cr) (mg/kg)		151	171			
	Cobalt (Co) (mg/kg)		29.4	28.1			
	Copper (Cu) (mg/kg)		3840	5340			
	Iron (Fe) (mg/kg)		55200	67600			
	Lead (Pb) (mg/kg)		1190	884			
	Lithium (Li) (mg/kg)		16.1	20.3			
	Magnesium (Mg) (mg/kg)		9800	9740			
	Manganese (Mn) (mg/kg)		617	643			
	Mercury (Hg) (mg/kg)		<0.050	<0.050			
	Molybdenum (Mo) (mg/kg)		31.8	15.8			
	Nickel (Ni) (mg/kg)		113	109			
	Phosphorus (P) (mg/kg)		13500	10100			
	Potassium (K) (mg/kg)		4670	4670			
	Selenium (Se) (mg/kg)		0.32	0.29			
	Silver (Ag) (mg/kg)		3.93	2.63			
	Sodium (Na) (mg/kg)		14100	15000			
	Strontium (Sr) (mg/kg)		281	291			
	Sulfur (S) (mg/kg)		8600	8400			
	Thallium (Tl) (mg/kg)		0.210	0.050			
	Tin (Sn) (mg/kg)		111	101			
	Titanium (Ti) (mg/kg)		898	1170			
Tungsten (W) (mg/kg)		5.77	3.86				
Uranium (U) (mg/kg)		3.61	3.54				
Vanadium (V) (mg/kg)		46.3	36.4				
Zinc (Zn) (mg/kg)		23900	3960				
Zirconium (Zr) (mg/kg)		1.7	1.9				

* 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	L2046161-16 SOIL 10-JAN-18 09:00 BA1802-A-1 REP 4	L2046161-17 SOIL 10-JAN-18 09:00 BA1802-A-11 REP 1	L2046161-18 SOIL 10-JAN-18 09:00 BA1802-A-11 REP 2	L2046161-19 SOIL 10-JAN-18 09:00 BA1802-A-11 REP 3	L2046161-20 SOIL 10-JAN-18 09:00 BA1802-A-11 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	L2046161-1	L2046161-2	L2046161-3	L2046161-4	L2046161-5
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1802-A-1	BA1802-A-2	BA1802-A-3	BA1802-A-4	BA1802-A-5
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.65	11.64	11.69	11.67	11.64
	2nd Preliminary pH (pH)		9.44	9.25	9.35	9.27	8.99
	Final pH (pH)		6.03	5.82	6.11	5.89	6.03
	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)		3.09	3.94	2.31	3.10	2.80
	Cadmium (Cd)-Leachable (mg/L)		1.71	0.193	0.149	0.140	0.156
	Calcium (Ca)-Leachable (mg/L)		1910	1920	1890	1840	1800
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.521	0.501	0.386	0.194	0.343
	Copper (Cu)-Leachable (mg/L)		1.54	1.65	2.69	1.99	2.53
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		0.29	<0.25	<0.25	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)		127	117	128	110	118
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.32	0.38	0.32	0.46	0.28
	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)		56.8	54.0	46.9	35.0	51.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2046161-6	L2046161-7	L2046161-8	L2046161-9	L2046161-10
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1802-A-6	BA1802-A-7	BA1802-A-8	BA1802-A-9	BA1802-A-10
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.65	11.68	11.72	11.86	11.85
	2nd Preliminary pH (pH)		8.94	7.37	8.32	9.16	9.16
	Final pH (pH)		5.96	5.89	6.14	6.10	6.03
	Extraction Solution Initial pH (pH)		2.86	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)		2.67	2.27	2.63	2.89	2.78
	Cadmium (Cd)-Leachable (mg/L)		0.161	0.232	0.165	0.185	0.217
	Calcium (Ca)-Leachable (mg/L)		1840	1900	1940	1910	1870
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.285	0.596	0.724	0.533	0.973
	Copper (Cu)-Leachable (mg/L)		1.92	2.44	1.67	2.01	2.14
	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	0.62	<0.25
	Magnesium (Mg)-Leachable (mg/L)		114	117	130	119	118
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.43	0.91	0.34	0.39	0.37
	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)		59.1	40.0	60.6	67.1	110

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ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2046161-11	L2046161-12	L2046161-13	L2046161-14	L2046161-15
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1802-A-11	BA1802-A-12	BA1802-A-1 REP 1	BA1802-A-1 REP 2	BA1802-A-1 REP 3
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.90	11.82	11.65	11.65	11.65
	2nd Preliminary pH (pH)		8.80	8.76	9.44	9.44	9.44
	Final pH (pH)		6.04	6.24	5.97	6.10	5.99
	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)		3.19	2.78			
	Cadmium (Cd)-Leachable (mg/L)		0.596	0.145	0.190	0.265	0.152
	Calcium (Ca)-Leachable (mg/L)		1920	1900			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.533	0.481			
	Copper (Cu)-Leachable (mg/L)		2.23	1.78			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		0.36	<0.25			
	Magnesium (Mg)-Leachable (mg/L)		124	120			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.36	0.32			
	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)		58.0	60.8			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2046161-16	L2046161-17	L2046161-18	L2046161-19	L2046161-20
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18	10-JAN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1802-A-1 REP 4	BA1802-A-11 REP 1	BA1802-A-11 REP 2	BA1802-A-11 REP 3	BA1802-A-11 REP 4
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.65	11.90	11.90	11.90	11.90
	2nd Preliminary pH (pH)		9.44	8.80	8.80	8.80	8.80
	Final pH (pH)		6.07	5.68	5.83	5.76	5.90
	Extraction Solution Initial pH (pH)		2.89	2.89	2.89	2.89	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)		0.152	0.629	0.201	0.622	0.157
	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	Antimony (Sb)	DUP-H	L2046161-10, -11, -12, -7, -8, -9
Duplicate	Copper (Cu)	DUP-H	L2046161-10, -11, -12, -7, -8, -9
Duplicate	Lead (Pb)	DUP-H	L2046161-10, -11, -12, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2046161-1, -2, -3, -4, -5, -6
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2046161-10, -11, -12, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2046161-1, -2, -3, -4, -5, -6
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2046161-1, -2, -3, -4, -5, -6

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
<p>This method uses a heated strong acid digestion with HNO₃ 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.</p>			
HG-200.2-CVAF-VA	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
<p>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.</p>			
HG-TCLP-CVAFS-VA	Soil	Mercury by CVAAS (TCLP)	EPA 1311/245.7
<p>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).</p>			
MET-200.2-CCMS-VA	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
<p>This method uses a heated strong acid digestion with HNO₃ 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.</p>			
MET-TCLP-ICP-VA	Soil	Metals by ICPOES (TCLP)	EPA 1311/6010B
<p>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).</p>			
MOISTURE-VA	Soil	Moisture content	CWS for PHC in Soil - Tier 1
<p>This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of six hours.</p>			
PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL
<p>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.</p>			

** 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.



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

COC # _____

Page ____ of ____

Report To		Report Format / Distribution		Service Requested (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		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
			brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

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

Lab Work Order # (lab use only)		ALS Contact:	Sampler:			MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
Sample #	Sample Identification (This description will appear on)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type						
BA1802-A-1		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-2		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-3		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-4		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-5		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-6		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-7		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-8		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-9		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-10		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-11		10-Jan-18	9:00	Soil	X	X		X	1	
BA1802-A-12		10-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:
<i>[Signature]</i>	17-Jan-18	09:00	<i>[Signature]</i>	JAN 17 2018	11 AM	21 ± 2°C				Yes / No ? If Yes add SIF