

Bottom Ash Data

2018 Week 25

The following analytical report was sent to the Ministry of Environment and Climate Change Strategy on July 16, 2018. The data represents bottom ash composite results for week 25 of 2018 (June 17, 2018 to June 23, 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: 26-JUN-18
Report Date: 09-JUL-18 16:04 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2119180
Project P.O. #: VANCO-0000047506
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

[This report shall not be reproduced except in full without the written authority of the Laboratory.]

ADDRESS: 8081 Lougheed Hwy, Suite 100, Burnaby, BC V5A 1W9 Canada | Phone: +1 604 253 4188 | Fax: +1 604 253 6700
ALS CANADA LTD Part of the ALS Group An ALS Limited Company

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2119180-1	L2119180-2	L2119180-3	L2119180-4	L2119180-5
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-1	BA1825-A-2	BA1825-A-3	BA1825-A-4	BA1825-A-5
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		18.6	19.8	16.5	18.0	17.7
	pH (1:2 soil:water) (pH)		11.90	12.02	11.97	11.95	11.97
Metals	Aluminum (Al) (mg/kg)		35900	38200	35100	38100	35100
	Antimony (Sb) (mg/kg)		159	155	160	150	183
	Arsenic (As) (mg/kg)		73.4	47.3	141	69.7	44.8
	Barium (Ba) (mg/kg)		520	570	582	571	562
	Beryllium (Be) (mg/kg)		0.37	0.38	0.43	0.40	0.39
	Bismuth (Bi) (mg/kg)		7.96	13.6	11.0	8.30	9.96
	Boron (B) (mg/kg)		294	602	635	285	379
	Cadmium (Cd) (mg/kg)		17.5	16.3	14.8	28.3	19.0
	Calcium (Ca) (mg/kg)		133000	135000	149000	140000	140000
	Chromium (Cr) (mg/kg)		191	280	176	219	247
	Cobalt (Co) (mg/kg)		80.0	75.4	27.5	25.8	134
	Copper (Cu) (mg/kg)		4620	10200	1990	3000	4180
	Iron (Fe) (mg/kg)		65100	77300	62200	71300	59100
	Lead (Pb) (mg/kg)		581	396	665	503	2080
	Lithium (Li) (mg/kg)		16.2	19.3	19.0	18.1	21.7
	Magnesium (Mg) (mg/kg)		9630	11800	13000	11600	11300
	Manganese (Mn) (mg/kg)		4710	1210	829	806	914
	Mercury (Hg) (mg/kg)		<0.050	<0.050	<0.050	<0.050	<0.050
	Molybdenum (Mo) (mg/kg)		51.8	69.4	53.0	40.7	44.6
	Nickel (Ni) (mg/kg)		161	343	99.5	136	238
	Phosphorus (P) (mg/kg)		10200	11100	11500	11300	10700
	Potassium (K) (mg/kg)		5030	5690	5950	6310	5620
	Selenium (Se) (mg/kg)		0.56	0.55	0.50	0.49	0.51
	Silver (Ag) (mg/kg)		8.57	5.38	4.67	11.4	5.74
	Sodium (Na) (mg/kg)		13800	16200	17100	16200	16200
	Strontium (Sr) (mg/kg)		346	330	378	343	336
Sulfur (S) (mg/kg)		14700	13900	14600	14700	14900	
Thallium (Tl) (mg/kg)		0.076	0.070	0.064	0.080	0.069	
Tin (Sn) (mg/kg)		156	142	163	191	152	
Titanium (Ti) (mg/kg)		1040	996	721	1080	928	
Tungsten (W) (mg/kg)		7.73	28.3	6.60	8.96	7.74	
Uranium (U) (mg/kg)		5.19	5.19	5.35	6.01	5.60	
Vanadium (V) (mg/kg)		48.9	55.4	61.4	60.1	56.8	
Zinc (Zn) (mg/kg)		5020	5120	3860	4140	4330	
Zirconium (Zr) (mg/kg)		1.8	1.6	1.6	1.6	1.4	

* 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	L2119180-6 SOIL 20-JUN-18 09:00 BA1825-A-6	L2119180-7 SOIL 20-JUN-18 09:00 BA1825-A-7	L2119180-8 SOIL 20-JUN-18 09:00 BA1825-A-8	L2119180-9 SOIL 20-JUN-18 09:00 BA1825-A-9	L2119180-10 SOIL 20-JUN-18 09:00 BA1825-A-10	
Grouping	Analyte					
SOIL						
Physical Tests	Moisture (%)	19.6	19.1	19.9	19.7	17.2
	pH (1:2 soil:water) (pH)	11.96	11.94	11.99	11.95	11.99
Metals	Aluminum (Al) (mg/kg)	30900	43900	36900	37600	30000
	Antimony (Sb) (mg/kg)	147	149	154	157	163
	Arsenic (As) (mg/kg)	43.9	39.0	43.8	53.1	48.2
	Barium (Ba) (mg/kg)	599	542	531	523	488
	Beryllium (Be) (mg/kg)	0.37	0.35	0.41	0.44	0.41
	Bismuth (Bi) (mg/kg)	14.1	7.46	11.3	9.16	7.89
	Boron (B) (mg/kg)	354	365	260	299	300
	Cadmium (Cd) (mg/kg)	17.7	14.5	13.3	15.1	14.9
	Calcium (Ca) (mg/kg)	136000	132000	142000	146000	140000
	Chromium (Cr) (mg/kg)	206	153	171	211	178
	Cobalt (Co) (mg/kg)	37.6	68.4	105	45.4	45.7
	Copper (Cu) (mg/kg)	2290	1230	4460	1850	4990
	Iron (Fe) (mg/kg)	78500	82400	61800	72100	63800
	Lead (Pb) (mg/kg)	568	573	1690	1080	1040
	Lithium (Li) (mg/kg)	17.3	15.9	40.9	26.7	18.7
	Magnesium (Mg) (mg/kg)	11000	11200	11600	11600	10800
	Manganese (Mn) (mg/kg)	1790	865	804	1080	718
	Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	0.061	<0.050
	Molybdenum (Mo) (mg/kg)	44.1	127	43.6	48.3	86.1
	Nickel (Ni) (mg/kg)	116	114	115	162	177
	Phosphorus (P) (mg/kg)	9550	10400	9830	10500	11100
	Potassium (K) (mg/kg)	5710	5630	5740	5980	5610
	Selenium (Se) (mg/kg)	0.52	0.46	0.44	0.46	0.44
	Silver (Ag) (mg/kg)	4.25	5.42	5.43	4.62	4.79
	Sodium (Na) (mg/kg)	15900	15500	15600	16500	16000
	Strontium (Sr) (mg/kg)	338	307	326	355	332
	Sulfur (S) (mg/kg)	14800	14600	13600	14800	14300
	Thallium (Tl) (mg/kg)	0.066	0.062	0.063	0.066	0.068
	Tin (Sn) (mg/kg)	131	171	159	185	129
	Titanium (Ti) (mg/kg)	1460	1420	1160	910	593
	Tungsten (W) (mg/kg)	6.47	9.68	6.20	8.22	5.59
	Uranium (U) (mg/kg)	5.21	4.84	5.12	5.12	5.06
	Vanadium (V) (mg/kg)	55.1	54.8	53.3	71.8	62.4
	Zinc (Zn) (mg/kg)	4500	4950	3800	3800	4110
	Zirconium (Zr) (mg/kg)	1.6	2.3	1.8	1.4	1.4

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2119180-11	L2119180-12	L2119180-13	L2119180-14	L2119180-15
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-11	BA1825-A-12	BA1825-A-12 REP1	BA1825-A-12 REP2	BA1825-A-12 REP3
Grouping	Analyte						
SOIL							
Physical Tests	Moisture (%)		20.0	17.3			
	pH (1:2 soil:water) (pH)		11.96	12.10			
Metals	Aluminum (Al) (mg/kg)		33700	30700			
	Antimony (Sb) (mg/kg)		147	170			
	Arsenic (As) (mg/kg)		38.7	52.1			
	Barium (Ba) (mg/kg)		520	516			
	Beryllium (Be) (mg/kg)		0.42	0.40			
	Bismuth (Bi) (mg/kg)		7.83	10.2			
	Boron (B) (mg/kg)		292	256			
	Cadmium (Cd) (mg/kg)		13.9	18.4			
	Calcium (Ca) (mg/kg)		142000	133000			
	Chromium (Cr) (mg/kg)		179	154			
	Cobalt (Co) (mg/kg)		46.6	25.7			
	Copper (Cu) (mg/kg)		2720	36300			
	Iron (Fe) (mg/kg)		63200	52200			
	Lead (Pb) (mg/kg)		359	1740			
	Lithium (Li) (mg/kg)		17.4	19.2			
	Magnesium (Mg) (mg/kg)		13600	11400			
	Manganese (Mn) (mg/kg)		998	737			
	Mercury (Hg) (mg/kg)		<0.050	<0.050			
	Molybdenum (Mo) (mg/kg)		55.4	40.7			
	Nickel (Ni) (mg/kg)		120	215			
	Phosphorus (P) (mg/kg)		10100	10900			
	Potassium (K) (mg/kg)		5610	5920			
	Selenium (Se) (mg/kg)		0.44	0.52			
	Silver (Ag) (mg/kg)		4.90	11.6			
	Sodium (Na) (mg/kg)		15900	16700			
	Strontium (Sr) (mg/kg)		327	344			
	Sulfur (S) (mg/kg)		14600	14400			
	Thallium (Tl) (mg/kg)		0.066	0.075			
	Tin (Sn) (mg/kg)		404	418			
	Titanium (Ti) (mg/kg)		806	882			
	Tungsten (W) (mg/kg)		10.4	9.09			
	Uranium (U) (mg/kg)		5.29	5.26			
Vanadium (V) (mg/kg)		51.6	54.6				
Zinc (Zn) (mg/kg)		6160	8260				
Zirconium (Zr) (mg/kg)		1.4	1.4				

* 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	L2119180-16 SOIL 20-JUN-18 09:00 BA1825-A-12 REP4	L2119180-17 SOIL 20-JUN-18 09:00 BA1825-A-7 REP1	L2119180-18 SOIL 20-JUN-18 09:00 BA1825-A-7 REP2	L2119180-19 SOIL 20-JUN-18 09:00 BA1825-A-7 REP3	L2119180-20 SOIL 20-JUN-18 09:00 BA1825-A-7 REP4
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	L2119180-1	L2119180-2	L2119180-3	L2119180-4	L2119180-5
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-1	BA1825-A-2	BA1825-A-3	BA1825-A-4	BA1825-A-5
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.78	11.75	11.73	11.74	11.73
	2nd Preliminary pH (pH)		10.38	10.47	10.46	10.43	10.34
	Final pH (pH)		6.07	6.11	6.07	6.16	5.98
	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)		4.43	4.76	3.66	4.26	3.85
	Cadmium (Cd)-Leachable (mg/L)		0.272	0.196	0.231	0.227	0.231
	Calcium (Ca)-Leachable (mg/L)		2020	2000	2080	2070	2040
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.258	0.334	0.442	1.02	0.545
	Copper (Cu)-Leachable (mg/L)		0.842	1.55	1.29	1.05	1.79
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		0.76	0.59	<0.25	<0.25	0.37
	Magnesium (Mg)-Leachable (mg/L)		113	111	117	114	112
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.49	0.52	0.43	0.67	0.58
	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)		53.6	50.0	42.5	58.3	109

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2119180-6	L2119180-7	L2119180-8	L2119180-9	L2119180-10
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-6	BA1825-A-7	BA1825-A-8	BA1825-A-9	BA1825-A-10
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.77	11.76	11.73	11.65	11.69
	2nd Preliminary pH (pH)		10.42	10.29	10.08	10.05	10.17
	Final pH (pH)		6.20	6.18	6.66	6.40	6.24
	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)		4.54	4.60	3.94	4.07	4.12
	Cadmium (Cd)-Leachable (mg/L)		0.206	0.561	0.202	0.195	0.194
	Calcium (Ca)-Leachable (mg/L)		2040	2050	2090	2120	2010
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)		0.825	0.357	1.16	0.666	0.640
	Copper (Cu)-Leachable (mg/L)		1.07	1.01	0.710	0.701	1.06
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)		0.27	0.43	<0.25	0.66	1.37
	Magnesium (Mg)-Leachable (mg/L)		112	116	114	116	115
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)		0.39	0.48	0.43	0.44	0.40
	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)		46.8	34.6	30.7	41.4	50.8

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2119180-11	L2119180-12	L2119180-13	L2119180-14	L2119180-15
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-11	BA1825-A-12	BA1825-A-12 REP1	BA1825-A-12 REP2	BA1825-A-12 REP3
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.75	11.73	11.73	11.73	11.73
	2nd Preliminary pH (pH)		10.44	10.09	10.09	10.09	10.09
	Final pH (pH)		6.61	6.09	5.93	6.16	6.13
	Extraction Solution Initial pH (pH)		2.89	2.89	2.90	2.90	2.90
	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)		4.30	4.31			
	Cadmium (Cd)-Leachable (mg/L)		0.182	4.39	0.241	0.197	0.514
	Calcium (Ca)-Leachable (mg/L)		2080	2040			
	Chromium (Cr)-Leachable (mg/L)		<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)		0.281	1.10			
	Copper (Cu)-Leachable (mg/L)		0.757	1.32			
	Iron (Fe)-Leachable (mg/L)		<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)		<0.25	<0.25			
	Magnesium (Mg)-Leachable (mg/L)		113	113			
	Mercury (Hg)-Leachable (mg/L)		<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)		0.44	0.43			
	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)		33.6	44.3			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

		Sample ID	L2119180-16	L2119180-17	L2119180-18	L2119180-19	L2119180-20
		Description	SOIL	SOIL	SOIL	SOIL	SOIL
		Sampled Date	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18	20-JUN-18
		Sampled Time	09:00	09:00	09:00	09:00	09:00
		Client ID	BA1825-A-12 REP4	BA1825-A-7 REP1	BA1825-A-7 REP2	BA1825-A-7 REP3	BA1825-A-7 REP4
Grouping	Analyte						
SOIL							
TCLP Metals	1st Preliminary pH (pH)		11.73	11.76	11.76	11.76	11.76
	2nd Preliminary pH (pH)		10.09	10.29	10.29	10.29	10.29
	Final pH (pH)		6.04	6.00	6.19	6.17	6.29
	Extraction Solution Initial pH (pH)		2.90	2.90	2.90	2.90	2.90
	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)		0.199	0.275	0.212	0.212	0.208
	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	Mercury (Hg)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Arsenic (As)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Bismuth (Bi)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Boron (B)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Cobalt (Co)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Copper (Cu)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Copper (Cu)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Lead (Pb)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Lead (Pb)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Lithium (Li)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Manganese (Mn)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Nickel (Ni)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Duplicate	Silver (Ag)	DUP-H	L2119180-1, -2, -3, -4, -5, -6
Duplicate	Zinc (Zn)	DUP-H	L2119180-10, -11, -12, -7, -8, -9
Certified Reference Material	Sodium (Na)	MES	L2119180-10, -11, -12, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2119180-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2119180-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2119180-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2119180-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).
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**
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	

Reference Information

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:

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.



L2119180-COFC

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	Email 1:	smckinney@covanta.com		
	Burnaby BC	Email 2:	rjohnson4@covanta.com		
Phone:	604-521-1025	Fax:	dskrypnik@covanta.com		
	<input type="checkbox"/> Yes <input type="checkbox"/> No		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:									Number of Containers
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)				
BA1825-A-1		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-2		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-3		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-4		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-5		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-6		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-7		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-8		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-9		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-10		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-11		20-Jun-18	9:00	Soil	X	X		X				1
BA1825-A-12		20-Jun-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)			Observations: Yes / No ? If Yes add SIF
Released by:	Date (dd-mmm-yy)	Time (hh:mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	
<i>[Signature]</i>	26 Jun-18	07:00	<i>[Signature]</i>	June 26	2PM	20 °C			