Bottom Ash Data

2019 Week 13

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

- Weekly Composite Results were submitted on April 18, 2019
- Daily Composite Results were submitted on May 10, 2019

This data represents bottom ash results for week 13 of 2019 (March 24, 2019 to March 30, 2019).

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: 01-APR-19
Report Date: 16-APR-19 11:48 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2251635

Project P.O. #: VANCO-0000048466
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 #13-22, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-22, 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

Grouping	Analyte	L2251635-1 Soil 27-MAR-19 09:00 BA1913-A-1	L2251635-2 Soil 27-MAR-19 09:00 BA1913-A-2	L2251635-3 Soil 27-MAR-19 09:00 BA1913-A-3	L2251635-4 Soil 27-MAR-19 09:00 BA1913-A-4	L2251635-5 Soil 27-MAR-19 09:00 BA1913-A-5
SOIL						
Physical Tests	Moisture (%)	21.5	22.3	20.8	21.1	21.6
	pH (1:2 soil:water) (pH)	10.74	10.68	10.72	10.80	10.38
Metals	Aluminum (Al) (mg/kg)	39400	37000	34900	45300	39700
	Antimony (Sb) (mg/kg)	166	254	176	197	174
	Arsenic (As) (mg/kg)	33.3	36.9	35.6	34.5	27.8
	Barium (Ba) (mg/kg)	552	524	468	407	432
	Beryllium (Be) (mg/kg)	0.42	0.42	0.43	0.41	0.39
	Bismuth (Bi) (mg/kg)	11.3	10.7	16.3	13.7	16.4
	Boron (B) (mg/kg)	357	366	402	535	383
	Cadmium (Cd) (mg/kg)	17.1	19.4	63.0	17.1	17.0
	Calcium (Ca) (mg/kg)	140000	140000	149000	143000	123000
	Chromium (Cr) (mg/kg)	169	506	174	187	123
	Cobalt (Co) (mg/kg)	49.0	40.0	48.5	35.3	27.0
	Copper (Cu) (mg/kg)	2570	2820	1890	2760	2840
	Iron (Fe) (mg/kg)	70000	65900	71600	53600	50700
	Lead (Pb) (mg/kg)	785	921	832	12400	463
	Lithium (Li) (mg/kg)	26.8	23.2	20.3	22.7	19.8
	Magnesium (Mg) (mg/kg)	11900	11300	11300	11600	10800
	Manganese (Mn) (mg/kg)	4230	861	820	1750	822
	Mercury (Hg) (mg/kg)	0.085	0.087	0.075	0.081	0.065
	Molybdenum (Mo) (mg/kg)	42.6	53.1	64.3	50.2	37.8
	Nickel (Ni) (mg/kg)	367	502	174	184	119
	Phosphorus (P) (mg/kg)	11200	12500	14800	12100	9910
	Potassium (K) (mg/kg)	6860	7060	6920	7140	6220
	Selenium (Se) (mg/kg)	0.39	0.43	0.51	0.51	0.47
	Silver (Ag) (mg/kg)	6.82	5.38	6.31	7.77	4.31
	Sodium (Na) (mg/kg)	17900	18500	17900	17600	17200
	Strontium (Sr) (mg/kg)	305	299	313	292	307
	Sulfur (S) (mg/kg)	15500	16900	17600	17000	16200
	Thallium (Tl) (mg/kg)	0.066	0.080	0.072	0.085	0.069
	Tin (Sn) (mg/kg)	198	3970	152	208	151
	Titanium (Ti) (mg/kg)	715	704	484	574	941
	Tungsten (W) (mg/kg)	7.99	9.74	12.0	9.36	7.86
	Uranium (U) (mg/kg)	4.80	5.10	4.98	4.90	4.22
	Vanadium (V) (mg/kg)	52.7	56.5	54.7	60.6	48.2
	Zinc (Zn) (mg/kg)	4820	10600	4640	7300	7280
	Zirconium (Zr) (mg/kg)	1.1	1.3	1.1	1.6	1.7

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2251635-6 Soil 27-MAR-19 09:00 BA1913-A-6	L2251635-7 Soil 27-MAR-19 09:00 BA1913-A-7	L2251635-8 Soil 27-MAR-19 09:00 BA1913-A-8	L2251635-9 Soil 27-MAR-19 09:00 BA1913-A-9	L2251635-10 Soil 27-MAR-19 09:00 BA1913-A-10
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	21.4	21.5	20.8	20.6	21.3
	pH (1:2 soil:water) (pH)	10.24	10.24	10.22	10.15	10.40
Metals	Aluminum (Al) (mg/kg)	32400	40600	30900	36000	36600
	Antimony (Sb) (mg/kg)	175	177	180	164	195
	Arsenic (As) (mg/kg)	31.4	32.3	29.2	29.1	31.9
	Barium (Ba) (mg/kg)	497	377	464	503	542
	Beryllium (Be) (mg/kg)	0.43	0.45	0.43	0.44	0.45
	Bismuth (Bi) (mg/kg)	12.2	17.3	11.5	12.0	24.0
	Boron (B) (mg/kg)	402	350	288	266	318
	Cadmium (Cd) (mg/kg)	15.5	16.6	15.9	16.1	18.2
	Calcium (Ca) (mg/kg)	137000	139000	127000	133000	140000
	Chromium (Cr) (mg/kg)	170	171	219	173	445
	Cobalt (Co) (mg/kg)	35.5	32.6	27.2	82.6	69.5
	Copper (Cu) (mg/kg)	2020	4600	9700	1600	1630
	Iron (Fe) (mg/kg)	73300	54100	50600	49300	48900
	Lead (Pb) (mg/kg)	586	408	429	441	589
	Lithium (Li) (mg/kg)	22.8	24.0	22.1	23.5	26.6
	Magnesium (Mg) (mg/kg)	12200	11200	11700	10900	12300
	Manganese (Mn) (mg/kg)	796	793	1160	833	811
	Mercury (Hg) (mg/kg)	0.087	0.101	0.070	0.070	0.085
	Molybdenum (Mo) (mg/kg)	45.5	53.5	49.4	38.7	80.9
	Nickel (Ni) (mg/kg)	315	185	250	144	363
	Phosphorus (P) (mg/kg)	11700	10800	11600	11100	10900
	Potassium (K) (mg/kg)	6980	7210	7060	7630	7170
	Selenium (Se) (mg/kg)	0.43	0.50	0.50	0.49	0.47
	Silver (Ag) (mg/kg)	5.96	6.11	5.05	5.29	6.86
	Sodium (Na) (mg/kg)	16300	16800	15500	17600	16700
	Strontium (Sr) (mg/kg)	313	349	309	307	325
	Sulfur (S) (mg/kg)	18300	18800	17900	18600	18400
	Thallium (Tl) (mg/kg)	0.064	0.090	0.063	0.066	0.068
	Tin (Sn) (mg/kg)	137	174	118	119	292
	Titanium (Ti) (mg/kg)	545	526	582	749	841
	Tungsten (W) (mg/kg)	10.3	7.42	8.84	10.8	10.7
	Uranium (U) (mg/kg)	4.28	4.51	4.44	4.61	4.42
	Vanadium (V) (mg/kg)	50.1	48.6	49.9	48.3	52.8
	Zinc (Zn) (mg/kg)	5970	4830	4500	5360	5090
	Zirconium (Zr) (mg/kg)	1.5	1.9	1.4	1.4	1.4

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2251635-11 Soil 27-MAR-19 09:00 BA1913-A-11	L2251635-12 Soil 27-MAR-19 09:00 BA1913-A-12	L2251635-13 Soil 27-MAR-19 09:00 BA1913-A-8 REP 1	L2251635-14 Soil 27-MAR-19 09:00 BA1913-A-8 REP 2	L2251635-15 Soil 27-MAR-19 09:00 BA1913-A-8 REP 3
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
Physical Tests	Moisture (%)	21.1	19.5			
	pH (1:2 soil:water) (pH)	10.20	10.22			
Metals	Aluminum (Al) (mg/kg)	37800	31700			
	Antimony (Sb) (mg/kg)	170	157			
	Arsenic (As) (mg/kg)	33.0	27.1			
	Barium (Ba) (mg/kg)	503	449			
	Beryllium (Be) (mg/kg)	0.45	0.44			
	Bismuth (Bi) (mg/kg)	16.0	10.4			
	Boron (B) (mg/kg)	405	292			
	Cadmium (Cd) (mg/kg)	16.3	20.4			
	Calcium (Ca) (mg/kg)	136000	132000			
	Chromium (Cr) (mg/kg)	207	228			
	Cobalt (Co) (mg/kg)	36.9	83.1			
	Copper (Cu) (mg/kg)	2570	2620			
	Iron (Fe) (mg/kg)	65200	50600			
	Lead (Pb) (mg/kg)	1150	802			
	Lithium (Li) (mg/kg)	25.2	47.3			
	Magnesium (Mg) (mg/kg)	11000	10400			
	Manganese (Mn) (mg/kg)	975	1040			
	Mercury (Hg) (mg/kg)	0.078	0.094			
	Molybdenum (Mo) (mg/kg)	55.7	59.7			
	Nickel (Ni) (mg/kg)	182	246			
	Phosphorus (P) (mg/kg)	10600	9830			
	Potassium (K) (mg/kg)	8680	6950			
	Selenium (Se) (mg/kg)	0.51	0.42			
	Silver (Ag) (mg/kg)	19.7	4.78			
	Sodium (Na) (mg/kg)	18600	17100			
	Strontium (Sr) (mg/kg)	325	331			
	Sulfur (S) (mg/kg)	18900	16400			
	Thallium (Tl) (mg/kg)	0.076	0.064			
	Tin (Sn) (mg/kg)	352	198			
	Titanium (Ti) (mg/kg)	929	492			
	Tungsten (W) (mg/kg)	12.2	8.29			
	Uranium (U) (mg/kg)	4.51	4.27			
	Vanadium (V) (mg/kg)	65.4	46.8			
	Zinc (Zn) (mg/kg)	5390	4880			
	Zirconium (Zr) (mg/kg)	1.7	1.6			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2251635-16	L2251635-17	L2251635-18	L2251635-19	L2251635-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	BA1913-A-8 REP 4	BA1913-A-12 REP 1	BA1913-A-12 REP 2	BA1913-A-12 REP 3	BA1913-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	L2251635-21	L2251635-22			
	Description	Soil	Soil			
	Sampled Date	27-MAR-19	27-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	BA1913-A-12 REP 5	BA1913-A-12 REP 6			
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

Grouping	Analyte	L2251635-1 Soil 27-MAR-19 09:00 BA1913-A-1	L2251635-2 Soil 27-MAR-19 09:00 BA1913-A-2	L2251635-3 Soil 27-MAR-19 09:00 BA1913-A-3	L2251635-4 Soil 27-MAR-19 09:00 BA1913-A-4	L2251635-5 Soil 27-MAR-19 09:00 BA1913-A-5
Sample ID		L2251635-1	L2251635-2	L2251635-3	L2251635-4	L2251635-5
Description		Soil	Soil	Soil	Soil	Soil
Sampled Date		27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19
Sampled Time		09:00	09:00	09:00	09:00	09:00
Client ID		BA1913-A-1	BA1913-A-2	BA1913-A-3	BA1913-A-4	BA1913-A-5
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.07	11.17	11.15	11.19	11.18
	2nd Preliminary pH (pH)	8.91	9.05	9.05	9.01	8.91
	Final pH (pH)	6.22	6.28	6.14	6.09	6.14
	Extraction Solution Initial pH (pH)	2.84	2.84	2.84	2.84	2.84
	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)	6.14	5.12	4.62	4.62	5.01
	Cadmium (Cd)-Leachable (mg/L)	0.382	0.488	0.265	0.320	0.307
	Calcium (Ca)-Leachable (mg/L)	2120	2150	2200	2110	2110
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)	0.352	0.607	0.703	0.992	0.957
	Copper (Cu)-Leachable (mg/L)	0.537	0.532	0.617	0.629	0.937
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)	<0.25	<0.25	<0.25	0.38	<0.25
	Magnesium (Mg)-Leachable (mg/L)	126	127	125	131	127
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)	1.03	0.95	0.82	0.84	0.92
	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)	40.2	54.4	42.3	42.9	55.4

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2251635-6 Soil 27-MAR-19 09:00 BA1913-A-6	L2251635-7 Soil 27-MAR-19 09:00 BA1913-A-7	L2251635-8 Soil 27-MAR-19 09:00 BA1913-A-8	L2251635-9 Soil 27-MAR-19 09:00 BA1913-A-9	L2251635-10 Soil 27-MAR-19 09:00 BA1913-A-10
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.16	11.12	11.17	11.11	11.17
	2nd Preliminary pH (pH)	9.22	9.07	9.23	9.08	8.72
	Final pH (pH)	6.10	6.10	6.22	5.85	5.96
	Extraction Solution Initial pH (pH)	2.84	2.84	2.84	2.84	2.84
	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)	4.71	4.49	4.25	4.34	5.39
	Cadmium (Cd)-Leachable (mg/L)	0.284	0.260	0.540	0.306	0.297
	Calcium (Ca)-Leachable (mg/L)	2130	2050	2060	1950	2010
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25	<0.25	<0.25	<0.25
	Cobalt (Co)-Leachable (mg/L)	1.15	0.514	0.377	0.639	0.837
	Copper (Cu)-Leachable (mg/L)	0.933	0.413	1.84	1.42	0.674
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0	<5.0	<5.0	<5.0
	Lead (Pb)-Leachable (mg/L)	<0.25	0.31	0.40	0.52	0.49
	Magnesium (Mg)-Leachable (mg/L)	136	124	125	124	126
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
	Nickel (Ni)-Leachable (mg/L)	0.91	0.94	0.74	0.86	0.84
	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)	54.2	99.8	45.8	52.1	47.5

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	L2251635-11 Soil 27-MAR-19 09:00 BA1913-A-11	L2251635-12 Soil 27-MAR-19 09:00 BA1913-A-12	L2251635-13 Soil 27-MAR-19 09:00 BA1913-A-8 REP 1	L2251635-14 Soil 27-MAR-19 09:00 BA1913-A-8 REP 2	L2251635-15 Soil 27-MAR-19 09:00 BA1913-A-8 REP 3
Sample ID						
Description						
Sampled Date						
Sampled Time						
Client ID						
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.08	11.13	11.17	11.17	11.17
	2nd Preliminary pH (pH)	9.27	9.04	9.23	9.23	9.23
	Final pH (pH)	6.06	6.10	6.30	6.08	6.13
	Extraction Solution Initial pH (pH)	2.84	2.84	2.86	2.86	2.86
	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)	5.25	4.78			
	Cadmium (Cd)-Leachable (mg/L)	0.427	3.78	0.288	0.486	0.356
	Calcium (Ca)-Leachable (mg/L)	2080	2080			
	Chromium (Cr)-Leachable (mg/L)	<0.25	<0.25			
	Cobalt (Co)-Leachable (mg/L)	0.643	0.760			
	Copper (Cu)-Leachable (mg/L)	0.982	0.220			
	Iron (Fe)-Leachable (mg/L)	<5.0	<5.0			
	Lead (Pb)-Leachable (mg/L)	<0.25	<0.25			
	Magnesium (Mg)-Leachable (mg/L)	120	134			
	Mercury (Hg)-Leachable (mg/L)	<0.0010	<0.0010			
	Nickel (Ni)-Leachable (mg/L)	1.13	1.59			
	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)	59.7	48.6			

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2251635-16	L2251635-17	L2251635-18	L2251635-19	L2251635-20
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	BA1913-A-8 REP 4	BA1913-A-12 REP 1	BA1913-A-12 REP 2	BA1913-A-12 REP 3	BA1913-A-12 REP 4
Grouping / **Analyte**					
SOIL					
TCLP Metals					
1st Preliminary pH (pH)	11.17	11.13	11.13	11.13	11.13
2nd Preliminary pH (pH)	9.23	9.04	9.04	9.04	9.04
Final pH (pH)	6.29	5.93	6.12	6.00	6.02
Extraction Solution Initial pH (pH)	2.86	2.86	2.86	2.86	2.86
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)	0.698	0.324	0.285	1.32	0.340
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.

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2251635-21	L2251635-22			
	Description	Soil	Soil			
	Sampled Date	27-MAR-19	27-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	BA1913-A-12 REP 5	BA1913-A-12 REP 6			
Grouping	**Analyte**					
SOIL						
TCLP Metals	1st Preliminary pH (pH)	11.13	11.13			
	2nd Preliminary pH (pH)	9.04	9.04			
	Final pH (pH)	5.90	5.99			
	Extraction Solution Initial pH (pH)	2.86	2.86			
	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)	0.328	0.389			
	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	Bismuth (Bi)	DUP-H	L2251635-5
Duplicate	Chromium (Cr)	DUP-H	L2251635-5
Duplicate	Cobalt (Co)	DUP-H	L2251635-5
Duplicate	Copper (Cu)	DUP-H	L2251635-5
Duplicate	Lead (Pb)	DUP-H	L2251635-5
Duplicate	Lithium (Li)	DUP-H	L2251635-5
Duplicate	Nickel (Ni)	DUP-H	L2251635-5
Duplicate	Zinc (Zn)	DUP-H	L2251635-5
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2251635-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2251635-13, -14, -15, -16, -17, -18, -19, -20, -21, -22
Matrix Spike	Calcium (Ca)-Leachable	MS-B	L2251635-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cobalt (Co)-Leachable	MS-B	L2251635-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Zinc (Zn)-Leachable	MS-B	L2251635-1, -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.
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)

Soil/sediment is dried, disaggregated, and sieved (2 mm). Strong Acid Leachable Metals in the <2mm fraction are solubilized by heated digestion with nitric and hydrochloric acids. Instrumental analysis is by Collision / Reaction Cell ICPMS.

Limitations: This method is intended to liberate environmentally available metals. Silicate minerals are not solubilized. Some metals may be only partially recovered (matrix dependent), including Al, Ba, Be, Cr, S, Sr, Ti, Tl, V, W, and Zr. Elemental Sulfur may be poorly recovered by this method. Volatile forms of sulfur (e.g. sulfide, H2S) may be excluded if lost during sampling, storage, or digestion.

MET-TCLP-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

MOISTURE-VA	Soil	Moisture content	CCME PHC in Soil - Tier 1 (mod)

This analysis is carried out gravimetrically by drying the sample at 105 C for a minimum of two 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 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

Reference Information

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

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

L2251635-COFC

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Report To				**Report Format / Distribution**				**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:	rjohnson4@covanta.com			○ Same 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
	BA1913-A-1	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-2	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-3	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-4	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-5	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-6	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-7	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-8	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-9	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-10	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-11	27-Mar-19	9:00	Soil	X	X				X							1
	BA1913-A-12	27-Mar-19	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
	1-Apr-19	08:00				18 °C	TC	Apr 1/19	11:41am	

GENF 20.00 Front

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

Date Received: 18-APR-19
Report Date: 01-MAY-19 18:08 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260398

Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260398-1	L2260398-2	L2260398-3	L2260398-4	L2260398-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	25-MAR-19	25-MAR-19	25-MAR-19	25-MAR-19	25-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-01-01	DBA1913-A-01-02	DBA1913-A-01-03	DBA1913-A-01-04	DBA1913-A-01-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.55	10.44	10.13	10.31	10.29
TCLP Metals	1st Preliminary pH (pH)	11.10	11.06	11.11	11.06	11.09
	2nd Preliminary pH (pH)	9.23	9.11	9.32	9.00	9.26
	Final pH (pH)	6.18	6.17	6.23	6.07	6.17
	Extraction Solution Initial pH (pH)	2.84	2.84	2.84	2.84	2.84
	Cadmium (Cd)-Leachable (mg/L)	0.244	0.197	0.219	0.206	0.209

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260398-6	L2260398-7	L2260398-8	L2260398-9	L2260398-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	25-MAR-19	25-MAR-19	25-MAR-19	25-MAR-19	25-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-01-06	DBA1913-A-01-07	DBA1913-A-01-08	DBA1913-A-01-09	DBA1913-A-01-10
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.28	10.32	10.26	10.21	10.33
TCLP Metals	1st Preliminary pH (pH)	11.15	11.23	11.15	11.15	11.17
	2nd Preliminary pH (pH)	9.08	9.15	8.99	9.12	9.43
	Final pH (pH)	6.23	6.29	6.19	6.18	6.24
	Extraction Solution Initial pH (pH)	2.84	2.84	2.84	2.84	2.84
	Cadmium (Cd)-Leachable (mg/L)	0.218	0.419	0.280	0.220	0.199

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260398-11	L2260398-12			
	Description	Soil	Soil			
	Sampled Date	25-MAR-19	25-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	DBA1913-A-01-11	DBA1913-A-01-12			
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.88	10.21			
TCLP Metals	1st Preliminary pH (pH)	11.18	11.20			
	2nd Preliminary pH (pH)	8.97	9.26			
	Final pH (pH)	6.29	6.22			
	Extraction Solution Initial pH (pH)	2.84	2.84			
	Cadmium (Cd)-Leachable (mg/L)	0.272	0.202			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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

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L2260398-COFC

COC # ______

Page ____ of ____

Report To	
Company:	Covanta Energy
Contact:	Steve Mckinney / Dan Skrypnyk
Address:	5150 Riverbend Drive
	Burnaby BC
Phone:	604-521-1025 Fax: ☐ Yes ☐ No

Report Format /	
☐ Standard ☐ Other	
☑ PDF ☐ Excel ☐ Digital ☐ Fax	
Email 1:	smckinney@covantaenergy.com
Email 2:	dskrypnyk@covanta.com
Email 3:	sarah.wellman@metrovancouver.org
	brent.kirkpatrick@metrovancouver.org
	rjohnson4@covanta.com

...uested (Rush for routine analysis subject to availability)

...d Turnaround Times - Business Days)

◯ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT

◯ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT

◯ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To	Same as Report ?
Hardcopy of Invoice with Report?	☐ Yes ☐ No
Company:	
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

Client / Project Information	
Job #:	
PO / AFE:	Weekly Bottom Ash - Suite
LSD:	(includes 2:1 pH)
Quote #:	
ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

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
	DBA1913-A-01-01	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-02	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-03	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-04	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-05	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-06	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-07	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-08	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-09	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-10	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-11	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-12	25-Mar-19	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

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
[signature]	18-APR-19	08:00	VAD	4/18	11:20	19 °C				

ALS Environmental

Chain of C
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L2260398-COFC

COC # _____

Page ____ of ____

Report To		**Report Format /**				**ıested** (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard	☐ Other			d 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**	
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
	DBA1913-A-01-01	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-02	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-03	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-04	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-05	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-06	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-07	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-08	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-09	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-10	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-11	25-Mar-19	9:00	Soil	X	1
	DBA1913-A-01-12	25-Mar-19	9:00	Soil	X	1

Please indicate below Filtered, Preserved or both (F, P, F/P)

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-APR-19	08:00		4/18	11:20am	19 °C				

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

Date Received: 18-APR-19
Report Date: 07-MAY-19 12:28 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260401

Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc: Includes 2:1 pH

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 #13-17, and have "REP" in the Client Sample ID field. Fluid determination was not performed for samples #13-17, 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	L2260401-1	L2260401-2	L2260401-3	L2260401-4	L2260401-5
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	26-MAR-19	26-MAR-19	26-MAR-19	26-MAR-19	26-MAR-19
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1913-A-02-01	DBA1913-A-02-02	DBA1913-A-02-03	DBA1913-A-02-04	DBA1913-A-02-05
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	10.15	10.09	10.06	10.10	10.03
TCLP Metals 1st Preliminary pH (pH)	11.16	11.13	11.15	11.20	11.16
2nd Preliminary pH (pH)	9.13	8.91	8.92	9.03	9.06
Final pH (pH)	6.07	6.21	5.83	6.12	6.30
Extraction Solution Initial pH (pH)	2.83	2.83	2.83	2.83	2.83
Cadmium (Cd)-Leachable (mg/L)	0.202	0.243	0.275	0.198	0.267

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Sample ID	L2260401-6	L2260401-7	L2260401-8	L2260401-9	L2260401-10
Description	Soil	Soil	Soil	Soil	Soil
Sampled Date	26-MAR-19	26-MAR-19	26-MAR-19	26-MAR-19	26-MAR-19
Sampled Time	09:00	09:00	09:00	09:00	09:00
Client ID	DBA1913-A-02-06	DBA1913-A-02-07	DBA1913-A-02-08	DBA1913-A-02-09	DBA1913-A-02-010
Grouping / **Analyte**					
SOIL					
Physical Tests pH (1:2 soil:water) (pH)	10.14	10.11	10.12	10.23	10.04
TCLP Metals 1st Preliminary pH (pH)	11.15	11.10	11.14	11.20	11.09
2nd Preliminary pH (pH)	8.92	8.88	9.07	9.27	8.96
Final pH (pH)	5.94	6.28	6.21	6.28	6.21
Extraction Solution Initial pH (pH)	2.83	2.83	2.83	2.83	2.83
Cadmium (Cd)-Leachable (mg/L)	0.281	0.190	0.487	0.245	0.207

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

Grouping	Analyte	Sample ID: L2260401-11 Description: Soil Sampled Date: 26-MAR-19 Sampled Time: 09:00 Client ID: DBA1913-A-02-011	L2260401-12 Soil 26-MAR-19 09:00 DBA1913-A-02-012	L2260401-13 Soil 26-MAR-19 09:00 DBA1913-A-02-012 REP 1	L2260401-14 Soil 26-MAR-19 09:00 DBA1913-A-02-012 REP 2	L2260401-15 Soil 26-MAR-19 09:00 DBA1913-A-02-012 REP 3
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.14	10.09			
TCLP Metals	1st Preliminary pH (pH)	11.12	11.11	11.11	11.11	11.11
	2nd Preliminary pH (pH)	8.57	9.12	9.12	9.12	9.12
	Final pH (pH)	6.40	6.19	6.02	6.06	6.01
	Extraction Solution Initial pH (pH)	2.83	2.83	2.83	2.83	2.83
	Cadmium (Cd)-Leachable (mg/L)	0.175	5.05	0.252	0.232	0.226

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260401-16	L2260401-17			
	Description	Soil	Soil			
	Sampled Date	26-MAR-19	26-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	DBA1913-A-02-012 REP 4	DBA1913-A-02-012 REP 5			
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)					
TCLP Metals	1st Preliminary pH (pH)	11.11	11.11			
	2nd Preliminary pH (pH)	9.12	9.12			
	Final pH (pH)	6.03	6.02			
	Extraction Solution Initial pH (pH)	2.83	2.83			
	Cadmium (Cd)-Leachable (mg/L)	0.304	0.240			

* 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	L2260401-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2260401-13, -14, -15, -16, -17

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-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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.

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COC # _____

Page ____ of ____

Report To				Report Format / D				Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy			☐ Standard ☐ Ot				◉ 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
	DBA1913-A-02-01	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-02	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-03	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-04	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-05	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-06	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-07	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-08	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-09	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-10	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-11	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-12	26-Mar-19	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
	18-APR-19	08:00				°C				

GENF 20.00 Front

ALS Environmental

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COC # _____

Page ____ of ____

Report To		**Report Format / D**		**...quested** (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard ☐ Ot...		◉ 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
	DBA1913-A-02-01	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-02	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-03	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-04	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-05	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-06	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-07	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-08	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-09	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-10	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-11	26-Mar-19	9:00	Soil	X	1
	DBA1913-A-02-12	26-Mar-19	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
	18-APR-19	08:00				°C				

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

Date Received: 18-APR-19
Report Date: 01-MAY-19 18:13 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260397
Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260397-1	L2260397-2	L2260397-3	L2260397-4	L2260397-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-03-01	DBA1913-A-03-02	DBA1913-A-03-03	DBA1913-A-03-04	DBA1913-A-03-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.08	10.09	10.07	10.16	10.03
TCLP Metals	1st Preliminary pH (pH)	10.81	10.86	10.95	10.92	10.78
	2nd Preliminary pH (pH)	8.97	8.88	2.85	9.05	9.05
	Final pH (pH)	5.79	5.73	5.50	5.78	5.98
	Extraction Solution Initial pH (pH)	2.85	2.85	2.87	2.85	2.85
	Cadmium (Cd)-Leachable (mg/L)	0.190	0.187	0.187	0.199	0.162

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260397-6	L2260397-7	L2260397-8	L2260397-9	L2260397-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19	27-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-03-06	DBA1913-A-03-07	DBA1913-A-03-08	DBA1913-A-03-09	DBA1913-A-03-10
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.15	9.97	10.16	10.47	10.06
TCLP Metals	1st Preliminary pH (pH)	10.91	10.85	10.93	10.94	10.89
	2nd Preliminary pH (pH)	8.86	8.82	8.93	8.71	9.07
	Final pH (pH)	5.79	5.84	5.72	5.77	6.04
	Extraction Solution Initial pH (pH)	2.85	2.85	2.85	2.84	2.84
	Cadmium (Cd)-Leachable (mg/L)	0.213	0.181	0.186	0.204	0.181

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260397-11	L2260397-12			
	Description	Soil	Soil			
	Sampled Date	27-MAR-19	27-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	DBA1913-A-03-11	DBA1913-A-03-12			
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.08	10.15			
TCLP Metals	1st Preliminary pH (pH)	10.87	10.93			
	2nd Preliminary pH (pH)	8.86	8.76			
	Final pH (pH)	5.96	5.93			
	Extraction Solution Initial pH (pH)	2.84	2.84			
	Cadmium (Cd)-Leachable (mg/L)	0.392	0.258			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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

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L2260397-COFC

COC # ______ Page ___ of ___

Report To	
Company:	Covanta Energy
Contact:	Steve Mckinney / Dan Skrypnyk
Address:	5150 Riverbend Drive
	Burnaby BC
Phone:	604-521-1025 Fax: ☐ Yes ☐ No

Report Format / ...	
☐ Standard ☐	
☑ PDF ☐ Excel ☐ Digital ☐ Fax	
Email 1:	smckinney@covantaenergy.com
Email 2:	dskrypnyk@covanta.com
Email 3:	sarah.wellman@metrovancouver.org
	brent.kirkpatrick@metrovancouver.org
	rjohnson4@covanta.com

...ested (Rush for routine analysis subject to availability)

Turnaround Times - Business Days)

○ Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT

○ Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT

○ Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Invoice To	Same as Report ?
Hardcopy of Invoice with Report?	☐ Yes ☐ No
Company:	
Contact:	
Address:	
Phone:	Fax:
Lab Work Order # (lab use only)	

Client / Project Information	
Job #:	
PO / AFE:	Weekly Bottom Ash - Suite
LSD:	(includes 2:1 pH)
Quote #:	
ALS Contact:	Sampler:

Analysis Request

Please indicate below Filtered, Preserved or both (F, P, F/P)

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
	DBA1913-A-03-01	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-02	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-03	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-04	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-05	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-06	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-07	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-08	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-09	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-10	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-11	27-Mar-19	9:00	Soil	X	1
	DBA1913-A-03-12	27-Mar-19	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: [signature]	Date (dd-mmm-yy) 18-APR-19	Time (hh-mm) 08:00	Received by: HA	Date: 4/18	Time: 11:20	Temperature: 19 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF

GENF 20.00 Front

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

Date Received: 18-APR-19
Report Date: 26-APR-19 16:18 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260400

Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc: Includes 2:1 pH

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260400-1	L2260400-2	L2260400-3	L2260400-4	L2260400-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	28-MAR-19	28-MAR-19	28-MAR-19	28-MAR-19	28-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-04-01	DBA1913-A-04-02	DBA1913-A-04-03	DBA1913-A-04-04	DBA1913-A-04-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.90	9.88	9.95	9.92	9.95
TCLP Metals	1st Preliminary pH (pH)	11.00	10.92	11.02	11.09	11.09
	2nd Preliminary pH (pH)	9.11	9.20	9.09	9.28	9.03
	Final pH (pH)	5.77	5.90	5.73	5.86	5.70
	Extraction Solution Initial pH (pH)	2.85	2.85	2.85	2.85	2.85
	Cadmium (Cd)-Leachable (mg/L)	0.186	0.613	0.285	0.208	0.206

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260400-6	L2260400-7	L2260400-8	L2260400-9	L2260400-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	28-MAR-19	28-MAR-19	28-MAR-19	28-MAR-19	28-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-04-06	DBA1913-A-04-07	DBA1913-A-04-08	DBA1913-A-04-09	DBA1913-A-04-010
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.00	9.93	10.02	9.97	9.94
TCLP Metals	1st Preliminary pH (pH)	11.10	11.14	11.10	11.09	11.09
	2nd Preliminary pH (pH)	9.07	9.11	9.17	9.06	9.13
	Final pH (pH)	5.80	5.46	5.84	5.75	5.56
	Extraction Solution Initial pH (pH)	2.85	2.85	2.85	2.85	2.85
	Cadmium (Cd)-Leachable (mg/L)	0.225	0.218	0.248	0.206	0.209

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260400-11	L2260400-12			
	Description	Soil	Soil			
	Sampled Date	28-MAR-19	28-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	DBA1913-A-04-011	DBA1913-A-04-012			
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.90	10.04			
TCLP Metals	1st Preliminary pH (pH)	11.07	11.08			
	2nd Preliminary pH (pH)	9.02	9.11			
	Final pH (pH)	5.73	5.67			
	Extraction Solution Initial pH (pH)	2.85	2.85			
	Cadmium (Cd)-Leachable (mg/L)	0.215	0.224			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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

Chain of Can

L2260400-COFC

COC # _____

Page ____ of ____

Report To				Report Format /		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
	DBA1913-A-04-01	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-02	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-03	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-04	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-05	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-06	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-07	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-08	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-09	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-10	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-11	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-12	28-Mar-19	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
	18-Apr-19	08:00	LHA	9/18	1112	19 °C				

ALS Environmental

Chain of Custody

L2260400-COFC

COC # _____

Page ____ of ____

Report To		**Report Format / Distribution**				**Turnaround Time (TAT) 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**	
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**	Please indicate below Filtered, Preserved or both (F, P, F/P)	**Number of Containers**
					CD-TCLP-VA(Cd and pH steps)	
	DBA1913-A-04-01	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-02	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-03	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-04	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-05	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-06	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-07	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-08	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-09	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-10	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-11	28-Mar-19	9:00	Soil	X	1
	DBA1913-A-04-12	28-Mar-19	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

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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-Apr-19	08:00		4/18	1112	19 °C				

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

Date Received: 18-APR-19
Report Date: 01-MAY-19 12:30 (MT)
Version: FINAL

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260396

Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc:

Brent Mack, B.Sc.
Account Manager

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260396-1	L2260396-2	L2260396-3	L2260396-4	L2260396-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-MAR-19	29-MAR-19	29-MAR-19	29-MAR-19	29-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-05-01	DBA1913-A-05-02	DBA1913-A-05-03	DBA1913-A-05-04	DBA1913-A-05-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.00	9.90	9.98	10.15	9.91
TCLP Metals	1st Preliminary pH (pH)	10.71	10.71	10.82	10.81	10.90
	2nd Preliminary pH (pH)	9.01	8.93	8.80	8.40	8.92
	Final pH (pH)	5.94	5.82	5.86	5.74	5.70
	Extraction Solution Initial pH (pH)	2.85	2.85	2.85	2.85	2.85
	Cadmium (Cd)-Leachable (mg/L)	0.215	0.198	0.192	0.194	0.229

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260396-6	L2260396-7	L2260396-8	L2260396-9	L2260396-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	29-MAR-19	29-MAR-19	29-MAR-19	29-MAR-19	29-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-05-06	DBA1913-A-05-07	DBA1913-A-05-08	DBA1913-A-05-09	DBA1913-A-05-10
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.96	10.00	10.05	10.02	10.08
TCLP Metals	1st Preliminary pH (pH)	10.89	10.86	10.83	10.82	10.89
	2nd Preliminary pH (pH)	9.08	8.95	9.03	9.04	9.01
	Final pH (pH)	5.74	5.71	5.77	5.73	5.81
	Extraction Solution Initial pH (pH)	2.85	2.85	2.85	2.85	2.85
	Cadmium (Cd)-Leachable (mg/L)	0.203	0.220	0.566	0.239	0.213

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260396-11	L2260396-12			
	Description	Soil	Soil			
	Sampled Date	29-MAR-19	29-MAR-19			
	Sampled Time	09:00	09:00			
	Client ID	DBA1913-A-05-11	DBA1913-A-05-12			
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.02	10.13			
TCLP Metals	1st Preliminary pH (pH)	10.82	10.82			
	2nd Preliminary pH (pH)	8.99	9.09			
	Final pH (pH)	5.78	5.72			
	Extraction Solution Initial pH (pH)	2.85	2.85			
	Cadmium (Cd)-Leachable (mg/L)	0.506	0.198			

Reference Information

Test Method References:

ALS Test Code	Matrix	Test Description	Method Reference**
MET-TCLP-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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

Chain of Custody

L2260396-COFC

COC # _____

Page ____ of ____

Report To		Report Format		Requested (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard		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: ☐ Yes ☐ No	Email 3: sarah.wellman@metrovancouver.org		Analysis Request
		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
	DBA1913-A-05-01	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-02	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-03	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-04	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-05	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-06	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-07	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-08	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-09	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-10	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-11	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-12	29-Mar-19	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
	18-APR-19	08:00	WA	4/18	0112	19 °C				

GENF 20.00 Front

ALS Environmental

Chain of Car

L2260396-COFC

COC # _____

Page ____ of ____

Report To		**Report Format**		**uested** (Rush for routine analysis subject to availability)
Company:	Covanta Energy	☐ Standard	☐	ard 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
	DBA1913-A-05-01	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-02	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-03	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-04	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-05	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-06	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-07	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-08	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-09	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-10	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-11	29-Mar-19	9:00	Soil	X	1
	DBA1913-A-05-12	29-Mar-19	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
	18-APR-19	08:00	HA	4/18	11:20am	19 °C				

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

Date Received: 18-APR-19
Report Date: 10-MAY-19 12:12 (MT)
Version: FINAL REV. 2

Client Phone: 604-521-1025

Certificate of Analysis

Lab Work Order #: L2260403

Project P.O. #: VANCO-0000048466
Job Reference:
C of C Numbers:
Legal Site Desc: Includes 2:1 pH

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	L2260403-1	L2260403-2	L2260403-3	L2260403-4	L2260403-5
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-06-01	DBA1913-A-06-02	DBA1913-A-06-03	DBA1913-A-06-04	DBA1913-A-06-05
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.93	9.91	10.08	9.92	9.92
TCLP Metals	1st Preliminary pH (pH)	10.87	10.82	10.89	10.99	10.93
	2nd Preliminary pH (pH)	8.53	8.23	8.51	6.53	8.42
	Final pH (pH)	5.65	5.65	6.00	5.68	5.80
	Extraction Solution Initial pH (pH)	2.86	2.86	2.86	2.86	2.86
	Cadmium (Cd)-Leachable (mg/L)	0.465	0.794	0.192	0.704	0.180

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260403-6	L2260403-7	L2260403-8	L2260403-9	L2260403-10
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-06-06	DBA1913-A-06-07	DBA1913-A-06-08	DBA1913-A-06-09	DBA1913-A-06-010
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.90	10.03	9.91	9.96	9.92
TCLP Metals	1st Preliminary pH (pH)	10.92	10.95	10.97	10.91	10.97
	2nd Preliminary pH (pH)	8.01	6.82	7.28	6.20	7.65
	Final pH (pH)	6.07	5.97	5.98	5.92	5.74
	Extraction Solution Initial pH (pH)	2.86	2.86	2.86	2.86	2.86
	Cadmium (Cd)-Leachable (mg/L)	0.170	0.249	0.442	0.491	0.219

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260403-11	L2260403-12	L2260403-13	L2260403-14	L2260403-15
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-06-011	DBA1913-A-06-012	DBA1913-A-06-02 REP 1	DBA1913-A-06-02 REP 2	DBA1913-A-06-04 REP 1
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	9.94	9.98			
TCLP Metals	1st Preliminary pH (pH)	10.92	10.97	10.82	10.82	10.99
	2nd Preliminary pH (pH)	8.34	8.24	8.23	8.23	6.53
	Final pH (pH)	5.93	5.97	5.98	5.89	5.95
	Extraction Solution Initial pH (pH)	2.86	2.86	2.83	2.83	2.83
	Cadmium (Cd)-Leachable (mg/L)	0.212	0.177	0.485	0.381	0.464

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

ALS ENVIRONMENTAL ANALYTICAL REPORT

	Sample ID	L2260403-16	L2260403-17	L2260403-18	L2260403-19	L2260403-20
	Description	Soil	Soil	Soil	Soil	Soil
	Sampled Date	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19	30-MAR-19
	Sampled Time	09:00	09:00	09:00	09:00	09:00
	Client ID	DBA1913-A-06-04 REP 2	DBA1913-A-06-02 REP 3	DBA1913-A-06-02 REP 4	DBA1913-A-06-04 REP 3	DBA1913-A-06-04 REP 4
Grouping	**Analyte**					
SOIL						
Physical Tests	pH (1:2 soil:water) (pH)	10.99	10.82	10.82	10.99	10.99
TCLP Metals	1st Preliminary pH (pH)	6.53	8.23	8.23	6.53	6.53
	2nd Preliminary pH (pH)	5.93	6.48	6.29	6.40	6.31
	Final pH (pH)	2.83	2.84	2.84	2.84	2.84
	Extraction Solution Initial pH (pH)	0.436	0.696	0.274	0.491	0.296
	Cadmium (Cd)-Leachable (mg/L)					

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

Reference Information

QC Samples with Qualifiers & Comments:

QC Type Description	Parameter	Qualifier	Applies to Sample Number(s)
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2260403-1, -10, -11, -12, -2, -3, -4, -5, -6, -7, -8, -9
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2260403-13, -14, -15, -16
Matrix Spike	Cadmium (Cd)-Leachable	MS-B	L2260403-17, -18, -19, -20

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-CCMS-VA	Soil	Metals by ICPMS (TCLP)	EPA 1311/6020A

This analysis is carried out in accordance with the extraction procedure outlined in "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods Volume 1C" SW-846 EPA Method 1311, published by the United States Environmental Protection Agency (EPA). In summary, the sample is extracted at a 20:1 liquid to solids ratio for 16 to 20 hours using either extraction fluid #1 (glacial acetic acid, water and sodium hydroxide) or extraction fluid #2 (glacial acetic acid), depending on the pH of the original sample. The extract is then filtered through a 0.6 to 0.8 micron glass fibre filter. Instrumental analysis of the digested extract is by collision cell inductively coupled plasma - mass spectrometry (modifed from EPA Method 6020A).

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

Chain of Custody
Canada

L2260403-COFC

COC # _____

Page ____ of ____

Report To				Report Format / Dist.				ed (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
	DBA1913-A-06-01	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-02	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-03	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-04	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-05	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-06	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-07	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-08	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-09	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-10	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-11	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-12	30-Mar-19	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.

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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
	8-Apr-19	08:00	HA	4/18	11:20a	19 °C				

ALS Environmental

Chain of Cust
Canada

L2260403-COFC

COC # _____

Page ____ of ____

Report To		**Report Format / Dis**		**ed** (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**	
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
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	DBA1913-A-06-02	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-03	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-04	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-05	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-06	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-07	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-08	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-09	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-10	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-11	30-Mar-19	9:00	Soil	X	1
	DBA1913-A-06-12	30-Mar-19	9:00	Soil	X	1

Please indicate below Filtered, Preserved or both (F, P, F/P)

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

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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-APR-19	08:00	LIA	4/18	11:20	19 °C				