Bottom Ash Data

2018 Week 37

The following analytical reports were sent to the Ministry of Environment and Climate Change Strategy:

- Weekly Composite Results were submitted on October 2, 2018
- Daily Composite Results were submitted on November 2, 2018

This data represents bottom ash results for week 37 of 2018 (September 9, 2018 to September 15, 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: 18-SEP-18
Report Date: 01-OCT-18 15:51 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2166261

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2166261-1	L2166261-2	L2166261-3	L2166261-4	L2166261-5
Description	soil	soil	soil	soil	soil
Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	BA1837-A-1	BA1837-A-2	BA1837-A-3	BA1837-A-4	BA1837-A-5
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	18.2	18.8	18.6	16.7	19.4
pH (1:2 soil:water) (pH)	11.73	11.62	11.67	11.59	11.54
Metals Aluminum (Al) (mg/kg)	35700	35100	35300	35100	38200
Antimony (Sb) (mg/kg)	82.6	78.8	65.1	77.0	78.2
Arsenic (As) (mg/kg)	23.4	23.7	25.5	32.7	25.3
Barium (Ba) (mg/kg)	652	658	575	591	684
Beryllium (Be) (mg/kg)	0.37	0.44	0.43	0.40	0.44
Bismuth (Bi) (mg/kg)	5.46	8.43	24.0	4.95	5.28
Boron (B) (mg/kg)	247	281	277	181	300
Cadmium (Cd) (mg/kg)	11.7	38.8	11.3	11.4	10.2
Calcium (Ca) (mg/kg)	105000	119000	100000	107000	113000
Chromium (Cr) (mg/kg)	327	703	217	346	209
Cobalt (Co) (mg/kg)	39.6	73.8	25.2	25.7	44.3
Copper (Cu) (mg/kg)	29600	6170	2500	1490	1430
Iron (Fe) (mg/kg)	82300	70200	74600	79800	77500
Lead (Pb) (mg/kg)	1380	352	2190	285	504
Lithium (Li) (mg/kg)	17.2	18.4	17.0	14.5	20.9
Magnesium (Mg) (mg/kg)	9790	11300	9290	9950	11900
Manganese (Mn) (mg/kg)	906	840	953	1330	1270
Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum (Mo) (mg/kg)	146	128	66.1	125	92.4
Nickel (Ni) (mg/kg)	379	224	213	212	232
Phosphorus (P) (mg/kg)	9260	8370	8230	8260	9810
Potassium (K) (mg/kg)	3910	4340	4180	4100	4680
Selenium (Se) (mg/kg)	1.10	1.31	1.20	1.26	1.05
Silver (Ag) (mg/kg)	8.17	3.63	2.47	2.67	3.07
Sodium (Na) (mg/kg)	13300	13400	12900	13300	14500
Strontium (Sr) (mg/kg)	266	313	487	277	610
Sulfur (S) (mg/kg)	7800	9500	8900	8500	10000
Thallium (Tl) (mg/kg)	0.071	0.084	0.078	0.083	0.090
Tin (Sn) (mg/kg)	295	197	93.0	118	126
Titanium (Ti) (mg/kg)	921	1080	642	515	821
Tungsten (W) (mg/kg)	6.45	9.69	14.9	6.41	11.9
Uranium (U) (mg/kg)	4.16	4.55	4.49	4.39	4.74
Vanadium (V) (mg/kg)	58.1	60.8	44.2	41.7	46.4
Zinc (Zn) (mg/kg)	12100	4140	2750	2930	6150
Zirconium (Zr) (mg/kg)	1.0	1.2	1.1	1.2	1.1

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2166261-6	L2166261-7	L2166261-8	L2166261-9	L2166261-10
Description	soil	soil	soil	soil	soil
Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	BA1837-A-6	BA1837-A-7	BA1837-A-8	BA1837-A-9	BA1837-A-10
Grouping / **Analyte**					
SOIL					
Physical Tests Moisture (%)	17.9	17.4	18.3	19.0	19.1
pH (1:2 soil:water) (pH)	11.69	11.71	11.60	11.69	12.00
Metals Aluminum (Al) (mg/kg)	31600	35600	32700	59200	36200
Antimony (Sb) (mg/kg)	75.8	68.2	98.7	84.8	104
Arsenic (As) (mg/kg)	25.3	20.7	35.5	23.5	50.0
Barium (Ba) (mg/kg)	568	589	656	669	546
Beryllium (Be) (mg/kg)	0.40	0.37	0.45	0.42	0.45
Bismuth (Bi) (mg/kg)	6.30	4.10	5.23	3.81	5.43
Boron (B) (mg/kg)	611	321	250	325	289
Cadmium (Cd) (mg/kg)	11.4	10.8	14.1	13.1	11.0
Calcium (Ca) (mg/kg)	111000	100000	112000	109000	112000
Chromium (Cr) (mg/kg)	155	139	283	201	181
Cobalt (Co) (mg/kg)	29.7	42.4	146	31.5	52.7
Copper (Cu) (mg/kg)	1580	1750	7710	4460	2010
Iron (Fe) (mg/kg)	66700	72100	61600	89400	86600
Lead (Pb) (mg/kg)	381	267	400	302	287
Lithium (Li) (mg/kg)	18.9	14.1	16.8	17.5	15.7
Magnesium (Mg) (mg/kg)	9710	10400	10100	10900	11000
Manganese (Mn) (mg/kg)	848	788	841	1240	961
Mercury (Hg) (mg/kg)	<0.050	<0.050	<0.050	<0.050	<0.050
Molybdenum (Mo) (mg/kg)	51.6	57.0	81.9	45.0	59.1
Nickel (Ni) (mg/kg)	87.2	100	1050	155	127
Phosphorus (P) (mg/kg)	10000	9250	11100	8810	9510
Potassium (K) (mg/kg)	4080	3840	4740	4540	3980
Selenium (Se) (mg/kg)	1.59	1.14	1.16	1.07	1.09
Silver (Ag) (mg/kg)	3.70	2.54	2.75	2.94	4.35
Sodium (Na) (mg/kg)	13700	12700	13600	14300	13800
Strontium (Sr) (mg/kg)	328	265	340	368	290
Sulfur (S) (mg/kg)	10700	8500	9000	9000	10400
Thallium (Tl) (mg/kg)	0.079	0.076	0.085	0.081	0.079
Tin (Sn) (mg/kg)	189	110	232	90.8	102
Titanium (Ti) (mg/kg)	482	590	500	1650	728
Tungsten (W) (mg/kg)	8.13	8.86	11.3	11.2	6.65
Uranium (U) (mg/kg)	4.23	4.25	4.54	4.37	4.67
Vanadium (V) (mg/kg)	40.3	39.6	46.4	47.4	45.0
Zinc (Zn) (mg/kg)	4220	3620	10100	5860	4200
Zirconium (Zr) (mg/kg)	1.0	1.1	1.0	2.1	1.2

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2166261-11 soil 12-SEP-18 09:00 BA1837-A-11	L2166261-12 soil 12-SEP-18 09:00 BA1837-A-12	L2166261-13 soil 12-SEP-18 09:00 BA1837-A-10 REP 1	L2166261-14 soil 12-SEP-18 09:00 BA1837-A-10 REP 2	L2166261-15 soil 12-SEP-18 09:00 BA1837-A-10 REP 3
SOIL						
Physical Tests	Moisture (%)	17.8	18.4			
	pH (1:2 soil:water) (pH)	11.85	11.84			
Metals	Aluminum (Al) (mg/kg)	41400	30000			
	Antimony (Sb) (mg/kg)	312	62.0			
	Arsenic (As) (mg/kg)	59.5	17.5			
	Barium (Ba) (mg/kg)	581	459			
	Beryllium (Be) (mg/kg)	0.79	0.30			
	Bismuth (Bi) (mg/kg)	8.19	3.79			
	Boron (B) (mg/kg)	240	197			
	Cadmium (Cd) (mg/kg)	12.5	8.91			
	Calcium (Ca) (mg/kg)	109000	77300			
	Chromium (Cr) (mg/kg)	186	154			
	Cobalt (Co) (mg/kg)	420	16.5			
	Copper (Cu) (mg/kg)	6580	6580			
	Iron (Fe) (mg/kg)	80500	78800			
	Lead (Pb) (mg/kg)	4230	309			
	Lithium (Li) (mg/kg)	27.1	11.3			
	Magnesium (Mg) (mg/kg)	11900	6750			
	Manganese (Mn) (mg/kg)	939	829			
	Mercury (Hg) (mg/kg)	<0.050	0.151			
	Molybdenum (Mo) (mg/kg)	86.5	70.8			
	Nickel (Ni) (mg/kg)	105	198			
	Phosphorus (P) (mg/kg)	9610	6030			
	Potassium (K) (mg/kg)	4310	2780			
	Selenium (Se) (mg/kg)	1.05	1.03			
	Silver (Ag) (mg/kg)	3.15	5.08			
	Sodium (Na) (mg/kg)	13700	9470			
	Strontium (Sr) (mg/kg)	346	262			
	Sulfur (S) (mg/kg)	9300	6500			
	Thallium (Tl) (mg/kg)	0.111	0.170			
	Tin (Sn) (mg/kg)	93.7	173			
	Titanium (Ti) (mg/kg)	642	440			
	Tungsten (W) (mg/kg)	6.73	8.25			
	Uranium (U) (mg/kg)	4.56	3.17			
	Vanadium (V) (mg/kg)	46.3	32.0			
	Zinc (Zn) (mg/kg)	5200	5700			
	Zirconium (Zr) (mg/kg)	1.4	<1.0			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2166261-16	L2166261-17	L2166261-18	L2166261-19	L2166261-20
	Description	soil	soil	soil	soil	soil
	Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	BA1837-A-10 REP 4	BA1837-A-12 REP 1	BA1837-A-12 REP 2	BA1837-A-12 REP 3	BA1837-A-12 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	L2166261-1	L2166261-2	L2166261-3	L2166261-4	L2166261-5
Description	soil	soil	soil	soil	soil
Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	BA1837-A-1	BA1837-A-2	BA1837-A-3	BA1837-A-4	BA1837-A-5
Grouping / **Analyte**					
SOIL					
TCLP Metals					
1st Preliminary pH (pH)	11.66	11.63	11.64	11.66	11.60
2nd Preliminary pH (pH)	8.96	9.18	8.74	9.59	9.10
Final pH (pH)	5.85	5.88	5.91	5.85	5.70
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)	2.33	2.37	3.52	2.02	2.38
Cadmium (Cd)-Leachable (mg/L)	0.219	0.287	0.200	0.237	0.227
Calcium (Ca)-Leachable (mg/L)	1780	1820	1850	1750	1740
Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt (Co)-Leachable (mg/L)	1.12	0.547	0.529	0.716	0.620
Copper (Cu)-Leachable (mg/L)	2.10	1.07	0.427	1.72	1.10
Iron (Fe)-Leachable (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
Lead (Pb)-Leachable (mg/L)	0.56	<0.25	<0.25	<0.25	0.94
Magnesium (Mg)-Leachable (mg/L)	110	112	112	109	107
Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel (Ni)-Leachable (mg/L)	0.61	0.65	0.63	0.74	0.71
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)	61.4	73.7	47.1	42.5	65.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2166261-6 soil 12-SEP-18 09:00 BA1837-A-6	L2166261-7 soil 12-SEP-18 09:00 BA1837-A-7	L2166261-8 soil 12-SEP-18 09:00 BA1837-A-8	L2166261-9 soil 12-SEP-18 09:00 BA1837-A-9	L2166261-10 soil 12-SEP-18 09:00 BA1837-A-10
Sample ID		L2166261-6	L2166261-7	L2166261-8	L2166261-9	L2166261-10
Description		soil	soil	soil	soil	soil
Sampled Date		12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
Sampled Time		09:00	09:00	09:00	09:00	09:00
Client ID		BA1837-A-6	BA1837-A-7	BA1837-A-8	BA1837-A-9	BA1837-A-10
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.77	11.77	11.66	11.63	11.72
	2nd Preliminary pH (pH)	9.63	9.31	9.17	9.03	8.90
	Final pH (pH)	5.87	5.97	6.11	6.15	6.02
	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)	2.13	2.37	2.46	2.59	2.40
	Cadmium (Cd)-Leachable (mg/L)	0.277	0.334	0.289	0.161	1.03
	Calcium (Ca)-Leachable (mg/L)	1790	1810	1730	1800	1710
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)	0.415	1.18	1.11	0.354	0.508
	Copper (Cu)-Leachable (mg/L)	0.790	1.32	1.32	0.681	1.44
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)	<0.25	0.30	<0.25	<0.25	<0.25
	Magnesium (Mg)-Leachable (mg/L)	112	113	121	113	106
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)	0.60	0.54	0.59	0.68	1.03
	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)	63.4	59.3	131	46.3	60.6

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2166261-11 soil 12-SEP-18 09:00 BA1837-A-11	L2166261-12 soil 12-SEP-18 09:00 BA1837-A-12	L2166261-13 soil 12-SEP-18 09:00 BA1837-A-10 REP 1	L2166261-14 soil 12-SEP-18 09:00 BA1837-A-10 REP 2	L2166261-15 soil 12-SEP-18 09:00 BA1837-A-10 REP 3
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.66	11.55	11.72	11.72	11.72
	2nd Preliminary pH (pH)	8.33	8.32	8.90	8.90	8.90
	Final pH (pH)	6.03	5.79	6.01	5.97	5.88
	Extraction Solution Initial pH (pH)	2.89	2.89	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)	2.55	1.90			
	Cadmium (Cd)-Leachable (mg/L)	0.194	0.656	3.35	0.223	0.218
	Calcium (Ca)-Leachable (mg/L)	1750	1680			
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)	0.697	1.31			
	Copper (Cu)-Leachable (mg/L)	1.07	0.988			
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)	1.12	2.16			
	Magnesium (Mg)-Leachable (mg/L)	110	102			
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)	0.48	0.89			
	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)	40.3	73.9			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2166261-16 soil 12-SEP-18 09:00 BA1837-A-10 REP 4	L2166261-17 soil 12-SEP-18 09:00 BA1837-A-12 REP 1	L2166261-18 soil 12-SEP-18 09:00 BA1837-A-12 REP 2	L2166261-19 soil 12-SEP-18 09:00 BA1837-A-12 REP 3	L2166261-20 soil 12-SEP-18 09:00 BA1837-A-12 REP 4
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.72	11.55	11.55	11.55	11.55
	2nd Preliminary pH (pH)	8.90	8.32	8.32	8.32	8.32
	Final pH (pH)	5.90	5.71	5.63	5.81	5.99
	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)	1.71	0.244	0.291	0.217	0.236
	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)
Method Blank	Copper (Cu)	B	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Antimony (Sb)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Chromium (Cr)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Cobalt (Co)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Copper (Cu)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Molybdenum (Mo)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Nickel (Ni)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Silver (Ag)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Strontium (Sr)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tin (Sn)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Tungsten (W)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Zinc (Zn)	DUP-H	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Duplicate	Selenium (Se)	DUP-H,J	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2166261-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9

Qualifiers for Individual Parameters Listed:

Qualifier	Description
B	Method Blank exceeds ALS DQO. Associated sample results which are < Limit of Reporting or > 5 times blank level are considered reliable.
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.
DUP-H,J	Duplicate results outside ALS DQO, due to sample heterogeneity. Duplicate results and limits are expressed in terms of absolute difference.
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 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.

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.

ALS Environmental

L2166261-COFC

COC #

Page ____ of ____

Report To				Report Format / Distribution				Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard				●Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk			☑ PDF	☐ Excel	☐ Digital	☐ Fax	OPriority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive			Email 1:	smckinney@covanta.com			OEmergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC			Email 2:	rjohnson4@covanta.com			OSame Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:		Email 3:	dskrypnyk@covanta.com			**Analysis Request**
		☐ Yes	☐ No		brent.kirkpatrick@metrovancouver.org			
					Sarah.Wellman@metrovancouver.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?	☐ Yes	☐ No		Job #:				
Company:				PO / AFE:	PO# 46693 Weekly Bottom Ash - Suite			
Contact:				LSD:	(includes 2:1 pH)			
Address:								
Phone:		Fax:		Quote #:				
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
	BA1837-A-1	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-2	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-3	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-4	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-5	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-6	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-7	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-8	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-9	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-10	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-11	12-Sep-18	9:00	Soil	X	X		X	1
	BA1837-A-12	12-Sep-18	9:00	Soil	X	X		X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	18-Sep-18	08:00	HA	9/18	12:25p	20 °C				

GENF 20.00 Front

Covanta Burnaby R.E., ULC
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 05-OCT-18
Report Date: 23-OCT-18 18:20 (MT)
Version: FINAL REV. 2

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2176793

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 #13-16, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-16, as per client instructions. The prep data was taken from the original samples but is reported with the re-prepped samples for informational purposes.

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176793-1	L2176793-2	L2176793-3	L2176793-4	L2176793-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-01-01	DBA1837-A-01-02	DBA1837-A-01-03	DBA1837-A-01-04	DBA1837-A-01-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.98	10.89	10.78	10.93	10.89
TCLP Metals	1st Preliminary pH (pH)	11.31	11.47	11.42	11.42	11.51
	2nd Preliminary pH (pH)	8.39	7.67	8.02	7.86	8.41
	Final pH (pH)	6.13	6.17	5.97	6.07	6.01
	Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
	Cadmium (Cd)-Leachable (mg/L)	0.162	0.271	0.175	0.207	0.143

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176793-6	L2176793-7	L2176793-8	L2176793-9	L2176793-10
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-01-06	DBA1837-A-01-07	DBA1837-A-01-08	DBA1837-A-01-09	DBA1837-A-01-10
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	11.06	10.87	10.83	10.98	11.23
TCLP Metals 1st Preliminary pH (pH)	11.46	11.59	11.44	11.51	11.47
2nd Preliminary pH (pH)	7.87	8.20	8.00	8.19	7.70
Final pH (pH)	5.99	6.00	6.20	5.91	6.22
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.143	0.143	0.181	1.05	0.107

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176793-11	L2176793-12	L2176793-13	L2176793-14	L2176793-15
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18	10-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-01-11	DBA1837-A-01-12	DBA1837-A-01-09 REP1	DBA1837-A-01-09 REP2	DBA1837-A-01-09 REP3
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	10.90	10.92			
TCLP Metals 1st Preliminary pH (pH)	11.52	11.54	11.51	11.51	11.51
2nd Preliminary pH (pH)	7.11	8.03	8.19	8.19	8.19
Final pH (pH)	6.02	6.11	6.01	5.93	5.64
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.142	0.315	0.162	0.151	0.164

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176793-16				
	Description	Soil				
	Sampled Date	10-SEP-18				
	Sampled Time	09:00				
	Client ID	DBA1837-A-01-09 REP4				
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)					
TCLP Metals	1st Preliminary pH (pH)	11.51				
	2nd Preliminary pH (pH)	8.19				
	Final pH (pH)	5.36				
	Extraction Solution Initial pH (pH)	2.90				
	Cadmium (Cd)-Leachable (mg/L)	0.197				

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2176793-13, -14, -15, -16

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**
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).

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

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.

ALS Environmental

L2176793-COFC

COC # _____

Page ____ of ____

Report To		Report		Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	smckinney@covanta.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	dskrypnyk@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3:	sarah.wellman@metrovancouver.org	**Analysis Request**
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			rjohnson4@covanta.com	
Invoice To	Same as Report ?	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:		
Company:		PO / AFE:	Weekly Bottom Ash - Suite	
Contact:		LSD:	(includes 2:1 pH)	
Address:				
Phone:	Fax:	Quote #:		
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	CD-TCLP-VA(Cd and pH steps)	Number of Containers
	DBA1837-A-01-01	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-02	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-03	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-04	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-05	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-06	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-07	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-08	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-09	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-10	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-11	10-Sep-18	9:00	Soil	X	1
	DBA1837-A-01-12	10-Sep-18	9:00	Soil	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	5-Oct-18	08:00	HN	10/5	11:15	19 °C				

GENF 20.00 Front

Covanta Burnaby R.E., ULC
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 05-OCT-18
Report Date: 15-OCT-18 18:40 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2176797

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

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176797-1	L2176797-2	L2176797-3	L2176797-4	L2176797-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-02-01	DBA1837-A-02-02	DBA1837-A-02-03	DBA1837-A-02-04	DBA1837-A-02-05
Grouping	**Analyte**					
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.10	11.07	11.05	11.02	11.14
	2nd Preliminary pH (pH)	7.91	7.82	7.83	6.71	6.77
	Final pH (pH)	5.70	5.69	5.67	5.82	5.64
	Extraction Solution Initial pH (pH)	2.92	2.92	2.92	2.92	2.92
	Cadmium (Cd)-Leachable (mg/L)	0.198	0.429	0.204	0.208	0.171

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176797-6	L2176797-7	L2176797-8	L2176797-9	L2176797-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18	12-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-02-06	DBA1837-A-02-07	DBA1837-A-02-08	DBA1837-A-02-09	DBA1837-A-02-10
Grouping	**Analyte**					
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.03	11.11	11.09	10.99	10.99
	2nd Preliminary pH (pH)	8.13	7.85	7.52	7.09	8.41
	Final pH (pH)	5.62	5.76	5.70	5.54	5.78
	Extraction Solution Initial pH (pH)	2.92	2.92	2.92	2.92	2.92
	Cadmium (Cd)-Leachable (mg/L)	0.205	0.180	0.219	0.242	0.176

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176797-11	L2176797-12			
	Description	Soil	Soil			
	Sampled Date	12-SEP-18	12-SEP-18			
	Sampled Time	09:00	09:00			
	Client ID	DBA1837-A-02-11	DBA1837-A-02-12			
Grouping	**Analyte**					
SOIL						
TCLP Metals	1st Preliminary pH (pH)	10.98	11.15			
	2nd Preliminary pH (pH)	6.78	6.09			
	Final pH (pH)	5.77	5.95			
	Extraction Solution Initial pH (pH)	2.92	2.92			
	Cadmium (Cd)-Leachable (mg/L)	0.207	0.182			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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).

** 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.

ALS Environmental

L2176797-COFC

COC # _____ Page ____ of ____

Report To		Report		Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	smckinney@covantaenergy.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	dskrypnyk@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3:	sarah.wellman@metrovancouver.org	**Analysis Request**
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			rjohnson4@covanta.com	
Invoice To	Same as Report ?	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:		
Company:		PO / AFE:	Weekly Bottom Ash - Suite	
Contact:		LSD:	(includes 2:1 pH)	
Address:				
Phone:	Fax:	Quote #:		
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	CD-TCLP-VA(Cd and pH steps)	Number of Containers
	DBA1837-A-02-01	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-02	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-03	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-04	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-05	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-06	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-07	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-08	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-09	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-10	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-11	sept 12 2018	9:00	Soil	X	1
	DBA1837-A-02-12	sept 12 2018	9:00	Soil	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	5-Oct-18	08:00	HA	10/5	11:15 am	19 °C				

GENF 20.00 Front

Covanta Burnaby R.E., ULC
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 05-OCT-18
Report Date: 31-OCT-18 14:29 (MT)
Version: FINAL REV. 2

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2176795

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 #13-24, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-24, 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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176795-1	L2176795-2	L2176795-3	L2176795-4	L2176795-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-03-01	DBA1837-A-03-02	DBA1837-A-03-03	DBA1837-A-03-04	DBA1837-A-03-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	12.24	12.33	12.38	12.36	12.32
TCLP Metals	1st Preliminary pH (pH)	11.76	11.73	11.72	11.76	11.77
	2nd Preliminary pH (pH)	9.36	9.21	9.07	9.10	9.18
	Final pH (pH)	5.92	5.81	5.90	6.01	5.90
	Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	2.89
	Cadmium (Cd)-Leachable (mg/L)	0.552	0.185	0.240	0.178	0.181

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176795-6	L2176795-7	L2176795-8	L2176795-9	L2176795-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-03-06	DBA1837-A-03-07	DBA1837-A-03-08	DBA1837-A-03-09	DBA1837-A-03-10
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	12.34	12.20	12.04	12.15	12.34
TCLP Metals	1st Preliminary pH (pH)	11.82	11.75	11.76	11.72	11.83
	2nd Preliminary pH (pH)	9.56	9.03	8.90	9.06	9.45
	Final pH (pH)	5.97	6.07	5.70	5.84	6.02
	Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	2.89
	Cadmium (Cd)-Leachable (mg/L)	0.225	0.187	0.201	0.434	2.50

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176795-11	L2176795-12	L2176795-13	L2176795-14	L2176795-15
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-03-11	DBA1837-A-03-12	DBA1837-A-03-01 REP1	DBA1837-A-03-01 REP2	DBA1837-A-03-01 REP3
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	12.30	12.04			
TCLP Metals 1st Preliminary pH (pH)	11.75	11.77	12.24	12.24	12.24
2nd Preliminary pH (pH)	9.33	9.00	11.76	11.76	11.76
Final pH (pH)	6.01	5.81	6.53	6.53	6.61
Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	2.89
Cadmium (Cd)-Leachable (mg/L)	0.182	0.173	0.156	0.167	0.129

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176795-16	L2176795-17	L2176795-18	L2176795-19	L2176795-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-03-01 REP4	DBA1837-A-03-10 REP1	DBA1837-A-03-10 REP2	DBA1837-A-03-10 REP3	DBA1837-A-03-10 REP4
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)					
TCLP Metals 1st Preliminary pH (pH)	12.24	12.34	12.34	12.34	12.34
2nd Preliminary pH (pH)	11.76	11.83	11.83	11.83	11.83
Final pH (pH)	6.98	6.91	6.45	6.52	6.24
Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	2.89
Cadmium (Cd)-Leachable (mg/L)	1.87	0.295	0.160	0.133	0.216

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176795-21	L2176795-22	L2176795-23	L2176795-24	
Description	Soil	Soil	Soil	Soil	
Sampled Date	13-SEP-18	13-SEP-18	13-SEP-18	13-SEP-18	
Sampled Time	09:00	09:00	09:00	09:00	
Client ID	DBA1837-A-03-01 REP5	DBA1837-A-03-01 REP6	DBA1837-A-03-10 REP5	DBA1837-A-03-10 REP6	
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)					
TCLP Metals 1st Preliminary pH (pH)	11.83	11.83	11.83	11.83	
2nd Preliminary pH (pH)	9.45	9.45	9.45	9.45	
Final pH (pH)	5.93	5.91	5.90	5.97	
Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	
Cadmium (Cd)-Leachable (mg/L)	0.173	0.228	0.306	0.168	

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
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).

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

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.

ALS Environmental

Cha

L2176795-COFC

COC # _____

Page ____ of ____

Report To		Report F		e Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	smckinney@covantaenergy.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	dskrypnyk@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3:	sarah.wellman@metrovancouver.org	**Analysis Request**
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			rjohnson4@covanta.com	
Invoice To	Same as Report ?	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:		
Company:		PO / AFE:	Weekly Bottom Ash - Suite	
Contact:		LSD:	(includes 2:1 pH)	
Address:				
Phone:	Fax:	Quote #:		
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	CD-TCLP-VA(Cd and pH steps)	Number of Containers
	DBA1837-A-03-01	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-02	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-03	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-04	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-05	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-06	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-07	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-08	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-09	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-10	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-11	sept 13 2018	9:00	Soil	X	1
	DBA1837-A-03-12	sept 13 2018	9:00	Soil	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	15-Oct-18	08:00	ITA	10/15	11:15am	19 °C				

GENF 20.00 Front

Covanta Burnaby R.E., ULC
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 05-OCT-18
Report Date: 31-OCT-18 13:29 (MT)
Version: FINAL REV. 2

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2176794
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 #13-28, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-28, 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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-1	L2176794-2	L2176794-3	L2176794-4	L2176794-5
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-04-01	DBA1837-A-04-02	DBA1837-A-04-03	DBA1837-A-04-04	DBA1837-A-04-05
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	12.46	12.47	12.45	12.43	12.51
TCLP Metals 1st Preliminary pH (pH)	11.89	11.79	11.78	11.81	11.83
2nd Preliminary pH (pH)	7.85	7.46	6.03	6.46	6.42
Final pH (pH)	5.90	5.94	5.97	5.93	5.87
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.309	0.326	0.675	0.403	0.517

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-6	L2176794-7	L2176794-8	L2176794-9	L2176794-10
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-04-06	DBA1837-A-04-07	DBA1837-A-04-08	DBA1837-A-04-09	DBA1837-A-04-10
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	12.39	12.29	12.22	12.21	12.13
TCLP Metals 1st Preliminary pH (pH)	11.76	11.77	11.80	11.84	11.81
2nd Preliminary pH (pH)	6.20	5.65	5.98	6.50	6.68
Final pH (pH)	6.00	6.06	6.07	6.04	6.16
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.391	0.321	0.371	0.368	0.315

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-11	L2176794-12	L2176794-13	L2176794-14	L2176794-15
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-04-11	DBA1837-A-04-12	DBA1837-A-04-03 REP1	DBA1837-A-04-03 REP2	DBA1837-A-04-03 REP3
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	12.21	12.22			
TCLP Metals 1st Preliminary pH (pH)	11.78	11.80	11.78	11.78	11.78
2nd Preliminary pH (pH)	6.22	6.58	6.03	6.03	6.03
Final pH (pH)	6.07	5.94	6.00	5.95	5.87
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.797	0.610	0.378	0.323	0.341

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-16	L2176794-17	L2176794-18	L2176794-19	L2176794-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1837-A-04-03 REP4	DBA1837-A-04-11 REP1	DBA1837-A-04-11 REP2	DBA1837-A-04-11 REP3	DBA1837-A-04-11 REP4
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)					
TCLP Metals 1st Preliminary pH (pH)	11.78	11.78	11.78	11.78	11.78
2nd Preliminary pH (pH)	6.03	6.22	6.22	6.22	6.22
Final pH (pH)	5.93	5.89	5.91	6.12	6.01
Extraction Solution Initial pH (pH)	2.90	2.90	2.90	2.90	2.90
Cadmium (Cd)-Leachable (mg/L)	0.291	0.324	0.491	0.389	0.439

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-21	L2176794-22	L2176794-23	L2176794-24	L2176794-25
Description	Soil	Soil	Soil	Soil	
Sampled Date	14-SEP-18	14-SEP-18	14-SEP-18	14-SEP-18	
Sampled Time	09:00	09:00	09:00	09:00	
Client ID	DBA1837-A-04-12 REP1	DBA1837-A-04-12 REP2	DBA1837-A-04-12 REP3	DBA1837-A-04-12 REP4	DBA1837-A-04-05 REP1
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	11.80	11.80	11.80	11.80	11.83
TCLP Metals 1st Preliminary pH (pH)	6.58	6.58	6.58	6.58	6.42
2nd Preliminary pH (pH)	6.14	6.02	6.18	6.03	6.09
Final pH (pH)	2.90	2.90	2.90	2.90	2.89
Extraction Solution Initial pH (pH)	0.280	0.292	1.01	0.335	0.349
Cadmium (Cd)-Leachable (mg/L)					

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2176794-26	L2176794-27	L2176794-28		
Description					
Sampled Date					
Sampled Time					
Client ID	DBA1837-A-04-05 REP2	DBA1837-A-04-05 REP3	DBA1837-A-04-05 REP4		
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)					
TCLP Metals 1st Preliminary pH (pH)	11.83	11.83	11.83		
2nd Preliminary pH (pH)	6.42	6.42	6.42		
Final pH (pH)	6.08	6.10	6.03		
Extraction Solution Initial pH (pH)	2.89	2.89	2.89		
Cadmium (Cd)-Leachable (mg/L)	0.397	0.336	0.352		

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2176794-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2176794-13, -14, -15, -16, -17, -18, -19, -20, -21, -22, -23, -24

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**
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).

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

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.

ALS Environmental

L2176794-COFC

COC # _____

Page ____ of ____

Report To		Report		Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Other		◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax		○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1:	smckinney@covantaenergy.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	dskrypnyk@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3:	sarah.wellman@metrovancouver.org	**Analysis Request**
	☐ Yes ☐ No		brent.kirkpatrick@metrovancouver.org	
			rjohnson4@covanta.com	
Invoice To	Same as Report ?	**Client / Project Information**		Please indicate below Filtered, Preserved or both (F, P, F/P)
Hardcopy of Invoice with Report?	☐ Yes ☐ No	Job #:		
Company:		PO / AFE:	Weekly Bottom Ash - Suite	
Contact:		LSD:	(includes 2:1 pH)	
Address:				
Phone:	Fax:	Quote #:		
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	CD-TCLP-VA(Cd and pH steps)	Number of Containers
	DBA1837-A-04-01	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-02	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-03	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-04	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-05	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-06	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-07	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-08	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-09	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-10	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-11	Sept 14 2018	9:00	Soil	X	1
	DBA1837-A-04-12	Sept 14 2018	9:00	Soil	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	5-Oct-18	08:00	HA	10/5	11:15am	19 °C				

Covanta Burnaby R.E., ULC
ATTN: Steve McKinney
5150 Riverbend Drive
Burnaby BC V3N 4V3

Date Received: 05-OCT-18
Report Date: 24-OCT-18 17:45 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2176799

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

Comments: ADDITIONAL 17-OCT-18 18:51

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176799-1	L2176799-2	L2176799-3	L2176799-4	L2176799-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-05-01	DBA1837-A-05-02	DBA1837-A-05-03	DBA1837-A-05-04	DBA1837-A-05-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.34	10.29	10.33	10.32	10.31
TCLP Metals	1st Preliminary pH (pH)	11.22	11.08	11.09	11.03	11.16
	2nd Preliminary pH (pH)	6.76	7.04	6.95	6.64	6.60
	Final pH (pH)	5.22	5.38	5.22	5.33	5.29
	Extraction Solution Initial pH (pH)	2.88	2.88	2.88	2.88	2.88
	Cadmium (Cd)-Leachable (mg/L)	0.254	0.225	0.901	0.189	0.798

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176799-6	L2176799-7	L2176799-8	L2176799-9	L2176799-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-05-06	DBA1837-A-05-07	DBA1837-A-05-08	DBA1837-A-05-09	DBA1837-A-05-10
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.39	10.41	10.41	10.42	10.35
TCLP Metals	1st Preliminary pH (pH)	11.05	11.20	11.09	11.13	11.01
	2nd Preliminary pH (pH)	6.61	6.90	6.73	8.19	9.02
	Final pH (pH)	5.44	5.33	5.52	6.05	5.92
	Extraction Solution Initial pH (pH)	2.88	2.88	2.88	2.88	2.88
	Cadmium (Cd)-Leachable (mg/L)	0.199	0.211	0.630	0.153	0.241

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2176799-11 Soil 15-SEP-18 09:00 DBA1837-A-05-11	L2176799-12 Soil 15-SEP-18 09:00 DBA1837-A-05-12	L2176799-13 Soil 15-SEP-18 09:00 DBA1837-A-05-03 REP1	L2176799-14 Soil 15-SEP-18 09:00 DBA1837-A-05-03 REP2	L2176799-15 Soil 15-SEP-18 09:00 DBA1837-A-05-03 REP3
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.39	10.48			
TCLP Metals	1st Preliminary pH (pH)	11.07	10.96	11.09	11.09	11.09
	2nd Preliminary pH (pH)	8.12	7.61	6.95	6.95	6.95
	Final pH (pH)	5.32	5.27	5.44	5.30	5.32
	Extraction Solution Initial pH (pH)	2.88	2.88	2.89	2.89	2.89
	Cadmium (Cd)-Leachable (mg/L)	0.238	0.297	0.183	0.283	0.180

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2176799-16	L2176799-17	L2176799-18	L2176799-19	L2176799-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18	15-SEP-18
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1837-A-05-03 REP4	DBA1837-A-05-05 REP1	DBA1837-A-05-05 REP2	DBA1837-A-05-05 REP3	DBA1837-A-05-05 REP4
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)					
TCLP Metals	1st Preliminary pH (pH)	11.09	11.16	11.16	11.16	11.16
	2nd Preliminary pH (pH)	6.95	6.60	6.60	6.60	6.60
	Final pH (pH)	5.37	5.30	5.39	5.37	5.37
	Extraction Solution Initial pH (pH)	2.89	2.89	2.89	2.89	2.89
	Cadmium (Cd)-Leachable (mg/L)	0.149	0.178	0.718	0.159	0.371

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2176799-1, -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**
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).

PH-1:2-VA	Soil	pH in Soil (1:2 Soil:Water Extraction)	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL

This analysis is carried out in accordance with procedures described in the pH, Electrometric in Soil and Sediment method - Section B Physical/Inorganic and Misc. Constituents, BC Environmental Laboratory Manual 2007. The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water. The pH of the solution is then measured using a standard pH probe.

** ALS test methods may incorporate modifications from specified reference methods to improve performance.

The last two letters of the above test code(s) indicate the laboratory that performed analytical analysis for that test. Refer to the list below:

Laboratory Definition Code	Laboratory Location
VA	ALS ENVIRONMENTAL - VANCOUVER, BRITISH COLUMBIA, CANADA

Chain of Custody Numbers:

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.

ALS Environmental

L2176799-COFC

COC # _____

Page ____ of ____

Report To		Report	Service Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Select	◉ Regular (Standard Turnaround Times - Business Days)
Contact:	Steve Mckinney / Dan Skrypnyk	☑ PDF ☐ Excel ☐ Digital ☐ Fax	○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Address:	5150 Riverbend Drive	Email 1: smckinney@covantaenergy.com	○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2: dskrypnyk@covanta.com	○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT
Phone:	604-521-1025 Fax:	Email 3: sarah.wellman@metrovancouver.org	**Analysis Request**
	☐ Yes ☐ No	brent.kirkpatrick@metrovancouver.org	
		rjohnson4@covanta.com	

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

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	CD-TCLP-VA(Cd and pH steps)	Number of Containers
	DBA1837-A-05-01	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-02	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-03	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-04	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-05	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-06	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-07	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-08	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-09	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-10	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-11	Sept 15 2018	9:00	Soil	X	1
	DBA1837-A-05-12	Sept 15 2018	9:00	Soil	X	1

Special Instructions / Regulations with water or land use (CCME-Freshwater Aquatic Life/BC CSR - Commercial/AB Tier 1 - Natural, etc) / Hazardous Details

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.

By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.

Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	5 Oct-18	08:00	HA	10/5	14:15	19 °C				