

## Bottom Ash Data

2018 Week 30

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The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on August 14, 2018. The data represents bottom ash composite results for week 30 of 2018 (July 22, 2018 to July 28, 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: 31-JUL-18  
Report Date: 10-AUG-18 17:45 (MT)  
Version: FINAL

Client Phone: 604-521-1025

## Certificate of Analysis

Lab Work Order #: L2138847  
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 #13-16, 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.

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Brent Mack, B.Sc.  
Account Manager

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID Description Sampled Date Sampled Time Client ID	L2138847-1 soil 25-JUL-18 09:00 BA1830-A-1	L2138847-2 soil 25-JUL-18 09:00 BA1830-A-2	L2138847-3 soil 25-JUL-18 09:00 BA1830-A-3	L2138847-4 soil 25-JUL-18 09:00 BA1830-A-4	L2138847-5 soil 25-JUL-18 09:00 BA1830-A-5	
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	17.7	19.1	18.1	17.7	17.7
	pH (1:2 soil:water) (pH)	11.65	11.80	11.87	11.94	11.79
<b>Metals</b>	Aluminum (Al) (mg/kg)	31400	32200	37400	32500	36000
	Antimony (Sb) (mg/kg)	116	124	239	131	126
	Arsenic (As) (mg/kg)	43.6	44.2	48.7	52.5	36.9
	Barium (Ba) (mg/kg)	596	547	556	515	553
	Beryllium (Be) (mg/kg)	0.40	0.38	0.42	0.41	0.42
	Bismuth (Bi) (mg/kg)	6.63	6.53	8.62	6.95	100
	Boron (B) (mg/kg)	410	253	228	223	231
	Cadmium (Cd) (mg/kg)	9.85	11.5	12.4	15.3	17.1
	Calcium (Ca) (mg/kg)	131000	142000	137000	128000	127000
	Chromium (Cr) (mg/kg)	186	166	148	155	258
	Cobalt (Co) (mg/kg)	23.7	21.5	26.1	277	17.0
	Copper (Cu) (mg/kg)	1150	1910	1490	2250	3520
	Iron (Fe) (mg/kg)	63900	63600	57400	65600	58400
	Lead (Pb) (mg/kg)	417	1070	5420	493	480
	Lithium (Li) (mg/kg)	17.1	15.9	15.9	47.4	16.1
	Magnesium (Mg) (mg/kg)	11600	11700	11300	10700	10600
	Manganese (Mn) (mg/kg)	742	956	793	955	1060
	Mercury (Hg) (mg/kg)	<0.050	0.059	0.090	<0.050	1.26
	Molybdenum (Mo) (mg/kg)	38.9	104	33.4	32.3	41.8
	Nickel (Ni) (mg/kg)	148	315	126	193	188
	Phosphorus (P) (mg/kg)	12500	13400	11500	9680	10100
	Potassium (K) (mg/kg)	5130	4680	4920	4670	5110
	Selenium (Se) (mg/kg)	0.32	0.33	0.40	0.33	0.36
	Silver (Ag) (mg/kg)	2.82	3.84	5.02	4.65	3.60
	Sodium (Na) (mg/kg)	15000	14400	14100	13300	14400
	Strontium (Sr) (mg/kg)	306	803	346	291	338
	Sulfur (S) (mg/kg)	12800	13600	15200	12600	12300
	Thallium (Tl) (mg/kg)	0.068	0.071	0.083	0.072	0.071
	Tin (Sn) (mg/kg)	120	207	108	986	139
	Titanium (Ti) (mg/kg)	695	529	1260	1080	1010
	Tungsten (W) (mg/kg)	4.48	13.9	6.62	5.72	5.01
	Uranium (U) (mg/kg)	5.52	5.57	5.77	5.45	5.27
	Vanadium (V) (mg/kg)	51.5	52.6	56.2	52.6	59.1
	Zinc (Zn) (mg/kg)	3890	3480	6950	3530	3390
	Zirconium (Zr) (mg/kg)	1.0	1.3	1.5	1.7	1.5

\* 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	L2138847-6 soil 25-JUL-18 09:00 BA1830-A-6	L2138847-7 soil 25-JUL-18 09:00 BA1830-A-7	L2138847-8 soil 25-JUL-18 09:00 BA1830-A-8	L2138847-9 soil 25-JUL-18 09:00 BA1830-A-9	L2138847-10 soil 25-JUL-18 09:00 BA1830-A-10	
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	17.4	18.2	15.7	17.4	18.3
	pH (1:2 soil:water) (pH)	11.86	11.84	11.81	11.74	11.90
<b>Metals</b>	Aluminum (Al) (mg/kg)	38200	39100	40500	31400	42500
	Antimony (Sb) (mg/kg)	116	115	122	125	210
	Arsenic (As) (mg/kg)	37.7	33.5	34.5	50.1	38.2
	Barium (Ba) (mg/kg)	605	656	658	608	693
	Beryllium (Be) (mg/kg)	0.42	0.41	0.42	0.47	0.41
	Bismuth (Bi) (mg/kg)	4.92	6.10	5.74	6.48	5.69
	Boron (B) (mg/kg)	469	273	306	246	285
	Cadmium (Cd) (mg/kg)	10.5	12.1	11.7	11.4	10.7
	Calcium (Ca) (mg/kg)	126000	128000	129000	133000	135000
	Chromium (Cr) (mg/kg)	245	204	172	165	178
	Cobalt (Co) (mg/kg)	76.9	35.4	75.3	22.6	25.5
	Copper (Cu) (mg/kg)	7940	1650	5110	3910	2820
	Iron (Fe) (mg/kg)	74500	71300	87600	60100	79600
	Lead (Pb) (mg/kg)	324	411	1640	956	5570
	Lithium (Li) (mg/kg)	58.2	40.2	17.2	18.6	16.5
	Magnesium (Mg) (mg/kg)	11300	11000	10900	11100	12300
	Manganese (Mn) (mg/kg)	890	822	1020	991	1070
	Mercury (Hg) (mg/kg)	<0.050	0.051	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)	40.3	36.0	33.8	41.4	31.4
	Nickel (Ni) (mg/kg)	172	113	243	97.9	923
	Phosphorus (P) (mg/kg)	10200	10200	11600	10900	9570
	Potassium (K) (mg/kg)	4820	5000	4840	4750	4750
	Selenium (Se) (mg/kg)	0.36	0.37	1.23	0.42	0.35
	Silver (Ag) (mg/kg)	3.88	7.76	4.67	3.83	3.64
	Sodium (Na) (mg/kg)	14800	14700	14700	14000	14500
	Strontium (Sr) (mg/kg)	313	351	622	342	320
	Sulfur (S) (mg/kg)	13600	12700	12500	13300	13100
	Thallium (Tl) (mg/kg)	0.072	0.072	0.081	0.064	0.084
	Tin (Sn) (mg/kg)	111	138	113	125	532
	Titanium (Ti) (mg/kg)	1180	1280	946	980	1450
	Tungsten (W) (mg/kg)	5.09	4.34	6.04	5.05	4.56
	Uranium (U) (mg/kg)	5.35	5.31	5.25	5.52	5.32
	Vanadium (V) (mg/kg)	58.5	59.7	51.5	50.4	61.6
	Zinc (Zn) (mg/kg)	5740	3680	4840	2770	3590
	Zirconium (Zr) (mg/kg)	1.4	1.4	1.3	1.2	1.6

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2138847-11	L2138847-12	L2138847-13	L2138847-14	L2138847-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1830-A-11	BA1830-A-12	BA1830-A-5 REP 1	BA1830-A-5 REP 2	BA1830-A-5 REP 3
Grouping	Analyte						
<b>SOIL</b>							
<b>Physical Tests</b>	Moisture (%)		17.3	18.0			
	pH (1:2 soil:water) (pH)		11.84	11.78			
<b>Metals</b>	Aluminum (Al) (mg/kg)		45700	30100			
	Antimony (Sb) (mg/kg)		131	115			
	Arsenic (As) (mg/kg)		45.9	39.2			
	Barium (Ba) (mg/kg)		586	571			
	Beryllium (Be) (mg/kg)		0.36	0.39			
	Bismuth (Bi) (mg/kg)		7.03	7.93			
	Boron (B) (mg/kg)		237	263			
	Cadmium (Cd) (mg/kg)		11.2	10.9			
	Calcium (Ca) (mg/kg)		129000	133000			
	Chromium (Cr) (mg/kg)		173	155			
	Cobalt (Co) (mg/kg)		33.5	31.8			
	Copper (Cu) (mg/kg)		3060	5080			
	Iron (Fe) (mg/kg)		59400	72300			
	Lead (Pb) (mg/kg)		470	1250			
	Lithium (Li) (mg/kg)		15.5	17.9			
	Magnesium (Mg) (mg/kg)		10300	12000			
	Manganese (Mn) (mg/kg)		782	891			
	Mercury (Hg) (mg/kg)		<0.050	<0.050			
	Molybdenum (Mo) (mg/kg)		37.4	72.7			
	Nickel (Ni) (mg/kg)		200	144			
	Phosphorus (P) (mg/kg)		10500	11500			
	Potassium (K) (mg/kg)		4810	5140			
	Selenium (Se) (mg/kg)		0.38	0.37			
	Silver (Ag) (mg/kg)		5.37	5.36			
	Sodium (Na) (mg/kg)		14300	15100			
	Strontium (Sr) (mg/kg)		302	317			
	Sulfur (S) (mg/kg)		12800	12500			
	Thallium (Tl) (mg/kg)		0.071	0.069			
	Tin (Sn) (mg/kg)		132	120			
	Titanium (Ti) (mg/kg)		1600	660			
	Tungsten (W) (mg/kg)		4.32	7.96			
	Uranium (U) (mg/kg)		5.38	5.77			
Vanadium (V) (mg/kg)		71.8	52.2				
Zinc (Zn) (mg/kg)		3630	3820				
Zirconium (Zr) (mg/kg)		2.2	1.4				

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	<b>Sample ID</b> <b>Description</b> <b>Sampled Date</b> <b>Sampled Time</b> <b>Client ID</b>			
	L2138847-16 soil 25-JUL-18 09:00 BA1830-A-5 REP 4			
Grouping	Analyte			
<b>SOIL</b>				
<b>Physical Tests</b>	Moisture (%) pH (1:2 soil:water) (pH)			
<b>Metals</b>	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	L2138847-1	L2138847-2	L2138847-3	L2138847-4	L2138847-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1830-A-1	BA1830-A-2	BA1830-A-3	BA1830-A-4	BA1830-A-5
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.69	11.68	11.60	11.55	11.64
	2nd Preliminary pH (pH)		9.60	9.69	9.07	9.35	9.34
	Final pH (pH)		6.31	6.11	6.25	6.04	6.27
	Extraction Solution Initial pH (pH)		2.92	2.92	2.92	2.92	2.92
	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)		2.76	2.87	2.95	3.24	2.81
	Cadmium (Cd)-Leachable (mg/L)		0.198	0.194	0.137	0.159	2.84
	Calcium (Ca)-Leachable (mg/L)		1970	1990	2050	1980	1980
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.564	1.04	0.531	0.414	0.604
	Copper (Cu)-Leachable (mg/L)		0.819	1.03	0.898	1.66	0.883
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	0.61	<0.25	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)		122	122	120	123	123
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.42	0.53	0.51	0.78	0.41
	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)		29.2	36.3	32.1	36.8	39.5

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2138847-6	L2138847-7	L2138847-8	L2138847-9	L2138847-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1830-A-6	BA1830-A-7	BA1830-A-8	BA1830-A-9	BA1830-A-10
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.70	11.66	11.72	11.64	11.50
	2nd Preliminary pH (pH)		9.66	9.11	9.30	9.46	9.12
	Final pH (pH)		5.99	6.10	6.04	6.10	6.28
	Extraction Solution Initial pH (pH)		2.92	2.92	2.92	2.92	2.92
	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)		2.74	3.16	2.75	2.86	2.82
	Cadmium (Cd)-Leachable (mg/L)		0.138	0.164	0.201	0.164	0.158
	Calcium (Ca)-Leachable (mg/L)		1890	1980	1970	1940	2010
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.291	0.355	1.48	0.550	0.455
	Copper (Cu)-Leachable (mg/L)		0.622	0.821	1.30	0.487	1.21
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		0.26	<0.25	<0.25	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)		116	123	121	116	123
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.56	0.60	0.63	0.48	0.59
	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)		92.6	59.5	38.5	36.2	25.2

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2138847-11	L2138847-12	L2138847-13	L2138847-14	L2138847-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18	25-JUL-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1830-A-11	BA1830-A-12	BA1830-A-5 REP 1	BA1830-A-5 REP 2	BA1830-A-5 REP 3
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.70	11.71	11.64	11.64	11.64
	2nd Preliminary pH (pH)		9.64	9.29	9.34	9.34	9.34
	Final pH (pH)		6.01	5.94	6.35	6.26	6.38
	Extraction Solution Initial pH (pH)		2.92	2.92	2.88	2.88	2.88
	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)		3.05	2.68			
	Cadmium (Cd)-Leachable (mg/L)		0.179	0.176	0.130	0.137	0.185
	Calcium (Ca)-Leachable (mg/L)		2040	1960			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.717	0.250			
	Copper (Cu)-Leachable (mg/L)		1.25	1.07			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		<0.25	0.52			
	Magnesium (Mg)-Leachable (mg/L)		123	117			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.55	0.69			
	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)		35.1	35.9			

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

# ALS ENVIRONMENTAL ANALYTICAL REPORT

	<b>Sample ID</b> <b>Description</b> <b>Sampled Date</b> <b>Sampled Time</b> <b>Client ID</b>	L2138847-16 soil 25-JUL-18 09:00 BA1830-A-5 REP 4			
Grouping	Analyte				
<b>SOIL</b>					
<b>TCLP Metals</b>	1st Preliminary pH (pH)	11.64			
	2nd Preliminary pH (pH)	9.34			
	Final pH (pH)	6.42			
	Extraction Solution Initial pH (pH)	2.88			
	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)	0.145			
	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	L2138847-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2138847-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2138847-1, -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**
<b>HG-200.2-CVAF-VA</b>	Soil	Mercury in Soil by CVAAS	EPA 200.2/1631E (mod)
Soil samples are digested with hot nitric and hydrochloric acids, followed by CVAAS analysis. This method is fully compliant with the BC SALM strong acid leachable metals digestion method.			
<b>HG-TCLP-CVAFS-VA</b>	Soil	Mercury by CVAAS (TCLP)	EPA 1311/245.7
This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter and analysed using atomic absorption spectrophotometry (EPA 245.7).			
<b>MET-200.2-CCMS-VA</b>	Soil	Metals in Soil by CRC ICPMS	EPA 200.2/6020A (mod)
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.			
<b>MET-TCLP-ICP-VA</b>	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).			
<b>MOISTURE-VA</b>	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.			
<b>PH-1:2-VA</b>	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.*



L2138847-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  
 Email 4: brent.kirkpatrick@metrovancover.org  
 Email 5: 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?  Yes  No  
 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	Analysis Request										Number of Containers			
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR-FULL-VA (all metals)										
BA1830-A-1		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-2		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-3		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-4		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-5		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-6		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-7		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-8		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-9		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-10		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-11		25-Jul-18	9:00	Soil	X	X				X								1
BA1830-A-12		25-Jul-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>	31-Jul-18	08:00	ALS	JUL 31 2018	11:30 AM	23.23°C				Yes / No ? If Yes, add SIF