

Bottom Ash Data

2021 Week 41

The following analytical report represents bottom ash composite results for week 41 of 2021 (October 3, 2021 to October 9, 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 : **VA21C2448**
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 : 12-Oct-2021 10:55
Date Analysis Commenced : 21-Oct-2021
Issue Date : 27-Oct-2021 08:50

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>
Caleb Deroche	Lab Analyst	Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Shaneel Dayal	Analyst	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	BA2141-A-1	BA2141-A-2	BA2141-A-3	BA2141-A-4	BA2141-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-001	VA21C2448-002	VA21C2448-003	VA21C2448-004	VA21C2448-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.7	22.8	21.6	22.2	21.3	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.3	11.2	11.1	11.3	11.2	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	33100	45000	46400	36300	35600	
antimony	7440-36-0	E440	0.10	mg/kg	116	170	103	133	114	
arsenic	7440-38-2	E440	0.10	mg/kg	24.4	34.6	21.0	29.2	26.7	
barium	7440-39-3	E440	0.50	mg/kg	560	567	619	624	556	
beryllium	7440-41-7	E440	0.10	mg/kg	0.42	0.46	0.42	0.39	0.48	
bismuth	7440-69-9	E440	0.20	mg/kg	8.48	11.7	7.46	8.78	11.7	
boron	7440-42-8	E440	5.0	mg/kg	191	202	205	192	170	
cadmium	7440-43-9	E440	0.020	mg/kg	12.8	14.1	41.7	10.4	10.5	
calcium	7440-70-2	E440	50	mg/kg	140000	163000	134000	143000	142000	
chromium	7440-47-3	E440	0.50	mg/kg	157	197	166	140	174	
cobalt	7440-48-4	E440	0.10	mg/kg	55.1	43.8	78.9	55.0	48.3	
copper	7440-50-8	E440	0.50	mg/kg	1640	9190	1550	2620	10100	
iron	7439-89-6	E440	50	mg/kg	56400	57100	56000	59900	62800	
lead	7439-92-1	E440	0.50	mg/kg	653	2460	412	731	432	
lithium	7439-93-2	E440	2.0	mg/kg	25.1	26.0	26.3	29.2	26.8	
magnesium	7439-95-4	E440	20	mg/kg	13000	13400	11700	12500	13000	
manganese	7439-96-5	E440	1.0	mg/kg	710	2060	818	741	898	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0676	0.108	0.0515	0.0559	0.0699	
molybdenum	7439-98-7	E440	0.10	mg/kg	32.6	30.1	23.5	26.4	24.2	
nickel	7440-02-0	E440	0.50	mg/kg	137	157	145	138	134	
phosphorus	7723-14-0	E440	50	mg/kg	11200	12000	10300	10900	9820	
potassium	7440-09-7	E440	100	mg/kg	6460	6720	5510	5850	5750	
selenium	7782-49-2	E440	0.20	mg/kg	0.32	0.40	0.37	0.39	0.33	
silver	7440-22-4	E440	0.10	mg/kg	4.34	7.69	4.59	5.34	7.41	
sodium	7440-23-5	E440	50	mg/kg	16200	17500	15000	15100	15800	
strontium	7440-24-6	E440	0.50	mg/kg	290	369	283	564	462	
sulfur	7704-34-9	E440	1000	mg/kg	13400	17300	11900	12600	13000	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2141-A-1	BA2141-A-2	BA2141-A-3	BA2141-A-4	BA2141-A-5
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-001	VA21C2448-002	VA21C2448-003	VA21C2448-004	VA21C2448-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.055	0.068	0.056	0.052	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	102	139	105	116	296	
titanium	7440-32-6	E440	1.0	mg/kg	356	422	468	470	355	
tungsten	7440-33-7	E440	0.50	mg/kg	9.34	11.2	15.7	11.3	9.61	
uranium	7440-61-1	E440	0.050	mg/kg	4.21	4.80	3.72	3.94	3.93	
vanadium	7440-62-2	E440	0.20	mg/kg	134	89.0	55.9	58.1	61.6	
zinc	7440-66-6	E440	2.0	mg/kg	4020	6390	4430	4240	5150	
zirconium	7440-67-7	E440	1.0	mg/kg	1.6	2.1	2.2	1.9	2.1	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.8	11.8	11.8	11.7	11.8	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.83	9.04	8.96	8.97	9.33	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.26	6.33	6.34	6.28	6.19	
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	1.55	1.68	1.80	1.72	1.77	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.179	0.200	0.172	0.182	0.186	
calcium, TCLP	7440-70-2	E444	10	mg/L	2040	2070	2130	2090	2170	
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	1.76	0.876	1.47	0.794	0.902	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.12	0.690	1.60	1.19	1.12	
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	145	138	151	144	149	
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	0.54	0.51	0.67	0.53	0.57	
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	BA2141-A-1	BA2141-A-2	BA2141-A-3	BA2141-A-4	BA2141-A-5
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-001	VA21C2448-002	VA21C2448-003	VA21C2448-004	VA21C2448-005	
					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	35.6	45.4	32.5	45.0	43.8	
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	BA2141-A-6	BA2141-A-7	BA2141-A-8	BA2141-A-9	BA2141-A-10
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-006	VA21C2448-007	VA21C2448-008	VA21C2448-009	VA21C2448-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	24.3	23.7	22.6	22.0	23.0	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	11.5	11.5	11.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	33000	53200	47000	40800	56200	
antimony	7440-36-0	E440	0.10	mg/kg	149	117	124	127	138	
arsenic	7440-38-2	E440	0.10	mg/kg	30.3	26.6	27.5	23.7	28.2	
barium	7440-39-3	E440	0.50	mg/kg	537	585	547	555	536	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.40	0.41	0.38	0.40	
bismuth	7440-69-9	E440	0.20	mg/kg	10.5	7.64	9.23	7.55	11.0	
boron	7440-42-8	E440	5.0	mg/kg	168	149	154	264	210	
cadmium	7440-43-9	E440	0.020	mg/kg	11.8	11.9	10.9	8.98	14.3	
calcium	7440-70-2	E440	50	mg/kg	153000	142000	150000	140000	154000	
chromium	7440-47-3	E440	0.50	mg/kg	228	165	139	176	168	
cobalt	7440-48-4	E440	0.10	mg/kg	64.9	76.3	276	45.1	224	
copper	7440-50-8	E440	0.50	mg/kg	2080	1610	3110	2440	4090	
iron	7439-89-6	E440	50	mg/kg	55200	62300	60600	64500	55800	
lead	7439-92-1	E440	0.50	mg/kg	1790	694	410	1160	672	
lithium	7439-93-2	E440	2.0	mg/kg	26.3	24.4	31.6	21.6	30.2	
magnesium	7439-95-4	E440	20	mg/kg	13000	12700	13500	13100	12900	
manganese	7439-96-5	E440	1.0	mg/kg	855	822	1460	871	970	
mercury	7439-97-6	E510	0.0500	mg/kg	0.0510	<0.0500	<0.0500	<0.0500	<0.0500	
molybdenum	7439-98-7	E440	0.10	mg/kg	36.3	33.4	66.2	23.0	28.1	
nickel	7440-02-0	E440	0.50	mg/kg	207	134	132	174	100	
phosphorus	7723-14-0	E440	50	mg/kg	12500	9840	10900	9230	11700	
potassium	7440-09-7	E440	100	mg/kg	5710	6350	5170	5160	5720	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.38	0.30	0.36	0.38	
silver	7440-22-4	E440	0.10	mg/kg	7.50	4.46	5.88	3.96	6.46	
sodium	7440-23-5	E440	50	mg/kg	15400	17800	13900	14900	15100	
strontium	7440-24-6	E440	0.50	mg/kg	411	310	301	298	325	
sulfur	7704-34-9	E440	1000	mg/kg	14000	12000	13800	14300	14800	
thallium	7440-28-0	E440	0.050	mg/kg	0.063	<0.050	0.050	<0.050	0.066	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2141-A-6	BA2141-A-7	BA2141-A-8	BA2141-A-9	BA2141-A-10
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-006	VA21C2448-007	VA21C2448-008	VA21C2448-009	VA21C2448-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	107	113	101	145	280	
titanium	7440-32-6	E440	1.0	mg/kg	426	653	422	887	582	
tungsten	7440-33-7	E440	0.50	mg/kg	12.6	9.50	14.1	16.0	15.5	
uranium	7440-61-1	E440	0.050	mg/kg	4.47	3.97	4.14	3.65	4.58	
vanadium	7440-62-2	E440	0.20	mg/kg	56.2	56.3	68.3	48.9	58.5	
zinc	7440-66-6	E440	2.0	mg/kg	4610	4560	4100	3190	14200	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	2.5	2.6	1.6	3.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.7	11.8	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.58	8.70	8.45	8.66	8.46	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.21	6.22	6.30	6.21	6.33	
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	1.82	1.77	1.80	1.72	1.82	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.221	0.172	0.329	0.202	0.187	
calcium, TCLP	7440-70-2	E444	10	mg/L	2190	2120	2140	2070	2110	
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	0.923	1.13	0.785	1.86	0.724	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.40	1.49	1.10	1.02	1.02	
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	157	148	150	144	141	
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	0.46	0.58	0.49	0.63	0.51	
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	BA2141-A-6	BA2141-A-7	BA2141-A-8	BA2141-A-9	BA2141-A-10
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00	06-Oct-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-006	VA21C2448-007	VA21C2448-008	VA21C2448-009	VA21C2448-010	
					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	39.1	36.7	34.2	33.4	34.5	
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	BA2141-A-11	BA2141-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	06-Oct-2021 09:00	06-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-011	VA21C2448-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	23.0	22.9	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	11.4	11.4	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	45900	45100	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	127	130	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	30.7	25.6	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	577	632	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.46	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	9.66	8.68	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	174	251	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	14.3	15.6	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	144000	148000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	250	184	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	45.6	35.9	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	1800	1960	----	----	----	
iron	7439-89-6	E440	50	mg/kg	54200	65300	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	458	483	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	26.4	23.0	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	13500	13900	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	877	934	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0509	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	35.3	31.4	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	195	122	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	12800	12200	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5950	5780	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.43	0.37	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	6.35	5.90	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	17100	16100	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	284	313	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	13800	14200	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.060	0.060	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2141-A-11	BA2141-A-12	----	----	----
Client sampling date / time					06-Oct-2021 09:00	06-Oct-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-011	VA21C2448-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	122	111	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	539	571	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	11.9	18.6	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	4.32	4.36	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	53.7	60.5	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	3840	4240	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.3	1.7	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.7	11.6	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.65	8.44	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.31	6.28	---	---	---	
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	1.95	1.80	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.295	0.186	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2150	2110	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.42	0.848	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.891	1.27	---	---	---	
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	146	143	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.51	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	---	---	---	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2141-A-11	BA2141-A-12	----	----	----
					Client sampling date / time	06-Oct-2021 09:00	06-Oct-2021 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA21C2448-011	VA21C2448-012	-----	-----	-----	
					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	28.1	35.0	----	----	----	
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	: VA21C2448	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	: 12-Oct-2021 10:55
PO	: VANCO 0000050390	Issue Date	: 27-Oct-2021 08:50
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 Duplicate outliers occur.
- No Laboratory Control Sample (LCS) outliers occur
- No Matrix Spike outliers occur.
- 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.



Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Reference Material (RM) Sample								
Metals	QC-MRG2-3256800 03	----	chromium	7440-47-3	E440	131 % ^{MES}	70.0-130%	Recovery greater than upper control limit
Metals	QC-MRG2-3256800 03	----	potassium	7440-09-7	E440	136 % ^{MES}	70.0-130%	Recovery greater than upper control limit
Metals	QC-MRG2-3256800 03	----	titanium	7440-32-6	E440	138 % ^{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 : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-1	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-10	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-11	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-12	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-2	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-3	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-4	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 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 BA2141-A-5	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-6	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-7	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-8	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2141-A-9	E510	06-Oct-2021	22-Oct-2021	----	----		25-Oct-2021	28 days	19 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2141-A-1	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2141-A-10	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2141-A-11	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2141-A-12	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 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 BA2141-A-2	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-3	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-4	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-5	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-6	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-7	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-8	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2141-A-9	E440	06-Oct-2021	22-Oct-2021	----	----		24-Oct-2021	180 days	18 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2141-A-1	E144	06-Oct-2021	----	----	----		21-Oct-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 BA2141-A-10	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-11	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-12	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-2	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-3	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-4	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-5	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-6	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2141-A-7	E144	06-Oct-2021	----	----	----		21-Oct-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 BA2141-A-8	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2141-A-9	E144	06-Oct-2021	----	----	----		21-Oct-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-1	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-10	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-11	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-12	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-2	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-3	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-4	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 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 BA2141-A-5	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-6	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-7	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-8	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2141-A-9	E108	06-Oct-2021	22-Oct-2021	----	----		22-Oct-2021	30 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2141-A-1	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2141-A-10	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2141-A-11	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days		
TCLP Metals : Mercury by CVAAS (TCLP)											
HDPE - total (lab preserved) BA2141-A-12	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 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) BA2141-A-2	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-3	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-4	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-5	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-6	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-7	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-8	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Mercury by CVAAS (TCLP)										
HDPE - total (lab preserved) BA2141-A-9	E512	23-Oct-2021	----	----	----		26-Oct-2021	----	20 days	
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2141-A-1	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 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) BA2141-A-10	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-11	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-12	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-2	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-3	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-4	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-5	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-6	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2141-A-7	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 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) BA2141-A-8	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2141-A-9	E444	23-Oct-2021	----	----	----		26-Oct-2021	180 days	20 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-1	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-10	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-11	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-12	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-2	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-3	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-4	EPP444	06-Oct-2021	23-Oct-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) BA2141-A-5	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-6	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-7	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-8	EPP444	06-Oct-2021	23-Oct-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 180 Day HT (e.g. metals ex. Hg) BA2141-A-9	EPP444	06-Oct-2021	23-Oct-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	325681	1	18	5.5	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	325680	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	325683	1	14	7.1	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	325682	1	18	5.5	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	325681	2	18	11.1	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	325680	2	19	10.5	10.0	✔
Moisture Content by Gravimetry	E144	325683	1	14	7.1	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	325682	1	18	5.5	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	330052	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	325681	1	18	5.5	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	330053	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	325680	1	19	5.2	5.0	✔
Moisture Content by Gravimetry	E144	325683	1	14	7.1	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	330052	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	330053	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 $20 \pm 5^\circ\text{C}$), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^\circ\text{C}$) 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.
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 $<60^\circ\text{C}$) 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 : VA21C2448
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 : VA21C2448

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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 : 12-Oct-2021 10:55
Date Analysis Commenced : 21-Oct-2021
Issue Date : 27-Oct-2021 08:50

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 Caleb Deroche (Lab Analyst, Metals), Kevin Duarte (Supervisor - Metals ICP Instrumentation, Metals), Rebecca Sit (Supervisor - Organics Extractions, Organics), and Shaneel Dayal (Analyst, Metals).

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Work Order : VA21C2448
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: 325682)											
KS2103347-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	8.47	8.65	2.1%	5%	----
Physical Tests (QC Lot: 325683)											
KS2103347-001	Anonymous	moisture	----	E144	0.25	%	7.10	6.78	4.56%	20%	----
Metals (QC Lot: 325680)											
KS2103246-004	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	20400	20900	2.63%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.23	0.29	0.07	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	6.25	6.94	10.4%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	124	138	10.5%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.75	0.84	10.5%	30%	----
		bismuth	7440-69-9	E440	0.20	mg/kg	0.43	0.44	0.003	Diff <2x LOR	----
		boron	7440-42-8	E440	5.0	mg/kg	<5.0	<5.0	0	Diff <2x LOR	----
		cadmium	7440-43-9	E440	0.020	mg/kg	0.143	0.171	17.5%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	5240	5250	0.254%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	53.3	56.0	4.97%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	18.8	23.6	22.6%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	43.7	47.9	9.16%	30%	----
		iron	7439-89-6	E440	50	mg/kg	39200	44000	11.6%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	13.4	14.1	5.43%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	31.4	32.8	4.42%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11100	11600	4.62%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	435	438	0.574%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	2.90	3.35	14.2%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	39.0	42.1	7.57%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	708	799	12.0%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	3700	3770	1.76%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	2.05	1.93	5.99%	30%	----
		silver	7440-22-4	E440	0.10	mg/kg	0.14	0.13	0.005	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	549	543	1.12%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	95.6	101	5.48%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	0.265	0.287	0.022	Diff <2x LOR	----



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: 325680) - continued											
KS2103246-004	Anonymous	tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		titanium	7440-32-6	E440	1.0	mg/kg	1500	1500	0.0207%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		uranium	7440-61-1	E440	0.050	mg/kg	2.70	2.80	3.91%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	59.2	63.0	6.14%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	92.2	99.6	7.72%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	4.6	5.1	0.5	Diff <2x LOR	----
Metals (QC Lot: 325681)											
KS2103347-001	Anonymous	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----



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: 325683)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 325680)						
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	----
tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	----
uranium	7440-61-1	E440	0.05	mg/kg	<0.050	----



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 325680) - continued						
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: 325681)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
TCLP Metals (QCLot: 330052)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	---
TCLP Metals (QCLot: 330053)						
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: 325682)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 325683)									
moisture	---	E144	0.25	%	50 %	99.7	90.0	110	---
Metals (QCLot: 325680)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	104	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	104	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	97.2	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.0	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	99.8	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.0	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	93.9	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	97.5	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	102	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	97.2	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	98.8	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	95.9	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	108	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	97.4	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	99.9	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	98.2	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.6	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	101	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.9	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	99.8	80.0	120	---
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	80.0	120	---
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.5	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.3	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	94.7	80.0	120	---
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	102	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	95.9	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.8	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	100	80.0	120	---



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 325680) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	100.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.9	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	102	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	99.7	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	96.9	80.0	120	----
Metals (QCLot: 325681)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	101	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: 330052)										
VA21C2448-001	BA2141-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	92.3	50.0	140	----
TCLP Metals (QCLot: 330053)										
VA21C2448-001	BA2141-A-1	antimony, TCLP	7440-36-0	E444	5.3 mg/L	5 mg/L	106	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.7 mg/L	5 mg/L	93.2	50.0	140	----
		barium, TCLP	7440-39-3	E444	13.0 mg/L	12.5 mg/L	104	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.236 mg/L	0.25 mg/L	94.6	50.0	140	----
		boron, TCLP	7440-42-8	E444	7.78 mg/L	10 mg/L	77.8	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.234 mg/L	0.25 mg/L	93.7	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	1.13 mg/L	1.25 mg/L	90.6	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	2.20 mg/L	2.5 mg/L	87.8	50.0	140	----
		iron, TCLP	7439-89-6	E444	227 mg/L	250 mg/L	90.7	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.1 mg/L	10 mg/L	101	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	238 mg/L	250 mg/L	95.2	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.22 mg/L	2.5 mg/L	88.6	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.84 mg/L	5 mg/L	96.9	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.102 mg/L	0.1 mg/L	102	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.8 mg/L	5 mg/L	96.5	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.03 mg/L	5 mg/L	101	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.68 mg/L	0.75 mg/L	90.1	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	92.0	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: 325680)									
QC-325680-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	123	70.0	130	----
QC-325680-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	118	70.0	130	----
QC-325680-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	122	70.0	130	----
QC-325680-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	121	70.0	130	----
QC-325680-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	119	70.0	130	----
QC-325680-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	128	40.0	160	----
QC-325680-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	113	70.0	130	----
QC-325680-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	113	70.0	130	----
QC-325680-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	# 131	70.0	130	MES
QC-325680-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	124	70.0	130	----
QC-325680-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	119	70.0	130	----
QC-325680-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	114	70.0	130	----
QC-325680-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	105	70.0	130	----
QC-325680-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	115	70.0	130	----
QC-325680-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	123	70.0	130	----
QC-325680-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	125	70.0	130	----
QC-325680-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	115	70.0	130	----
QC-325680-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	120	70.0	130	----
QC-325680-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	120	70.0	130	----
QC-325680-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	# 136	70.0	130	MES
QC-325680-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	122	70.0	130	----
QC-325680-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	105	70.0	130	----
QC-325680-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	111	40.0	160	----
QC-325680-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	107	70.0	130	----
QC-325680-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	# 138	70.0	130	MES
QC-325680-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	111	70.0	130	----
QC-325680-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	129	70.0	130	----
QC-325680-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	118	70.0	130	----
QC-325680-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	106	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: 325681)									
QC-325681-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	100	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 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	Fax:	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		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)	
Same as Report ?		Job #:			
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:					

Lab Work Order # (lab use only)		ALS Contact:	Sampler:									Number of Containers	
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)					
	BA2141-A-1	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-2	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-3	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-4	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-5	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-6	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-7	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-8	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-9	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-10	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-11	06-Oct-21	9:00	Soil	X	X		X					1
	BA2141-A-12	06-Oct-21	9:00	Soil	X	X		X					1

Environmental Division
Vancouver
Work Order Reference
VA21C2448



Telephone : +1 604 253 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: 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>	12-Oct-21	0800	<i>cm</i>	12/10/21	10:55 am	15 °C			

2 buckets