

Bottom Ash Data

2021 Week 21

The following analytical report represents bottom ash composite results for week 21 of 2021 (May 16, 2021 to May 22, 2021).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.



CERTIFICATE OF ANALYSIS

Work Order : **VA21B0117**
Client : **Covanta Burnaby Renewable Energy, ULC**
Contact : Steve McKinney
Address : 5150 Riverbend Drive
Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : 46693
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Page : 1 of 11
Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
Burnaby BC Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 25-May-2021 14:00
Date Analysis Commenced : 27-May-2021
Issue Date : 04-Jun-2021 13:45

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Certificate of Analysis contains the following information:

- General Comments
- Analytical Results

Additional information pertinent to this report will be found in the following separate attachments: Quality Control Report, QC Interpretive report to assist with Quality Review and Sample Receipt Notification (SRN).

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Gloria Chan	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia



General Comments

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Refer to the ALS Quality Control Interpretive report (QCI) for applicable references and methodology summaries. Reference methods may incorporate modifications to improve performance.

Where a reported less than (<) result is higher than the LOR, this may be due to primary sample extract/digestate dilution and/or insufficient sample for analysis.

Where the LOR of a reported result differs from standard LOR, this may be due to high moisture content, insufficient sample (reduced weight employed) or matrix interference.

Please refer to Quality Control Interpretive report (QCI) for information regarding Holding Time compliance.

Key : CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances
LOR: Limit of Reporting (detection limit).

<i>Unit</i>	<i>Description</i>
%	percent
mg/kg	milligrams per kilogram
mg/L	milligrams per litre
pH units	pH units

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior 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.

Test results reported relate only to the samples as received by the laboratory.

UNLESS OTHERWISE STATED on SRN or QCI Report, ALL SAMPLES WERE RECEIVED IN ACCEPTABLE CONDITION.



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2121-A-1	BA2121-A-2	BA2121-A-3	BA2121-A-4	BA2121-A-5
(Matrix: Soil/Solid)					Client sampling date / time	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-001	VA21B0117-002	VA21B0117-003	VA21B0117-004	VA21B0117-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.5	18.0	17.6	18.6	18.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.3	11.1	11.1	11.1	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31200	29600	27500	30300	39800	
antimony	7440-36-0	E440	0.10	mg/kg	118	114	124	121	106	
arsenic	7440-38-2	E440	0.10	mg/kg	34.5	38.2	32.1	35.7	33.6	
barium	7440-39-3	E440	0.50	mg/kg	445	411	404	556	538	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.35	0.34	0.48	0.34	
bismuth	7440-69-9	E440	0.20	mg/kg	10.2	154	19.1	12.7	9.83	
boron	7440-42-8	E440	5.0	mg/kg	178	196	198	188	194	
cadmium	7440-43-9	E440	0.020	mg/kg	12.4	12.5	11.0	13.7	20.9	
calcium	7440-70-2	E440	50	mg/kg	117000	120000	114000	127000	118000	
chromium	7440-47-3	E440	0.50	mg/kg	176	161	194	179	190	
cobalt	7440-48-4	E440	0.10	mg/kg	42.8	193	58.3	124	122	
copper	7440-50-8	E440	0.50	mg/kg	2800	2770	8050	2540	1710	
iron	7439-89-6	E440	50	mg/kg	51000	56000	65900	74400	53900	
lead	7439-92-1	E440	0.50	mg/kg	696	468	1960	2250	1870	
lithium	7439-93-2	E440	2.0	mg/kg	24.0	29.9	23.2	21.8	27.2	
magnesium	7439-95-4	E440	20	mg/kg	13000	11800	11400	12200	12400	
manganese	7439-96-5	E440	1.0	mg/kg	874	1300	825	816	7030	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	27.8	28.4	18.0	22.0	17.1	
nickel	7440-02-0	E440	0.50	mg/kg	169	176	171	345	388	
phosphorus	7723-14-0	E440	50	mg/kg	10800	10000	9960	9810	9190	
potassium	7440-09-7	E440	100	mg/kg	5180	4720	4490	4820	4890	
selenium	7782-49-2	E440	0.20	mg/kg	0.48	0.46	0.42	0.34	0.48	
silver	7440-22-4	E440	0.10	mg/kg	5.60	6.96	4.85	6.06	6.15	
sodium	7440-23-5	E440	50	mg/kg	14100	12600	12900	13300	13700	
strontium	7440-24-6	E440	0.50	mg/kg	286	280	284	295	382	
sulfur	7704-34-9	E440	1000	mg/kg	13000	13700	12100	13000	13800	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-1	BA2121-A-2	BA2121-A-3	BA2121-A-4	BA2121-A-5
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-001	VA21B0117-002	VA21B0117-003	VA21B0117-004	VA21B0117-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.067	0.056	0.061	0.064	
tin	7440-31-5	E440	2.0	mg/kg	107	126	130	180	102	
titanium	7440-32-6	E440	1.0	mg/kg	430	445	291	392	772	
tungsten	7440-33-7	E440	0.50	mg/kg	13.2	11.4	8.30	10.7	11.6	
uranium	7440-61-1	E440	0.050	mg/kg	5.60	5.70	5.05	5.35	5.07	
vanadium	7440-62-2	E440	0.20	mg/kg	53.1	52.2	48.3	51.7	50.1	
zinc	7440-66-6	E440	2.0	mg/kg	4730	5110	3790	4750	4430	
zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.2	1.5	1.2	1.2	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.7	11.7	11.8	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.41	8.83	9.09	9.55	8.95	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.07	6.20	6.13	6.21	6.30	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.86	2.02	1.90	2.02	2.07	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	1.84	0.171	1.99	0.190	0.197	
calcium, TCLP	7440-70-2	E444	10	mg/L	1840	1880	1900	1890	1940	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.709	0.683	0.523	0.860	0.852	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.51	1.08	1.58	0.654	0.757	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	133	135	134	135	136	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.62	0.54	0.72	0.44	0.53	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-1	BA2121-A-2	BA2121-A-3	BA2121-A-4	BA2121-A-5
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-001	VA21B0117-002	VA21B0117-003	VA21B0117-004	VA21B0117-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	47.1	41.4	58.9	43.3	39.2	39.2
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-6	BA2121-A-7	BA2121-A-8	BA2121-A-9	BA2121-A-10
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-006	VA21B0117-007	VA21B0117-008	VA21B0117-009	VA21B0117-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	17.1	17.8	16.4	17.8	18.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.2	11.3	11.2	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37000	30300	37400	35200	29200	
antimony	7440-36-0	E440	0.10	mg/kg	536	116	110	123	129	
arsenic	7440-38-2	E440	0.10	mg/kg	35.3	37.3	28.6	35.6	36.8	
barium	7440-39-3	E440	0.50	mg/kg	508	468	558	495	451	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.32	0.37	0.37	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	11.8	11.6	8.52	9.83	10.4	
boron	7440-42-8	E440	5.0	mg/kg	167	182	199	190	207	
cadmium	7440-43-9	E440	0.020	mg/kg	12.3	13.6	10.6	11.1	12.8	
calcium	7440-70-2	E440	50	mg/kg	122000	114000	122000	120000	126000	
chromium	7440-47-3	E440	0.50	mg/kg	166	172	214	233	200	
cobalt	7440-48-4	E440	0.10	mg/kg	50.4	63.8	26.8	42.3	45.0	
copper	7440-50-8	E440	0.50	mg/kg	2120	4050	1920	3890	6890	
iron	7439-89-6	E440	50	mg/kg	57900	56800	57300	67700	59000	
lead	7439-92-1	E440	0.50	mg/kg	1450	1070	2840	1010	2300	
lithium	7439-93-2	E440	2.0	mg/kg	20.9	21.5	21.6	24.2	24.3	
magnesium	7439-95-4	E440	20	mg/kg	12000	11500	11200	11700	11900	
manganese	7439-96-5	E440	1.0	mg/kg	847	1040	789	907	932	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	24.8	22.2	27.8	30.2	26.8	
nickel	7440-02-0	E440	0.50	mg/kg	135	148	192	183	245	
phosphorus	7723-14-0	E440	50	mg/kg	11300	9980	9090	10000	10300	
potassium	7440-09-7	E440	100	mg/kg	4900	4820	4490	4550	4920	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.34	0.31	0.38	0.47	
silver	7440-22-4	E440	0.10	mg/kg	4.97	10.6	7.18	5.50	8.55	
sodium	7440-23-5	E440	50	mg/kg	13900	13300	13600	13300	13400	
strontium	7440-24-6	E440	0.50	mg/kg	305	282	313	302	314	
sulfur	7704-34-9	E440	1000	mg/kg	13900	13100	11500	11800	14000	
thallium	7440-28-0	E440	0.050	mg/kg	0.065	0.072	0.075	0.057	0.068	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-6	BA2121-A-7	BA2121-A-8	BA2121-A-9	BA2121-A-10
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-006	VA21B0117-007	VA21B0117-008	VA21B0117-009	VA21B0117-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	3420	640	129	144	546	
titanium	7440-32-6	E440	1.0	mg/kg	410	353	488	316	396	
tungsten	7440-33-7	E440	0.50	mg/kg	11.8	8.65	10.8	10.4	12.0	
uranium	7440-61-1	E440	0.050	mg/kg	5.43	5.39	5.24	4.82	5.57	
vanadium	7440-62-2	E440	0.20	mg/kg	57.0	53.0	55.0	53.0	55.9	
zinc	7440-66-6	E440	2.0	mg/kg	4720	9060	5160	5940	6690	
zirconium	7440-67-7	E440	1.0	mg/kg	1.3	1.0	1.4	1.5	1.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.9	11.8	11.8	11.8	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.53	9.29	9.44	9.89	8.70	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	2.86	2.86	2.86	
pH, TCLP final	----	EPP444	0.010	pH units	6.04	5.96	6.23	6.03	6.15	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025	
boron, TCLP	7440-42-8	E444	0.50	mg/L	1.96	2.14	2.06	2.17	2.12	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.200	0.167	0.462	0.172	0.156	
calcium, TCLP	7440-70-2	E444	10	mg/L	1810	1870	1880	1820	1980	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.788	0.870	1.44	0.783	0.976	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.11	0.538	0.547	0.902	0.678	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	130	139	140	138	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.52	0.64	0.61	0.52	0.62	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-6	BA2121-A-7	BA2121-A-8	BA2121-A-9	BA2121-A-10
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00	19-May-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-006	VA21B0117-007	VA21B0117-008	VA21B0117-009	VA21B0117-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
zinc, TCLP	7440-66-6	E444	0.50	mg/L	62.6	47.6	49.6	46.8	45.0	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

Please refer to the General Comments section for an explanation of any qualifiers detected.



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-11	BA2121-A-12	----	----	----
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-011	VA21B0117-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	18.2	17.2	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	38400	35700	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	132	107	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	36.3	31.9	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	452	493	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.38	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.29	79.6	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	188	203	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	10.5	10.6	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	109000	119000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	168	146	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	81.3	37.9	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2050	9930	----	----	----	
iron	7439-89-6	E440	50	mg/kg	57300	66800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	1620	514	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	20.7	25.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	11000	11700	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	799	760	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	22.1	24.8	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	145	265	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	9050	9220	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4240	4490	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.26	0.38	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.03	16.7	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	12600	13200	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	414	292	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12300	12800	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.054	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-11	BA2121-A-12	----	----	----
Client sampling date / time					19-May-2021 09:00	19-May-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-011	VA21B0117-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	98.7	556	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	409	352	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	10.1	10.5	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.91	4.94	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	54.4	47.7	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5020	7080	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	1.6	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.7	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.14	8.97	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.09	6.18	---	---	---	
antimony, TCLP	7440-36-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
arsenic, TCLP	7440-38-2	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	<2.5	---	---	---	
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	<0.025	---	---	---	
boron, TCLP	7440-42-8	E444	0.50	mg/L	2.09	4.04	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.168	0.405	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1910	3820	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.771	1.19	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.661	2.00	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	---	---	---	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	277	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.57	1.12	---	---	---	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	---	---	---	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	---	---	---	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2121-A-11	BA2121-A-12	----	----	----
					Client sampling date / time	19-May-2021 09:00	19-May-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21B0117-011	VA21B0117-012	-----	-----	-----	
					Result	Result	---	---	---	
TCLP Metals										
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	0.15	----	----	----	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	43.9	79.7	----	----	----	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	----	----	----	

Please refer to the General Comments section for an explanation of any qualifiers detected.

QUALITY CONTROL INTERPRETIVE REPORT

Work Order	: VA21B0117	Page	: 1 of 15
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: Vancouver - Environmental
Contact	: Steve McKinney	Account Manager	: Brent Mack
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	: 604 521 1025	Telephone	: 778-370-3279
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 25-May-2021 14:00
PO	: 46693	Issue Date	: 04-Jun-2021 13:45
C-O-C number	: ----		
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report is automatically generated by the ALS LIMS (Laboratory Information Management System) through evaluation of Quality Control (QC) results and other QA parameters associated with this submission, and is intended to facilitate rapid data validation by auditors or reviewers. The report highlights any exceptions and outliers to ALS Data Quality Objectives, provides holding time details and exceptions, summarizes QC sample frequencies, and lists applicable methodology references and summaries.

Key

- Anonymous:** Refers to samples which are not part of this work order, but which formed part of the QC process lot.
CAS Number: Chemical Abstracts Services number is a unique identifier assigned to discrete substances.
DQO: Data Quality Objective.
LOR: Limit of Reporting (detection limit).
RPD: Relative Percent Difference.

Summary of Outliers

Outliers : Quality Control Samples

- No Method Blank value outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA21B0117-001	BA2121-A-1	cobalt	7440-48-4	E440	139 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B0117-001	BA2121-A-1	copper	7440-50-8	E440	34.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B0117-001	BA2121-A-1	lead	7439-92-1	E440	52.3 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B0117-001	BA2121-A-1	lithium	7439-93-2	E440	46.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B0117-001	BA2121-A-1	nickel	7440-02-0	E440	170 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

Qualifier	Description
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-1	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-10	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-11	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-12	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-2	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-3	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-4	E510	19-May-2021	01-Jun-2021	----	14 days	✓	01-Jun-2021	28 days	1 days	✓	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-5	E510	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-6	E510	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-7	E510	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-8	E510	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	28 days	1 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2121-A-9	E510	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	28 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2121-A-1	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2121-A-10	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2121-A-11	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2121-A-12	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-2	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-3	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-4	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-5	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-6	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-7	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-8	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2121-A-9	E440	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	180 days	1 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2121-A-1	E144	19-May-2021	----	----	----		31-May-2021	----	----		



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-10	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-11	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-12	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-2	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-3	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-4	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-5	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-6	E144	19-May-2021	----	----	----		31-May-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2121-A-7	E144	19-May-2021	----	----	----		31-May-2021	----	----	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2121-A-8	E144	19-May-2021	----	----	----		31-May-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2121-A-9	E144	19-May-2021	----	----	----		31-May-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-1	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-10	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-11	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-12	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-2	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-3	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-4	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-5	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-6	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-7	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-8	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2121-A-9	E108	19-May-2021	01-Jun-2021	----	14 days	✔	01-Jun-2021	30 days	1 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2121-A-1	E512	27-May-2021	----	----	----		28-May-2021	----	10 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2121-A-10	E512	27-May-2021	----	----	----		28-May-2021	----	10 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2121-A-11	E512	27-May-2021	----	----	----		28-May-2021	----	10 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2121-A-12	E512	27-May-2021	----	----	----		28-May-2021	----	10 days		



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-2	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-3	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-4	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-5	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-6	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-7	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-8	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2121-A-9	E512	27-May-2021	----	----	----		28-May-2021	----	10 days	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2121-A-1	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-10	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-11	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-12	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-2	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-3	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-4	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-5	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-6	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2121-A-7	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔	



Matrix: Soil/Solid

Evaluation: ✖ = Holding time exceedance ; ✔ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2121-A-8	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2121-A-9	E444	27-May-2021	----	----	----		28-May-2021	180 days	10 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-1	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-10	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-11	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-12	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-2	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-3	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-4	EPP444	19-May-2021	27-May-2021	----	----		----	----	----	



Matrix: **Soil/Solid**

Evaluation: * = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-5	EPP444	19-May-2021	27-May-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-6	EPP444	19-May-2021	27-May-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-7	EPP444	19-May-2021	27-May-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-8	EPP444	19-May-2021	27-May-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2121-A-9	EPP444	19-May-2021	27-May-2021	----	----		----	----	----		

Legend & Qualifier Definitions

Rec. HT: ALS recommended hold time (see units).



Quality Control Parameter Frequency Compliance

The following report summarizes the frequency of laboratory QC samples analyzed within the analytical batches (QC lots) in which the submitted samples were processed. The actual frequency should be greater than or equal to the expected frequency.

Matrix: **Soil/Solid**

Evaluation: ✖ = QC frequency outside specification; ✔ = QC frequency within specification.

Quality Control Sample Type	Method	QC Lot #	Count		Frequency (%)		Evaluation
			QC	Regular	Actual	Expected	
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	209098	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	209099	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	209102	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	209100	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	209098	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	209099	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	209102	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	209100	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	207743	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	209098	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	207744	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	209099	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	209102	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	207743	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	207744	1	12	8.3	5.0	✔



Methodology References and Summaries

The analytical methods used by ALS are developed using internationally recognized reference methods (where available), such as those published by US EPA, APHA Standard Methods, ASTM, ISO, Environment Canada, BC MOE, and Ontario MOE. Reference methods may incorporate modifications to improve performance (indicated by "mod").

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108 Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally 20 ± 5°C), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at <60 °C) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144 Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at 105°C. Moisture content is calculated as the weight loss (due to water) divided by the wet weight of the sample, expressed as a percentage.
Metals in Soil/Solid by CRC ICPMS	E440 Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method 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.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	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.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.

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Work Order : VA21B0117
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order : **VA21B0117**

Page : 1 of 11

Client : Covanta Burnaby Renewable Energy, ULC
Contact : Steve McKinney
Address : 5150 Riverbend Drive
 Burnaby BC Canada V3N 4V3
Telephone : 604 521 1025
Project : Weekly Bottom Ash - Suite
PO : 46693
C-O-C number : ----
Sampler : ----
Site : ----
Quote number : Standing Offer (BC work)
No. of samples received : 12
No. of samples analysed : 12

Laboratory : Vancouver - Environmental
Account Manager : Brent Mack
Address : 8081 Lougheed Highway
 Burnaby, British Columbia Canada V5A 1W9
Telephone : 778-370-3279
Date Samples Received : 25-May-2021 14:00
Date Analysis Commenced : 27-May-2021
Issue Date : 04-Jun-2021 13:45

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

- Laboratory Duplicate (DUP) Report; Relative Percentage Difference (RPD) and Acceptance Limits
- Matrix Spike (MS) Report; Recovery and Acceptance Limits
- Reference Material (RM) Report; Recovery and Acceptance Limits
- Method Blank (MB) Report; Recovery and Acceptance Limits
- Laboratory Control Sample (LCS) Report; Recovery and Acceptance Limits

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Angela Ren	Team Leader - Metals	Metals, Burnaby, British Columbia
Dee Lee	Analyst	Metals, Burnaby, British Columbia
Gloria Chan	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia

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Work Order : VA21B0117
Client : Covanta Burnaby Renewable Energy, ULC
Project : Weekly Bottom Ash - Suite



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Services number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percentage Difference

= Indicates a QC result that did not meet the ALS DQO.



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test specific).

Sub-Matrix: Soil/Solid

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 209100)											
VA21B0117-001	BA2121-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.0	0.5%	5%	----
Physical Tests (QC Lot: 209102)											
VA21B0045-001	Anonymous	moisture	----	E144	0.25	%	14.6	13.4	8.80%	20%	----
Metals (QC Lot: 209098)											
VA21B0117-001	BA2121-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 209099)											
VA21B0117-001	BA2121-A-1	aluminum	7429-90-5	E440	50	mg/kg	31200	22500	32.7%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	118	111	6.66%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	34.5	32.8	4.87%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	445	447	0.470%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.36	0.004	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	10.2	8.84	14.8%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	178	181	1.96%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	12.4	12.8	3.50%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	117000	122000	4.30%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	176	176	0.0805%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	42.8	237	139%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2800	1980	34.6%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	51000	66600	26.6%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	696	407	52.3%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	24.0	38.4	46.2%	30%	DUP-H
		magnesium	7439-95-4	E440	20	mg/kg	13000	10500	21.4%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	874	1140	26.9%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	27.8	22.2	22.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	169	2120	170%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	10800	10800	0.191%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5180	4660	10.6%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.48	0.43	0.04	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	5.60	7.09	23.5%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	14100	12800	10.1%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	286	278	2.78%	40%	----



Sub-Matrix: **Soil/Solid**

Laboratory Duplicate (DUP) Report

<i>Laboratory sample ID</i>	<i>Client sample ID</i>	<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Original Result</i>	<i>Duplicate Result</i>	<i>RPD(%) or Difference</i>	<i>Duplicate Limits</i>	<i>Qualifier</i>
Metals (QC Lot: 209099) - continued											
VA21B0117-001	BA2121-A-1	sulfur	7704-34-9	E440	1000	mg/kg	13000	12400	4.03%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.061	0.055	0.006	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	107	98.3	8.14%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	430	311	32.2%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	13.2	10.0	26.9%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	5.60	5.34	4.87%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	53.1	47.8	10.5%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4730	4240	11.0%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.1	1.1	0.02	Diff <2x LOR	----

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DUP-H	Duplicate results outside ALS DQO, due to sample heterogeneity.



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 209102)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 209098)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 209099)						
aluminum	7429-90-5	E440	50	mg/kg	<50	----
antimony	7440-36-0	E440	0.1	mg/kg	<0.10	----
arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	----
barium	7440-39-3	E440	0.5	mg/kg	<0.50	----
beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	----
bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	----
boron	7440-42-8	E440	5	mg/kg	<5.0	----
cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	----
calcium	7440-70-2	E440	50	mg/kg	<50	----
chromium	7440-47-3	E440	0.5	mg/kg	<0.50	----
cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	----
copper	7440-50-8	E440	0.5	mg/kg	<0.50	----
iron	7439-89-6	E440	50	mg/kg	<50	----
lead	7439-92-1	E440	0.5	mg/kg	<0.50	----
lithium	7439-93-2	E440	2	mg/kg	<2.0	----
magnesium	7439-95-4	E440	20	mg/kg	<20	----
manganese	7439-96-5	E440	1	mg/kg	<1.0	----
molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	----
nickel	7440-02-0	E440	0.5	mg/kg	<0.50	----
phosphorus	7723-14-0	E440	50	mg/kg	<50	----
potassium	7440-09-7	E440	100	mg/kg	<100	----
selenium	7782-49-2	E440	0.2	mg/kg	<0.20	----
silver	7440-22-4	E440	0.1	mg/kg	<0.10	----
sodium	7440-23-5	E440	50	mg/kg	<50	----
strontium	7440-24-6	E440	0.5	mg/kg	<0.50	----
sulfur	7704-34-9	E440	1000	mg/kg	<1000	----
thallium	7440-28-0	E440	0.05	mg/kg	<0.050	----
tin	7440-31-5	E440	2	mg/kg	<2.0	----
titanium	7440-32-6	E440	1	mg/kg	<1.0	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 209099) - continued						
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----
vanadium	7440-62-2	E440	0.2	mg/kg	<0.20	----
zinc	7440-66-6	E440	2	mg/kg	<2.0	----
zirconium	7440-67-7	E440	1	mg/kg	<1.0	----
TCLP Metals (QCLot: 207743)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 207744)						
antimony, TCLP	7440-36-0	E444	1	mg/L	<1.0	----
arsenic, TCLP	7440-38-2	E444	1	mg/L	<1.0	----
barium, TCLP	7440-39-3	E444	2.5	mg/L	<2.5	----
beryllium, TCLP	7440-41-7	E444	0.025	mg/L	<0.025	----
boron, TCLP	7440-42-8	E444	0.5	mg/L	<0.50	----
cadmium, TCLP	7440-43-9	E444	0.05	mg/L	<0.050	----
calcium, TCLP	7440-70-2	E444	10	mg/L	<10	----
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	----
cobalt, TCLP	7440-48-4	E444	0.05	mg/L	<0.050	----
copper, TCLP	7440-50-8	E444	0.05	mg/L	<0.050	----
iron, TCLP	7439-89-6	E444	5	mg/L	<5.0	----
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	----
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	<2.5	----
nickel, TCLP	7440-02-0	E444	0.25	mg/L	<0.25	----
selenium, TCLP	7782-49-2	E444	0.1	mg/L	<0.10	----
silver, TCLP	7440-22-4	E444	0.05	mg/L	<0.050	----
thallium, TCLP	7440-28-0	E444	1	mg/L	<1.0	----
uranium, TCLP	7440-61-1	E444	0.2	mg/L	<0.20	----
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	----
zinc, TCLP	7440-66-6	E444	0.5	mg/L	<0.50	----
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----



Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: **Soil/Solid**

					Laboratory Control Sample (LCS) Report				
Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Physical Tests (QCLot: 209100)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 209102)									
moisture	----	E144	0.25	%	50 %	99.8	90.0	110	----
Metals (QCLot: 209098)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	85.3	80.0	120	----
Metals (QCLot: 209099)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	96.9	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	111	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	92.7	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.8	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	93.8	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	91.6	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.9	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	89.5	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	92.7	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	92.9	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	91.2	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	95.1	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	94.1	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	91.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.7	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.1	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	91.3	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	117	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.9	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	110	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	96.9	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	91.8	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	105	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	88.5	80.0	120	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
Metals (QCLot: 209099) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	93.9	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.1	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	95.0	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.2	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	98.7	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	108	80.0	120	----



Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: **Soil/Solid**

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 207743)										
VA21B0117-001	BA2121-A-1	mercury, TCLP	7439-97-6	E512	0.0013 mg/L	0.001 mg/L	134	50.0	140	----
TCLP Metals (QCLot: 207744)										
VA21B0117-001	BA2121-A-1	antimony, TCLP	7440-36-0	E444	5.6 mg/L	5 mg/L	112	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.4 mg/L	5 mg/L	109	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.9 mg/L	12.5 mg/L	111	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.258 mg/L	0.25 mg/L	103	50.0	140	----
		boron, TCLP	7440-42-8	E444	9.28 mg/L	10 mg/L	92.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		chromium, TCLP	7440-47-3	E444	1.31 mg/L	1.25 mg/L	105	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	2.51 mg/L	2.5 mg/L	100	50.0	140	----
		iron, TCLP	7439-89-6	E444	261 mg/L	250 mg/L	104	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.6 mg/L	10 mg/L	106	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	242 mg/L	250 mg/L	96.8	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.54 mg/L	2.5 mg/L	102	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.78 mg/L	5 mg/L	116	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.116 mg/L	0.1 mg/L	116	50.0	140	----
		thallium, TCLP	7440-28-0	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.20 mg/L	5 mg/L	104	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.81 mg/L	0.75 mg/L	108	50.0	140	----
		zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		zirconium, TCLP	7440-67-7	E444	9 mg/L	10 mg/L	93.3	50.0	150	----



Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 209098)									
QC-209098-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	94.3	70.0	130	----
Metals (QCLot: 209099)									
QC-209099-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	109	70.0	130	----
QC-209099-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	97.5	70.0	130	----
QC-209099-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	108	70.0	130	----
QC-209099-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	96.4	70.0	130	----
QC-209099-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
QC-209099-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	117	40.0	160	----
QC-209099-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	93.1	70.0	130	----
QC-209099-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	93.7	70.0	130	----
QC-209099-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
QC-209099-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.3	70.0	130	----
QC-209099-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	94.3	70.0	130	----
QC-209099-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	99.0	70.0	130	----
QC-209099-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	92.0	70.0	130	----
QC-209099-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	103	70.0	130	----
QC-209099-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	103	70.0	130	----
QC-209099-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	106	70.0	130	----
QC-209099-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	102	70.0	130	----
QC-209099-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	97.2	70.0	130	----
QC-209099-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	106	70.0	130	----
QC-209099-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	113	70.0	130	----
QC-209099-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	101	70.0	130	----
QC-209099-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	99.2	70.0	130	----
QC-209099-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	93.7	40.0	160	----
QC-209099-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	90.1	70.0	130	----
QC-209099-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	115	70.0	130	----
QC-209099-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	101	70.0	130	----
QC-209099-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	104	70.0	130	----



Sub-Matrix: **Soil/Solid**

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 209099) - continued									
QC-209099-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
QC-209099-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	108	70.0	130	----



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COC #

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Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company:	Covanta Energy	<input type="checkbox"/> Standard	<input type="checkbox"/> Other	<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact:	Steve Mckinney / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive	Email 1: smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT	
	Burnaby BC	Email 2: rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone:	604-521-1025	Email 3: dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT	
	<input type="checkbox"/> Yes <input type="checkbox"/> No	brent.kirkpatrick@metrovancover.org		Analysis Request	
		Sarah.Wellman@metrovancover.org			

Invoice To Same as Report ?		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)					
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:							
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite							
Contact:		LSD: (includes 2:1 pH)							
Address:		Quote #:							
Phone:		Fax:							
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
					X	X			X	X	
BA2121-A-1	Environmental Division Vancouver Work Order Reference VA21B0117  Telephone: +1 604 253 4188	19-May-21	9:00	Soil	X	X			X		1
BA2121-A-2		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-3		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-4		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-5		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-6		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-7		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-8		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-9		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-10		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-11		19-May-21	9:00	Soil	X	X			X		1
BA2121-A-12		19-May-21	9:00	Soil	X	X			X		1

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

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

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)			Observations: Yes / No ? If Yes add SIF
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	
<i>[Signature]</i>	25 May 21	0800	MR	May 25	2PM	18 °C			