

Bottom Ash Data

2021 Week 29

The following analytical report represents bottom ash composite results for week 29 of 2021 (July 11, 2021 to July 17, 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 : **VA21B4806**
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 : VANCO 0000050390
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 : 20-Jul-2021 12:05
Date Analysis Commenced : 21-Jul-2021
Issue Date : 28-Jul-2021 17:00

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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, 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	BA2129-A-1	BA2129-A-2	BA2129-A-3	BA2129-A-4	BA2129-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-001	VA21B4806-002	VA21B4806-003	VA21B4806-004	VA21B4806-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	18.3	18.4	20.3	20.1	20.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	11.1	11.0	10.8	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31500	35700	32000	33800	30900	
antimony	7440-36-0	E440	0.10	mg/kg	137	131	159	116	130	
arsenic	7440-38-2	E440	0.10	mg/kg	28.9	25.3	35.0	31.4	27.2	
barium	7440-39-3	E440	0.50	mg/kg	623	629	649	530	566	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.37	0.42	0.49	0.46	
bismuth	7440-69-9	E440	0.20	mg/kg	17.1	7.23	8.06	5.64	6.01	
boron	7440-42-8	E440	5.0	mg/kg	189	205	213	209	276	
cadmium	7440-43-9	E440	0.020	mg/kg	9.71	9.45	9.70	7.85	8.89	
calcium	7440-70-2	E440	50	mg/kg	138000	136000	160000	147000	138000	
chromium	7440-47-3	E440	0.50	mg/kg	154	192	285	220	167	
cobalt	7440-48-4	E440	0.10	mg/kg	35.0	344	105	499	30.3	
copper	7440-50-8	E440	0.50	mg/kg	2980	2330	6290	5420	1680	
iron	7439-89-6	E440	50	mg/kg	57800	51700	69600	68700	59200	
lead	7439-92-1	E440	0.50	mg/kg	633	441	1610	1530	1550	
lithium	7439-93-2	E440	2.0	mg/kg	23.2	40.7	23.4	23.9	22.7	
magnesium	7439-95-4	E440	20	mg/kg	11600	12200	12000	10600	10200	
manganese	7439-96-5	E440	1.0	mg/kg	855	760	998	854	893	
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	21.6	14.6	21.3	35.3	16.0	
nickel	7440-02-0	E440	0.50	mg/kg	110	397	197	111	262	
phosphorus	7723-14-0	E440	50	mg/kg	10400	10400	12300	11600	9660	
potassium	7440-09-7	E440	100	mg/kg	5380	5160	5170	5480	4990	
selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.33	0.39	0.33	0.34	
silver	7440-22-4	E440	0.10	mg/kg	11.0	6.15	12.7	11.8	6.69	
sodium	7440-23-5	E440	50	mg/kg	14700	13900	14700	14000	13600	
strontium	7440-24-6	E440	0.50	mg/kg	337	323	368	336	340	
sulfur	7704-34-9	E440	1000	mg/kg	12600	12400	13300	11500	12000	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-1	BA2129-A-2	BA2129-A-3	BA2129-A-4	BA2129-A-5
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-001	VA21B4806-002	VA21B4806-003	VA21B4806-004	VA21B4806-005	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	1520	216	1600	252	111	
titanium	7440-32-6	E440	1.0	mg/kg	448	537	459	240	546	
tungsten	7440-33-7	E440	0.50	mg/kg	8.45	8.69	9.79	6.68	9.73	
uranium	7440-61-1	E440	0.050	mg/kg	3.29	3.19	3.40	3.30	3.05	
vanadium	7440-62-2	E440	0.20	mg/kg	51.2	40.1	48.9	44.2	38.7	
zinc	7440-66-6	E440	2.0	mg/kg	4820	4430	4700	3390	4770	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.3	1.4	2.6	1.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.5	11.6	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.18	7.60	8.31	8.43	8.48	
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	6.18	6.14	6.53	6.42	6.20	
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	2.44	2.19	2.09	2.32	2.04	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.151	0.131	0.143	0.531	1.42	
calcium, TCLP	7440-70-2	E444	10	mg/L	2030	2020	1890	2040	1900	
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	0.737	1.15	1.09	0.982	0.840	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.16	1.34	0.786	0.903	0.666	
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	137	136	138	133	119	
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	0.40	0.58	0.44	0.41	0.52	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-1	BA2129-A-2	BA2129-A-3	BA2129-A-4	BA2129-A-5
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-001	VA21B4806-002	VA21B4806-003	VA21B4806-004	VA21B4806-005	
TCLP Metals					Result	Result	Result	Result	Result	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	40.1	34.4	32.0	24.3	32.3	
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	BA2129-A-6	BA2129-A-7	BA2129-A-8	BA2129-A-9	BA2129-A-10
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-006	VA21B4806-007	VA21B4806-008	VA21B4806-009	VA21B4806-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	18.6	19.4	18.8	19.0	20.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	10.6	11.0	11.0	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31600	43800	40400	33200	45500	
antimony	7440-36-0	E440	0.10	mg/kg	265	150	171	131	183	
arsenic	7440-38-2	E440	0.10	mg/kg	28.9	31.1	31.2	29.0	38.2	
barium	7440-39-3	E440	0.50	mg/kg	608	627	693	594	648	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.42	0.37	0.44	0.41	
bismuth	7440-69-9	E440	0.20	mg/kg	7.40	7.99	6.73	8.04	61.2	
boron	7440-42-8	E440	5.0	mg/kg	172	192	185	203	171	
cadmium	7440-43-9	E440	0.020	mg/kg	8.03	9.52	9.86	10.6	6.70	
calcium	7440-70-2	E440	50	mg/kg	134000	158000	155000	143000	134000	
chromium	7440-47-3	E440	0.50	mg/kg	227	222	234	171	142	
cobalt	7440-48-4	E440	0.10	mg/kg	61.5	53.5	155	52.1	43.3	
copper	7440-50-8	E440	0.50	mg/kg	3170	3140	8560	3230	4080	
iron	7439-89-6	E440	50	mg/kg	81500	49900	58900	65800	60700	
lead	7439-92-1	E440	0.50	mg/kg	9120	2710	604	607	2200	
lithium	7439-93-2	E440	2.0	mg/kg	24.1	28.5	24.7	22.7	21.9	
magnesium	7439-95-4	E440	20	mg/kg	10400	12200	11600	11500	11000	
manganese	7439-96-5	E440	1.0	mg/kg	730	880	6300	867	1670	
mercury	7439-97-6	E510	0.0500	mg/kg	0.165	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.8	20.1	20.1	15.7	14.8	
nickel	7440-02-0	E440	0.50	mg/kg	561	260	273	151	217	
phosphorus	7723-14-0	E440	50	mg/kg	11000	13000	12200	11000	10600	
potassium	7440-09-7	E440	100	mg/kg	4760	6150	5190	5290	4570	
selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.39	0.36	0.37	0.34	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	----	10.2	----	----	
silver	7440-22-4	E440	0.10	mg/kg	6.64	7.71	----	6.76	7.10	
sodium	7440-23-5	E440	50	mg/kg	12900	14600	14000	14300	13000	
strontium	7440-24-6	E440	0.50	mg/kg	310	358	374	334	318	
sulfur	7704-34-9	E440	1000	mg/kg	11100	13600	13000	12800	10600	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	0.053	<0.050	<0.050	0.059	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-6	BA2129-A-7	BA2129-A-8	BA2129-A-9	BA2129-A-10
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-006	VA21B4806-007	VA21B4806-008	VA21B4806-009	VA21B4806-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	123	103	189	116	214	
titanium	7440-32-6	E440	1.0	mg/kg	302	364	460	416	467	
tungsten	7440-33-7	E440	0.50	mg/kg	7.68	20.1	9.68	8.52	10.9	
uranium	7440-61-1	E440	0.050	mg/kg	2.91	3.62	3.39	3.20	2.88	
vanadium	7440-62-2	E440	0.20	mg/kg	43.3	44.4	41.9	40.2	51.8	
zinc	7440-66-6	E440	2.0	mg/kg	3600	5400	9920	4140	4720	
zirconium	7440-67-7	E440	1.0	mg/kg	1.7	2.0	1.4	1.2	1.6	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.6	11.7	11.7	11.7	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.69	8.73	8.45	8.26	8.49	
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	6.18	6.12	6.11	6.34	6.32	
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	2.18	2.45	2.56	2.36	2.22	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.173	0.129	0.147	0.267	0.130	
calcium, TCLP	7440-70-2	E444	10	mg/L	1960	1900	1860	2010	2010	
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	0.950	0.612	0.929	0.579	1.13	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.984	1.11	0.782	0.591	1.01	
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	138	133	134	134	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	0.53	0.51	0.51	0.38	0.76	
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	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-6	BA2129-A-7	BA2129-A-8	BA2129-A-9	BA2129-A-10
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00	14-Jul-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-006	VA21B4806-007	VA21B4806-008	VA21B4806-009	VA21B4806-010	
					Result	Result	Result	Result	Result	
TCLP Metals										
zinc, TCLP	7440-66-6	E444	0.50	mg/L	37.4	38.1	41.9	33.4	43.3	
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					Client sample ID	BA2129-A-11	BA2129-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	14-Jul-2021 09:00	14-Jul-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-011	VA21B4806-012	-----	-----	-----	
					Result	Result	----	----	----	
Physical Tests										
moisture	----	E144	0.25	%	19.1	19.1	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.2	11.1	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	31300	28400	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	141	123	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	33.2	28.1	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	615	502	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.52	7.47	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	198	195	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	9.04	8.65	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	153000	142000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	228	192	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	145	206	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1820	1820	----	----	----	
iron	7439-89-6	E440	50	mg/kg	65800	58400	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	878	507	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	35.5	49.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12400	11700	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	1310	1040	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	17.1	15.5	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	410	874	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11000	11000	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4940	4710	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.46	0.34	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	7.49	7.80	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	13700	13600	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	350	316	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12300	12000	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	
tin	7440-31-5	E440	2.0	mg/kg	217	144	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-11	BA2129-A-12	----	----	----
Client sampling date / time					14-Jul-2021 09:00	14-Jul-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-011	VA21B4806-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
titanium	7440-32-6	E440	1.0	mg/kg	402	229	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	9.50	9.51	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	3.29	3.12	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	48.3	39.5	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	5350	4100	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.2	1.7	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.09	8.71	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.86	2.86	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.25	6.17	---	---	---	
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	2.28	2.15	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.134	0.121	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2030	1890	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.41	2.06	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.07	1.28	---	---	---	
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	139	130	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.52	0.54	---	---	---	
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	---	---	---	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	---	---	---	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	28.7	39.6	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2129-A-11	BA2129-A-12	----	----	----
					Client sampling date / time	14-Jul-2021 09:00	14-Jul-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21B4806-011	VA21B4806-012	-----	-----	-----	
					Result	Result	----	----	----	
TCLP Metals										
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	: VA21B4806	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	: 20-Jul-2021 12:05
PO	: VANCO 0000050390	Issue Date	: 28-Jul-2021 17:00
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

- Reference Material (RM) Sample outliers occur - please see the following pages for full details.

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	VA21B4806-001	BA2129-A-1	bismuth	7440-69-9	E440	88.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4806-001	BA2129-A-1	boron	7440-42-8	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4806-001	BA2129-A-1	cobalt	7440-48-4	E440	87.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4806-001	BA2129-A-1	silver	7440-22-4	E440	50.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B4806-001	BA2129-A-1	tin	7440-31-5	E440	149 % DUP-H	40%	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.

Reference Material (RM) Sample								
Metals	QC-MRG2-2487850 03	----	titanium	7440-32-6	E440	132 % MES	70.0-130%	Recovery greater than upper control limit

Result Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



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 : High Silver in Soil/Solid by CRC ICPMS											
LDPE bag BA2129-A-8	E440.Ag	14-Jul-2021	28-Jul-2021	----	----		28-Jul-2021	----	14 days		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-1	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-10	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-11	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-12	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-2	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-3	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 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 BA2129-A-4	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-5	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-6	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-7	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-8	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2129-A-9	E510	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	28 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2129-A-1	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2129-A-10	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2129-A-11	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 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 BA2129-A-12	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-2	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-3	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-4	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-5	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-6	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-7	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-8	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2129-A-9	E440	14-Jul-2021	23-Jul-2021	----	----		26-Jul-2021	180 days	12 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 : Moisture Content by Gravimetry										
LDPE bag BA2129-A-1	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-10	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-11	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-12	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-2	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-3	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-4	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-5	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2129-A-6	E144	14-Jul-2021	----	----	----		21-Jul-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 BA2129-A-7	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2129-A-8	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2129-A-9	E144	14-Jul-2021	----	----	----		21-Jul-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-1	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-10	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-11	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-12	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-2	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-3	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 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 BA2129-A-4	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-5	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-6	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-7	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-8	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2129-A-9	E108	14-Jul-2021	23-Jul-2021	----	----		23-Jul-2021	30 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2129-A-1	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2129-A-10	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2129-A-11	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 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		
				Rec	Actual			Rec	Actual	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-12	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-2	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-3	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-4	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-5	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-6	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-7	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-8	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2129-A-9	E512	21-Jul-2021	----	----	----		23-Jul-2021	----	9 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) BA2129-A-1	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-10	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-11	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-12	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-2	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-3	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-4	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-5	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-6	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 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) BA2129-A-7	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-8	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2129-A-9	E444	21-Jul-2021	----	----	----		25-Jul-2021	180 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-1	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-10	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-11	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-12	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-2	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-3	EPP444	14-Jul-2021	21-Jul-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) BA2129-A-4	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-5	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-6	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-7	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-8	EPP444	14-Jul-2021	21-Jul-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2129-A-9	EPP444	14-Jul-2021	21-Jul-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	248785	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	248786	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	248788	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	248787	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	253431	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	248785	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	248786	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	248788	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	248787	1	12	8.3	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	253431	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	250504	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	248785	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	250503	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	248786	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	248788	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	250504	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	250503	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)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Elemental Sulfur may be poorly recovered by this method. Analysis is by Collision/Reaction Cell ICPMS.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are 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



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
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.
Digestion for Silver	EP440.Ag 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.
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 : VA21B4806

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 : VANCO 0000050390
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 : 20-Jul-2021 12:05
Date Analysis Commenced : 21-Jul-2021
Issue Date : 28-Jul-2021 17:00

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.

Table with 3 columns: Signatories, Position, Laboratory Department. Rows include Kevin Duarte (Supervisor - Metals ICP Instrumentation), Ophelia Chiu (Department Manager - Organics), and Robin Weeks (Team Leader - Metals).

Page : 2 of 11
Work Order : VA21B4806
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: 248787)											
VA21B4806-001	BA2129-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	11.0	10.9	1.2%	5%	----
Physical Tests (QC Lot: 248788)											
VA21B4806-001	BA2129-A-1	moisture	----	E144	0.25	%	18.3	19.5	6.55%	20%	----
Metals (QC Lot: 248785)											
VA21B4806-001	BA2129-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
Metals (QC Lot: 248786)											
VA21B4806-001	BA2129-A-1	aluminum	7429-90-5	E440	50	mg/kg	31500	31900	1.28%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	137	119	14.5%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	28.9	24.9	15.1%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	623	632	1.43%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.38	0.01	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	17.1	6.61	88.7%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	189	257	30.8%	30%	DUP-H
		cadmium	7440-43-9	E440	0.020	mg/kg	9.71	7.66	23.5%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	138000	137000	0.663%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	154	175	12.3%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	35.0	89.8	87.8%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2980	3170	6.23%	30%	----
		iron	7439-89-6	E440	50	mg/kg	57800	77500	29.2%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	633	464	30.8%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	23.2	28.6	20.7%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11600	11200	3.53%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	855	817	4.59%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	21.6	16.6	26.5%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	110	143	26.2%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10400	10300	1.58%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5380	5150	4.32%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.37	0.32	0.05	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	11.0	6.53	50.7%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	14700	13900	5.52%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	337	348	3.11%	40%	----



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
Metals (QC Lot: 248786) - continued											
VA21B4806-001	BA2129-A-1	sulfur	7704-34-9	E440	1000	mg/kg	12600	12000	4.90%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	1520	223	149%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	448	474	5.70%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	8.45	7.21	15.9%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	3.29	3.05	7.56%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	51.2	40.1	24.4%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4820	4030	18.0%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.4	0.07	Diff <2x LOR	----

Qualifiers

Qualifier	Description
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: 248788)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 248785)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 248786)						
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: 248786) - 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	----
Metals (QCLot: 253431)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 250503)						
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	----
TCLP Metals (QCLot: 250504)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



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: 248787)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	99.8	95.0	105	---
Physical Tests (QCLot: 248788)									
moisture	---	E144	0.25	%	50 %	100.0	90.0	110	---
Metals (QCLot: 248785)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	103	80.0	120	---
Metals (QCLot: 248786)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	112	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	106	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	108	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	108	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	105	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	102	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	109	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	102	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.5	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	112	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	106	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	99.6	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	103	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	104	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	105	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	104	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	107	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	118	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	110	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	106	80.0	120	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Laboratory Control Sample (LCS) Report				
					Spike Concentration	Recovery (%)	Recovery Limits (%)		Qualifier
					LCS	Low	High		
Metals (QCLot: 248786) - continued									
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	101	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	108	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	100.0	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	106	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	105	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	100	80.0	120	----
Metals (QCLot: 253431)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	96.3	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: 250503)										
VA21B4806-001	BA2129-A-1	antimony, TCLP	7440-36-0	E444	4.6 mg/L	5 mg/L	91.5	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.2 mg/L	5 mg/L	83.6	50.0	140	----
		barium, TCLP	7440-39-3	E444	11.1 mg/L	12.5 mg/L	88.6	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.221 mg/L	0.25 mg/L	88.3	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.93 mg/L	10 mg/L	89.3	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.190 mg/L	0.25 mg/L	75.9	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	1.07 mg/L	1.25 mg/L	85.7	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	1.83 mg/L	2.5 mg/L	73.2	50.0	140	----
		iron, TCLP	7439-89-6	E444	201 mg/L	250 mg/L	80.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.63 mg/L	10 mg/L	86.3	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	202 mg/L	250 mg/L	81.0	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.00 mg/L	2.5 mg/L	80.1	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.60 mg/L	5 mg/L	92.0	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.104 mg/L	0.1 mg/L	104	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.4 mg/L	5 mg/L	88.8	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.16 mg/L	5 mg/L	83.2	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.64 mg/L	0.75 mg/L	85.3	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	92.3	50.0	150	----
TCLP Metals (QCLot: 250504)										
VA21B4806-001	BA2129-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	92.4	50.0	140	----



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: 248785)									
QC-248785-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
Metals (QCLot: 248786)									
QC-248786-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	111	70.0	130	----
QC-248786-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	108	70.0	130	----
QC-248786-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	112	70.0	130	----
QC-248786-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
QC-248786-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	119	70.0	130	----
QC-248786-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	135	40.0	160	----
QC-248786-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	110	70.0	130	----
QC-248786-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	116	70.0	130	----
QC-248786-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
QC-248786-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	----
QC-248786-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	99.5	70.0	130	----
QC-248786-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	104	70.0	130	----
QC-248786-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	108	70.0	130	----
QC-248786-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	111	70.0	130	----
QC-248786-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
QC-248786-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
QC-248786-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
QC-248786-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	108	70.0	130	----
QC-248786-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	107	70.0	130	----
QC-248786-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
QC-248786-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
QC-248786-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	113	70.0	130	----
QC-248786-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	98.8	40.0	160	----
QC-248786-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	96.2	70.0	130	----
QC-248786-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	# 132	70.0	130	MES
QC-248786-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	107	70.0	130	----
QC-248786-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	110	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: 248786) - continued									
QC-248786-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	103	70.0	130	----
QC-248786-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	102	70.0	130	----

Qualifiers

Qualifier	Description
MES	Data Quality Objective was marginally exceeded (by < 10% absolute) for < 10% of analytes in a Multi-Element Scan / Multi-Parameter Scan (considered acceptable as per OMOE & CCME).



ALS Environmental

Chain of Custody / Analytical Request Form

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COC #

Page ___ of ___

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

Invoice To		Client / Project Information		Analysis Request	
Same as Report ?		Job #:		Please indicate below Filtered, Preserved or both (F, P, F/P)	
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite			
Company:		LSD: (includes 2:1 pH)			
Contact:		Quote #:			
Address:					
Phone:					
Fax:					

Lab Work Order # (lab use only)	4806	ALS Contact:		Sampler:						Number of Containers
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)		

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
1	BA2129-A-1	14-Jul-21	9:00	Soil	X	X		X			1
2	BA2129-A-2	14-Jul-21	9:00	Soil	X	X		X			1
3	BA2129-A-3	14-Jul-21	9:00	Soil	X	X		X			1
4	BA2129-A-4	14-Jul-21	9:00	Soil	X	X		X			1
5	BA2129-A-5	14-Jul-21	9:00	Soil	X	X		X			1
6	BA2129-A-6	14-Jul-21	9:00	Soil	X	X		X			1
7	BA2129-A-7	14-Jul-21	9:00	Soil	X	X		X			1
8	BA2129-A-8	14-Jul-21	9:00	Soil	X	X		X			1
9	BA2129-A-9	14-Jul-21	9:00	Soil	X	X		X			1
10	BA2129-A-10	14-Jul-21	9:00	Soil	X	X		X			1
11	BA2129-A-11	14-Jul-21	9:00	Soil	X	X		X			1
12	BA2129-A-12	14-Jul-21	9:00	Soil	X	X		X			1

Environmental Division
Vancouver
Work Order Reference
VA21B4806



Telephone : +1 604 263 4188

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:	
Released by:	Date (dd-mmm-yy):	Time (hh:mm):	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Yes / No ? If Yes add SIF
<i>[Signature]</i>	20-21-21	<i>[Signature]</i>				24°C	<i>[Signature]</i>	July 20/	12:05	

2 buckets

21 pm

GENF 20.00 Front