

## Bottom Ash Data

2018 Week 13



The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on April 20, 2018. The data represents bottom ash composite results for week 13 of 2018 (March 25, 2018 to March 31, 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: 03-APR-18  
Report Date: 20-APR-18 16:03 (MT)  
Version: FINAL REV. 2

Client Phone: 604-521-1025

## Certificate of Analysis

Lab Work Order #: L2074966  
Project P.O. #: VANCO-0000047506  
Job Reference:  
C of C Numbers:  
Legal Site Desc:

Comments: ADDITIONAL 11-APR-18 14:15

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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	L2074966-1 soil 28-MAR-18 09:00 BA1813-A-1	L2074966-2 soil 28-MAR-18 09:00 BA1813-A-2	L2074966-3 soil 28-MAR-18 09:00 BA1813-A-3	L2074966-4 soil 28-MAR-18 09:00 BA1813-A-4	L2074966-5 soil 28-MAR-18 09:00 BA1813-A-5	
Grouping	Analyte					
<b>SOIL</b>						
<b>Physical Tests</b>	Moisture (%)	19.7	22.1	19.0	20.4	19.8
	pH (1:2 soil:water) (pH)	11.57	11.62	11.58	11.65	11.61
<b>Metals</b>	Aluminum (Al) (mg/kg)	31400	30900	33000	26900	26200
	Antimony (Sb) (mg/kg)	115	131	115	130	116
	Arsenic (As) (mg/kg)	38.9	25.1	31.2	27.5	31.8
	Barium (Ba) (mg/kg)	573	590	571	517	542
	Beryllium (Be) (mg/kg)	0.45	0.44	0.40	0.53	0.41
	Bismuth (Bi) (mg/kg)	8.12	6.02	5.63	6.86	8.90
	Boron (B) (mg/kg)	281	241	299	349	266
	Cadmium (Cd) (mg/kg)	10.3	10.6	10.8	14.8	12.0
	Calcium (Ca) (mg/kg)	127000	133000	127000	134000	133000
	Chromium (Cr) (mg/kg)	153	176	179	138	162
	Cobalt (Co) (mg/kg)	38.1	53.7	71.5	165	46.6
	Copper (Cu) (mg/kg)	2770	1630	1120	1480	19200
	Iron (Fe) (mg/kg)	65500	47600	48300	48800	59800
	Lead (Pb) (mg/kg)	428	1420	904	441	846
	Lithium (Li) (mg/kg)	21.8	26.8	19.9	28.3	21.0
	Magnesium (Mg) (mg/kg)	11100	11000	10300	11000	10900
	Manganese (Mn) (mg/kg)	714	787	856	802	846
	Mercury (Hg) (mg/kg)	0.056	<0.050	<0.050	<0.050	0.077
	Molybdenum (Mo) (mg/kg)	94.0	92.7	162	101	102
	Nickel (Ni) (mg/kg)	147	110	105	117	133
	Phosphorus (P) (mg/kg)	12400	11900	12300	11400	12100
	Potassium (K) (mg/kg)	5270	5570	5270	5420	5310
	Selenium (Se) (mg/kg)	0.36	0.32	0.31	0.32	0.58
	Silver (Ag) (mg/kg)	3.88	4.01	7.28	6.46	11.1
	Sodium (Na) (mg/kg)	14700	17000	15400	15300	15300
	Strontium (Sr) (mg/kg)	313	337	336	321	343
	Sulfur (S) (mg/kg)	11900	12100	12300	13200	13600
	Thallium (Tl) (mg/kg)	0.104	0.106	0.098	0.115	0.166
	Tin (Sn) (mg/kg)	264	108	87.1	95.3	107
	Titanium (Ti) (mg/kg)	804	710	786	792	686
	Tungsten (W) (mg/kg)	3.60	4.96	11.0	4.51	6.78
	Uranium (U) (mg/kg)	6.49	6.75	6.67	6.78	6.65
	Vanadium (V) (mg/kg)	52.9	57.6	59.3	53.1	55.1
	Zinc (Zn) (mg/kg)	2680	3390	3870	3700	11900
	Zirconium (Zr) (mg/kg)	1.3	1.4	1.6	1.4	1.4

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2074966-6	L2074966-7	L2074966-8	L2074966-9	L2074966-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1813-A-6	BA1813-A-7	BA1813-A-8	BA1813-A-9	BA1813-A-10
Grouping	Analyte						
<b>SOIL</b>							
<b>Physical Tests</b>	Moisture (%)		21.3	22.7	19.4	20.0	21.7
	pH (1:2 soil:water) (pH)		11.58	11.55	11.51	11.57	11.65
<b>Metals</b>	Aluminum (Al) (mg/kg)		28500	29300	35800	34500	36300
	Antimony (Sb) (mg/kg)		104	146	98.3	106	113
	Arsenic (As) (mg/kg)		45.9	28.1	35.5	31.1	25.0
	Barium (Ba) (mg/kg)		499	479	555	549	545
	Beryllium (Be) (mg/kg)		0.45	0.43	0.36	0.44	0.42
	Bismuth (Bi) (mg/kg)		4.82	10.6	6.84	6.96	6.75
	Boron (B) (mg/kg)		456	253	566	236	295
	Cadmium (Cd) (mg/kg)		27.1	11.1	9.34	13.0	11.6
	Calcium (Ca) (mg/kg)		122000	126000	120000	136000	136000
	Chromium (Cr) (mg/kg)		129	265	136	130	134
	Cobalt (Co) (mg/kg)		92.7	192	15.9	26.5	22.6
	Copper (Cu) (mg/kg)		1420	1600	6640	3500	1700
	Iron (Fe) (mg/kg)		54800	46300	50200	52000	56600
	Lead (Pb) (mg/kg)		334	837	341	661	444
	Lithium (Li) (mg/kg)		19.5	29.2	15.2	21.6	21.1
	Magnesium (Mg) (mg/kg)		9330	9550	9980	9970	10800
	Manganese (Mn) (mg/kg)		647	930	669	825	783
	Mercury (Hg) (mg/kg)		0.068	<0.050	<0.050	0.056	<0.050
	Molybdenum (Mo) (mg/kg)		85.2	106	87.4	87.5	246
	Nickel (Ni) (mg/kg)		81.0	262	161	119	99.7
	Phosphorus (P) (mg/kg)		9810	11900	10100	11800	11800
	Potassium (K) (mg/kg)		4870	5020	4830	5150	5570
	Selenium (Se) (mg/kg)		0.37	0.46	0.38	0.37	0.34
	Silver (Ag) (mg/kg)		4.34	4.58	4.30	4.39	7.32
	Sodium (Na) (mg/kg)		14200	14800	15200	14400	16700
	Strontium (Sr) (mg/kg)		289	289	298	324	329
	Sulfur (S) (mg/kg)		10400	11700	10600	12700	12500
Thallium (Tl) (mg/kg)		0.086	0.111	0.091	0.116	0.105	
Tin (Sn) (mg/kg)		163	103	110	131	112	
Titanium (Ti) (mg/kg)		655	798	1510	786	879	
Tungsten (W) (mg/kg)		5.90	4.76	4.25	5.22	6.44	
Uranium (U) (mg/kg)		6.06	7.02	6.01	6.82	7.21	
Vanadium (V) (mg/kg)		49.7	53.5	45.8	53.7	55.0	
Zinc (Zn) (mg/kg)		5760	5330	5880	5980	3680	
Zirconium (Zr) (mg/kg)		1.5	1.6	2.4	1.7	1.8	

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2074966-11	L2074966-12	L2074966-13	L2074966-14	L2074966-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1813-A-11	BA1813-A-12	BA1813-A-5 REP 1	BA1813-A-5 REP 2	BA1813-A-5 REP 3
Grouping	Analyte						
<b>SOIL</b>							
<b>Physical Tests</b>	Moisture (%)		17.8	18.3			
	pH (1:2 soil:water) (pH)		11.47	11.40			
<b>Metals</b>	Aluminum (Al) (mg/kg)		26700	32400			
	Antimony (Sb) (mg/kg)		95.1	92.1			
	Arsenic (As) (mg/kg)		23.4	26.3			
	Barium (Ba) (mg/kg)		582	568			
	Beryllium (Be) (mg/kg)		0.45	0.40			
	Bismuth (Bi) (mg/kg)		7.27	6.01			
	Boron (B) (mg/kg)		284	294			
	Cadmium (Cd) (mg/kg)		8.81	11.0			
	Calcium (Ca) (mg/kg)		125000	124000			
	Chromium (Cr) (mg/kg)		142	160			
	Cobalt (Co) (mg/kg)		24.7	41.7			
	Copper (Cu) (mg/kg)		4200	2100			
	Iron (Fe) (mg/kg)		53200	61200			
	Lead (Pb) (mg/kg)		451	347			
	Lithium (Li) (mg/kg)		15.9	16.0			
	Magnesium (Mg) (mg/kg)		10600	9530			
	Manganese (Mn) (mg/kg)		741	663			
	Mercury (Hg) (mg/kg)		0.060	<0.050			
	Molybdenum (Mo) (mg/kg)		96.6	106			
	Nickel (Ni) (mg/kg)		321	126			
	Phosphorus (P) (mg/kg)		10500	11900			
	Potassium (K) (mg/kg)		4890	4950			
	Selenium (Se) (mg/kg)		0.33	0.30			
	Silver (Ag) (mg/kg)		23.9	3.73			
	Sodium (Na) (mg/kg)		14000	15400			
	Strontium (Sr) (mg/kg)		289	308			
	Sulfur (S) (mg/kg)		10000	10500			
Thallium (Tl) (mg/kg)		0.089	0.084				
Tin (Sn) (mg/kg)		1040	86.3				
Titanium (Ti) (mg/kg)		876	1100				
Tungsten (W) (mg/kg)		3.99	5.89				
Uranium (U) (mg/kg)		5.98	5.92				
Vanadium (V) (mg/kg)		50.8	53.2				
Zinc (Zn) (mg/kg)		3700	3030				
Zirconium (Zr) (mg/kg)		1.2	1.6				

\* 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>			
	L2074966-16 soil 28-MAR-18 09:00 BA1813-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)			

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## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2074966-1	L2074966-2	L2074966-3	L2074966-4	L2074966-5
		Description	soil	soil	soil	soil	soil
		Sampled Date	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1813-A-1	BA1813-A-2	BA1813-A-3	BA1813-A-4	BA1813-A-5
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.56	11.77	11.65	11.63	11.70
	2nd Preliminary pH (pH)		8.20	8.84	8.30	8.47	8.63
	Final pH (pH)		5.68	5.80	5.69	5.77	5.29
	Extraction Solution Initial pH (pH)		2.89	2.89	2.89	2.89	2.89
	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)		2.90	3.56	2.82	3.31	2.54
	Cadmium (Cd)-Leachable (mg/L)		0.115	0.182	0.123	0.139	0.215
	Calcium (Ca)-Leachable (mg/L)		1950	1940	1990	2010	1700
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.826	0.424	0.429	0.561	0.173
	Copper (Cu)-Leachable (mg/L)		0.525	1.02	0.735	0.702	2.05
	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	0.31	15.8
	Magnesium (Mg)-Leachable (mg/L)		113	110	117	119	89.8
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.46	0.44	0.52	0.45	0.35
	Selenium (Se)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Silver (Ag)-Leachable (mg/L)		<0.050	<0.050	<0.050	<0.050	<0.050
	Thallium (Tl)-Leachable (mg/L)		<1.0	<1.0	<1.0	<1.0	<1.0
	Vanadium (V)-Leachable (mg/L)		<0.15	<0.15	<0.15	<0.15	<0.15
	Zinc (Zn)-Leachable (mg/L)		38.5	41.6	48.1	33.8	36.8

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

## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2074966-6	L2074966-7	L2074966-8	L2074966-9	L2074966-10
		Description	soil	soil	soil	soil	soil
		Sampled Date	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1813-A-6	BA1813-A-7	BA1813-A-8	BA1813-A-9	BA1813-A-10
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.56	11.62	11.64	11.54	11.76
	2nd Preliminary pH (pH)		7.94	8.09	7.79	8.08	9.01
	Final pH (pH)		5.40	5.74	5.46	5.46	5.89
	Extraction Solution Initial pH (pH)		2.89	2.89	2.89	2.89	2.89
	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)		2.53	3.14	3.69	2.43	3.11
	Cadmium (Cd)-Leachable (mg/L)		0.141	0.118	0.080	0.130	0.187
	Calcium (Ca)-Leachable (mg/L)		1830	1960	1750	1910	2010
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.875	0.363	0.298	0.469	0.533
	Copper (Cu)-Leachable (mg/L)		1.45	1.21	0.055	1.09	2.21
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	23.8	5.6	<5.0
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	0.87
	Magnesium (Mg)-Leachable (mg/L)		105	112	101	114	114
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.36	0.51	0.72	0.69	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)		36.9	34.6	63.5	42.3	33.8

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



## ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2074966-11	L2074966-12	L2074966-13	L2074966-14	L2074966-15
		Description	soil	soil	soil	soil	soil
		Sampled Date	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18	28-MAR-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1813-A-11	BA1813-A-12	BA1813-A-5 REP 1	BA1813-A-5 REP 2	BA1813-A-5 REP 3
Grouping	Analyte						
<b>SOIL</b>							
<b>TCLP Metals</b>	1st Preliminary pH (pH)		11.60	11.66	11.70	11.70	11.70
	2nd Preliminary pH (pH)		8.30	8.27	8.63	8.63	8.63
	Final pH (pH)		5.65	5.40	5.70	5.66	5.66
	Extraction Solution Initial pH (pH)		2.89	2.89	2.84	2.84	2.84
	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)		2.69	2.74			
	Cadmium (Cd)-Leachable (mg/L)		0.129	0.142			
	Calcium (Ca)-Leachable (mg/L)		2040	1870			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.303	0.321			
	Copper (Cu)-Leachable (mg/L)		0.993	1.92			
	Iron (Fe)-Leachable (mg/L)		5.8	8.5			
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	0.29
	Magnesium (Mg)-Leachable (mg/L)		116	100			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.68	0.63			
	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)		41.2	95.7			

\* 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>	L2074966-16 soil 28-MAR-18 09:00 BA1813-A-5 REP 4			
Grouping	Analyte				
<b>SOIL</b>					
<b>TCLP Metals</b>	1st Preliminary pH (pH)	11.70			
	2nd Preliminary pH (pH)	8.63			
	Final pH (pH)	5.45			
	Extraction Solution Initial pH (pH)	2.84			
	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)				
	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)	<0.25			
	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	L2074966-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2074966-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2074966-1, -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 HNO <sub>3</sub> 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-CCMS-VA</b>	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A
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. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modified from EPA Method 6020A).			
<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.*



L2074966-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?  Yes  No  
 Hardcopy of Invoice with Report?  Yes  No  
 Company:  
 Contact:  
 Address:  
 Phone: Fax:

Client / Project Information

Job #:  
 PO / AFE: IPO# 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				
BA1813-A-1		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-2		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-3		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-4		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-5		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-6		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-7		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-8		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-9		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-10		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-11		28-Mar-18	9:00	Soil	X	X		X					1
BA1813-A-12		28-Mar-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): 3-APR-18	Time (hh-mm): 0730	Received by: JL	Date: 4/3/18	Time: 10:50 AM	Temperature: 22.2°C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF