

Bottom Ash Data

2021 Week 36

The following analytical report represents bottom ash composite results for week 36 of 2021 (August 29, 2021 to September 4, 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 : **VA21B9169**
Contact : **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 : 07-Sep-2021 11:55
Date Analysis Commenced : 14-Sep-2021
Issue Date : 20-Sep-2021 13:56

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>
Dee Lee	Analyst	Metals, Burnaby, British Columbia
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	BA2136-A-1	BA2136-A-2	BA2136-A-3	BA2136-A-4	BA2136-A-5
(Matrix: Soil/Solid)										
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-001	VA21B9169-002	VA21B9169-003	VA21B9169-004	VA21B9169-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	17.7	16.5	17.2	17.0	15.9	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.9	10.9	10.9	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	34700	40800	34000	31200	35400	
antimony	7440-36-0	E440	0.10	mg/kg	113	99.6	113	112	119	
arsenic	7440-38-2	E440	0.10	mg/kg	25.8	25.3	42.1	23.9	26.2	
barium	7440-39-3	E440	0.50	mg/kg	658	544	541	490	502	
beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.35	0.32	0.34	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	14.5	10.4	6.51	7.31	8.68	
boron	7440-42-8	E440	5.0	mg/kg	252	269	193	227	246	
cadmium	7440-43-9	E440	0.020	mg/kg	8.76	7.86	7.87	7.88	12.3	
calcium	7440-70-2	E440	50	mg/kg	120000	108000	108000	117000	115000	
chromium	7440-47-3	E440	0.50	mg/kg	165	152	142	181	183	
cobalt	7440-48-4	E440	0.10	mg/kg	33.9	49.9	48.6	236	38.5	
copper	7440-50-8	E440	0.50	mg/kg	2550	5150	2340	2300	3120	
iron	7439-89-6	E440	50	mg/kg	67100	51600	80700	67500	65900	
lead	7439-92-1	E440	0.50	mg/kg	534	326	324	453	400	
lithium	7439-93-2	E440	2.0	mg/kg	26.8	25.4	19.8	27.6	26.4	
magnesium	7439-95-4	E440	20	mg/kg	12200	11100	10600	12200	10400	
manganese	7439-96-5	E440	1.0	mg/kg	873	1030	834	865	777	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	<0.0500	0.103	0.0617	
molybdenum	7439-98-7	E440	0.10	mg/kg	19.6	23.0	21.5	27.6	23.9	
nickel	7440-02-0	E440	0.50	mg/kg	117	299	119	188	123	
phosphorus	7723-14-0	E440	50	mg/kg	13600	10900	11600	10800	11300	
potassium	7440-09-7	E440	100	mg/kg	5740	5430	4500	5420	5580	
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.35	0.34	0.30	0.42	
silver	7440-22-4	E440.Ag	0.10	mg/kg	----	14.6	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	7.66	----	5.62	6.81	7.49	
sodium	7440-23-5	E440	50	mg/kg	15800	15000	13200	14400	15200	
strontium	7440-24-6	E440	0.50	mg/kg	302	276	259	275	523	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2136-A-1	BA2136-A-2	BA2136-A-3	BA2136-A-4	BA2136-A-5
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-001	VA21B9169-002	VA21B9169-003	VA21B9169-004	VA21B9169-005	
					Result	Result	Result	Result	Result	
Metals										
sulfur	7704-34-9	E440	1000	mg/kg	11600	10600	10600	10700	12400	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050	
tin	7440-31-5	E440	2.0	mg/kg	131	218	99.8	99.6	126	
titanium	7440-32-6	E440	1.0	mg/kg	498	649	512	334	433	
tungsten	7440-33-7	E440	0.50	mg/kg	26.3	24.5	15.3	16.8	18.4	
uranium	7440-61-1	E440	0.050	mg/kg	2.79	2.10	1.81	2.82	2.54	
vanadium	7440-62-2	E440	0.20	mg/kg	41.2	32.0	42.5	36.2	36.8	
zinc	7440-66-6	E440	2.0	mg/kg	3720	3450	5460	3150	3820	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.9	1.4	2.1	2.0	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.6	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.38	10.1	10.2	9.84	9.94	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	5.79	5.82	5.87	5.74	5.99	
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	1.84	1.85	2.16	1.92	1.93	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.134	0.167	0.205	0.224	0.157	
calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2100	2220	2170	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	2.45	1.46	1.59	1.50	3.46	
copper, TCLP	7440-50-8	E444	0.050	mg/L	<0.050	1.92	1.46	1.41	1.50	
iron, TCLP	7439-89-6	E444	5.0	mg/L	7.6	<5.0	<5.0	<5.0	<5.0	
lead, TCLP	7439-92-1	E444	0.25	mg/L	0.43	0.90	<0.25	2.00	<0.25	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	144	133	146	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	1.21	0.50	0.79	0.68	0.62	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2136-A-1	BA2136-A-2	BA2136-A-3	BA2136-A-4	BA2136-A-5
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-001	VA21B9169-002	VA21B9169-003	VA21B9169-004	VA21B9169-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<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	<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	72.6	102	67.3	62.0	81.6	81.6
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2136-A-6	BA2136-A-7	BA2136-A-8	BA2136-A-9	BA2136-A-10
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-006	VA21B9169-007	VA21B9169-008	VA21B9169-009	VA21B9169-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	16.1	16.7	16.0	15.7	18.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.4	10.8	10.8	10.8	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	32500	32400	34400	45600	37500	
antimony	7440-36-0	E440	0.10	mg/kg	181	123	112	117	85.5	
arsenic	7440-38-2	E440	0.10	mg/kg	32.9	32.9	22.9	22.2	21.1	
barium	7440-39-3	E440	0.50	mg/kg	490	485	634	647	536	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.36	0.42	0.33	0.37	
bismuth	7440-69-9	E440	0.20	mg/kg	12.3	7.70	8.23	30.1	6.10	
boron	7440-42-8	E440	5.0	mg/kg	230	231	233	192	148	
cadmium	7440-43-9	E440	0.020	mg/kg	11.6	12.6	10.7	10.0	8.02	
calcium	7440-70-2	E440	50	mg/kg	123000	109000	117000	106000	109000	
chromium	7440-47-3	E440	0.50	mg/kg	201	294	235	292	183	
cobalt	7440-48-4	E440	0.10	mg/kg	95.4	95.7	40.0	31.2	50.0	
copper	7440-50-8	E440	0.50	mg/kg	1510	3160	3730	1090	1820	
iron	7439-89-6	E440	50	mg/kg	68700	68300	62100	69500	66300	
lead	7439-92-1	E440	0.50	mg/kg	540	567	1160	326	277	
lithium	7439-93-2	E440	2.0	mg/kg	25.8	23.3	24.5	19.3	24.6	
magnesium	7439-95-4	E440	20	mg/kg	11900	10500	11800	10200	11600	
manganese	7439-96-5	E440	1.0	mg/kg	1050	1080	1100	910	782	
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	28.6	39.0	29.9	31.9	19.5	
nickel	7440-02-0	E440	0.50	mg/kg	294	302	209	201	143	
phosphorus	7723-14-0	E440	50	mg/kg	12800	10300	11500	9130	12000	
potassium	7440-09-7	E440	100	mg/kg	5620	5480	5500	4280	5040	
selenium	7782-49-2	E440	0.20	mg/kg	0.44	0.39	0.39	0.28	0.30	
silver	7440-22-4	E440	0.10	mg/kg	11.7	7.25	5.43	4.38	8.65	
sodium	7440-23-5	E440	50	mg/kg	16300	14600	15400	13300	13700	
strontium	7440-24-6	E440	0.50	mg/kg	316	313	303	235	283	
sulfur	7704-34-9	E440	1000	mg/kg	13200	12700	11300	8900	10600	
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	BA2136-A-6	BA2136-A-7	BA2136-A-8	BA2136-A-9	BA2136-A-10
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-006	VA21B9169-007	VA21B9169-008	VA21B9169-009	VA21B9169-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	675	103	203	866	92.2	
titanium	7440-32-6	E440	1.0	mg/kg	272	237	343	1090	418	
tungsten	7440-33-7	E440	0.50	mg/kg	20.5	17.7	15.6	13.9	15.9	
uranium	7440-61-1	E440	0.050	mg/kg	2.55	2.17	2.88	2.27	2.61	
vanadium	7440-62-2	E440	0.20	mg/kg	38.5	36.7	58.0	44.2	37.6	
zinc	7440-66-6	E440	2.0	mg/kg	4830	6670	3650	2560	2780	
zirconium	7440-67-7	E440	1.0	mg/kg	2.2	2.1	1.8	1.5	1.9	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	11.5	11.6	11.6	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.98	10.1	9.66	9.74	9.95	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	2.89	2.89	2.89	
pH, TCLP final	----	EPP444	0.010	pH units	6.09	5.89	5.87	5.75	5.83	
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	2.06	1.96	1.86	1.95	1.95	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.184	0.178	0.188	0.195	0.328	
calcium, TCLP	7440-70-2	E444	10	mg/L	2180	2170	2160	2180	2220	
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	2.80	1.40	2.07	1.79	1.47	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.12	1.33	1.04	1.43	2.85	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	<5.0	9.3	<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	143	145	148	147	137	
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	0.56	0.60	1.14	0.70	0.49	
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	BA2136-A-6	BA2136-A-7	BA2136-A-8	BA2136-A-9	BA2136-A-10
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00	01-Sep-2021 09:00
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-006	VA21B9169-007	VA21B9169-008	VA21B9169-009	VA21B9169-010	
					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	51.7	46.2	77.8	112	95.6	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	<10

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



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2136-A-11	BA2136-A-12	----	----	----
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-011	VA21B9169-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	16.3	16.2	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.9	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	53300	35600	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	91.4	176	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	23.4	24.2	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	710	589	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.50	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	6.53	11.7	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	238	189	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	8.17	9.52	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	104000	111000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	153	318	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	58.3	27.2	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	8380	4140	----	----	----	
iron	7439-89-6	E440	50	mg/kg	47200	53100	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	316	465	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	20.1	21.5	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10800	11100	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	900	674	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	19.0	33.5	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	255	366	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10300	12000	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	5120	5270	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.34	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	5.56	5.76	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14600	15200	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	502	288	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	8800	10900	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2136-A-11	BA2136-A-12	----	----	----
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-011	VA21B9169-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	88.4	1560	----	----	----	
titanium	7440-32-6	E440	1.0	mg/kg	1580	409	----	----	----	
tungsten	7440-33-7	E440	0.50	mg/kg	12.1	17.8	----	----	----	
uranium	7440-61-1	E440	0.050	mg/kg	2.08	2.83	----	----	----	
vanadium	7440-62-2	E440	0.20	mg/kg	41.2	40.4	----	----	----	
zinc	7440-66-6	E440	2.0	mg/kg	3540	4030	----	----	----	
zirconium	7440-67-7	E440	1.0	mg/kg	3.7	1.8	----	----	----	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.6	11.6	----	----	----	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.97	10.0	----	----	----	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.89	2.89	----	----	----	
pH, TCLP final	----	EPP444	0.010	pH units	5.71	6.01	----	----	----	
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	1.91	1.95	----	----	----	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.160	0.465	----	----	----	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2150	----	----	----	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.959	1.44	----	----	----	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.12	0.934	----	----	----	
iron, TCLP	7439-89-6	E444	5.0	mg/L	<5.0	<5.0	----	----	----	
lead, TCLP	7439-92-1	E444	0.25	mg/L	<0.25	<0.25	----	----	----	
magnesium, TCLP	7439-95-4	E444	2.5	mg/L	136	134	----	----	----	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	----	----	----	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.70	0.46	----	----	----	
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	BA2136-A-11	BA2136-A-12	----	----	----
Client sampling date / time					01-Sep-2021 09:00	01-Sep-2021 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA21B9169-011	VA21B9169-012	-----	-----	-----	
					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	70.3	61.9	----	----	----	
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	: VA21B9169	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	: 07-Sep-2021 11:55
PO	: VANCO 0000050390	Issue Date	: 20-Sep-2021 13:56
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 Matrix Spike outliers occur.
- Duplicate outliers occur - please see following pages for full details.
- Laboratory Control Sample (LCS) outliers occur - please see following pages for full details.
- No Test sample Surrogate recovery outliers exist.

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA21B9169-001	BA2136-A-1	bismuth	7440-69-9	E440	44.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	cadmium	7440-43-9	E440	40.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	chromium	7440-47-3	E440	70.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	cobalt	7440-48-4	E440	85.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	manganese	7439-96-5	E440	34.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	nickel	7440-02-0	E440	123 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	phosphorus	7723-14-0	E440	30.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	silver	7440-22-4	E440	41.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA21B9169-001	BA2136-A-1	tungsten	7440-33-7	E440	64.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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

Laboratory Control Sample (LCS) Recoveries								
Metals	QC-MRG2-2924460 02	----	antimony	7440-36-0	E440	121 % MES	80.0-120%	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 BA2136-A-2	E440.Ag	01-Sep-2021	17-Sep-2021	----	----		17-Sep-2021	----	16 days		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-1	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-10	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-11	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-12	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-2	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✓	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-3	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 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 BA2136-A-4	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-5	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-6	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-7	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-8	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2136-A-9	E510	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2136-A-1	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2136-A-10	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2136-A-11	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 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		
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-12	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-2	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-3	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-4	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-5	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-6	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-7	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-8	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2136-A-9	E440	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	180 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 : Moisture Content by Gravimetry										
LDPE bag BA2136-A-1	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-10	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-11	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-12	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-2	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-3	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-4	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-5	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2136-A-6	E144	01-Sep-2021	----	----	----		15-Sep-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 BA2136-A-7	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2136-A-8	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2136-A-9	E144	01-Sep-2021	----	----	----		15-Sep-2021	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-1	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-10	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-11	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-12	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-2	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-3	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 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 BA2136-A-4	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-5	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-6	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-7	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-8	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2136-A-9	E108	01-Sep-2021	16-Sep-2021	----	----		16-Sep-2021	30 days	15 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-1	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-10	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-11	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 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)											
Glass vial - total (lab preserved) BA2136-A-12	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-2	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-3	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-4	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-5	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-6	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-7	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-8	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2136-A-9	E512	14-Sep-2021	----	----	----		15-Sep-2021	28 days	14 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) BA2136-A-1	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-10	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-11	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-12	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-2	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-3	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-4	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-5	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2136-A-6	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 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) BA2136-A-7	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2136-A-8	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2136-A-9	E444	14-Sep-2021	----	----	----		15-Sep-2021	180 days	15 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-1	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-10	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-11	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-12	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-2	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-3	EPP444	01-Sep-2021	14-Sep-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: 28 day HT (e.g. Hg, CrVI) BA2136-A-4	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-5	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-6	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-7	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-8	EPP444	01-Sep-2021	14-Sep-2021	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2136-A-9	EPP444	01-Sep-2021	14-Sep-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	292447	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	292446	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	292449	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	292448	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	295042	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	292447	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	292446	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	292449	1	18	5.5	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	292448	1	20	5.0	5.0	✔
Method Blanks (MB)							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	295042	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	293183	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	292447	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	293184	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	292446	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	292449	1	18	5.5	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	293183	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	293184	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 : VA21B9169

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 : 07-Sep-2021 11:55
Date Analysis Commenced : 14-Sep-2021
Issue Date : 20-Sep-2021 13:56

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 Dee Lee (Analyst), Kevin Duarte (Supervisor - Metals ICP Instrumentation), Ophelia Chiu (Department Manager - Organics), and Robin Weeks (Team Leader - Metals).

Page : 2 of 11
Work Order : VA21B9169
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: 292448)											
VA21B9169-001	BA2136-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.7	1.0%	5%	----
Physical Tests (QC Lot: 292449)											
VA21B9169-001	BA2136-A-1	moisture	----	E144	0.25	%	17.7	17.2	3.10%	20%	----
Metals (QC Lot: 292446)											
VA21B9169-001	BA2136-A-1	aluminum	7429-90-5	E440	50	mg/kg	34700	31700	8.94%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	113	120	5.98%	30%	----
		arsenic	7440-38-2	E440	0.10	mg/kg	25.8	29.7	13.9%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	658	550	17.9%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.36	0.03	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	14.5	9.20	44.7%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	252	226	10.7%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	8.76	13.2	40.1%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	120000	110000	8.02%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	165	344	70.3%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	33.9	84.4	85.5%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	2550	3100	19.1%	30%	----
		iron	7439-89-6	E440	50	mg/kg	67100	61900	7.96%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	534	424	23.0%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	26.8	27.1	0.950%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	12200	11300	7.87%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	873	1240	34.8%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	19.6	25.3	25.4%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	117	493	123%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	13600	10000	30.5%	30%	DUP-H
		potassium	7440-09-7	E440	100	mg/kg	5740	5210	9.78%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.27	0.11	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	7.66	5.05	41.1%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	15800	16000	0.913%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	302	321	6.15%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11600	11100	4.68%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----



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: 292446) - continued											
VA21B9169-001	BA2136-A-1	tin	7440-31-5	E440	2.0	mg/kg	131	107	20.4%	40%	----
		titanium	7440-32-6	E440	1.0	mg/kg	498	384	25.8%	40%	----
		tungsten	7440-33-7	E440	0.50	mg/kg	26.3	13.4	64.9%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	2.79	2.30	19.0%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	41.2	35.5	14.8%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	3720	3460	7.45%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.4	0.1	Diff <2x LOR	----
Metals (QC Lot: 292447)											
VA21B9169-001	BA2136-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	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: 292449)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 292446)						
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: 292446) - 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: 292447)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
Metals (QCLot: 295042)						
silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 293183)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 293184)						
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: 292448)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	101	95.0	105	---
Physical Tests (QCLot: 292449)									
moisture	---	E144	0.25	%	50 %	98.2	90.0	110	---
Metals (QCLot: 292446)									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	106	80.0	120	---
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	# 121	80.0	120	MES
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	97.7	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	102	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	98.8	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	106	80.0	120	---
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	96.8	80.0	120	---
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	107	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	107	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	105	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	101	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	107	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	108	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	106	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	112	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	110	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	106	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	107	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	110	80.0	120	---
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	111	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	100	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	111	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	103	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: 292446) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.1	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	94.1	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	108	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	112	80.0	120	----
Metals (QCLot: 292447)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.8	80.0	120	----
Metals (QCLot: 295042)									
silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	101	80.0	120	----

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).



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: 293183)										
VA21B9169-001	BA2136-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	93.4	50.0	140	----
TCLP Metals (QCLot: 293184)										
VA21B9169-001	BA2136-A-1	antimony, TCLP	7440-36-0	E444	5.8 mg/L	5 mg/L	116	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.8 mg/L	5 mg/L	95.0	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.6 mg/L	12.5 mg/L	100	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.225 mg/L	0.25 mg/L	90.0	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.3 mg/L	10 mg/L	103	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.233 mg/L	0.25 mg/L	93.0	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	1.16 mg/L	1.25 mg/L	92.6	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	2.23 mg/L	2.5 mg/L	89.3	50.0	140	----
		iron, TCLP	7439-89-6	E444	234 mg/L	250 mg/L	93.4	50.0	140	----
		lead, TCLP	7439-92-1	E444	10.4 mg/L	10 mg/L	104	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	251 mg/L	250 mg/L	100	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.22 mg/L	2.5 mg/L	88.8	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.17 mg/L	5 mg/L	103	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.108 mg/L	0.1 mg/L	108	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	91.9	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.75 mg/L	5 mg/L	95.0	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	99.6	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	10 mg/L	10 mg/L	103	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: 292446)									
QC-292446-003	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	110	70.0	130	----
QC-292446-003	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	120	70.0	130	----
QC-292446-003	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	110	70.0	130	----
QC-292446-003	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	108	70.0	130	----
QC-292446-003	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	107	70.0	130	----
QC-292446-003	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	122	40.0	160	----
QC-292446-003	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	107	70.0	130	----
QC-292446-003	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	96.9	70.0	130	----
QC-292446-003	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	116	70.0	130	----
QC-292446-003	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	108	70.0	130	----
QC-292446-003	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	110	70.0	130	----
QC-292446-003	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	111	70.0	130	----
QC-292446-003	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
QC-292446-003	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	108	70.0	130	----
QC-292446-003	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	114	70.0	130	----
QC-292446-003	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	113	70.0	130	----
QC-292446-003	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	116	70.0	130	----
QC-292446-003	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	110	70.0	130	----
QC-292446-003	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	104	70.0	130	----
QC-292446-003	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	116	70.0	130	----
QC-292446-003	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	109	70.0	130	----
QC-292446-003	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	119	70.0	130	----
QC-292446-003	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	99.1	40.0	160	----
QC-292446-003	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	111	70.0	130	----
QC-292446-003	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	123	70.0	130	----
QC-292446-003	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	104	70.0	130	----
QC-292446-003	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	111	70.0	130	----
QC-292446-003	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	106	70.0	130	----
QC-292446-003	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	123	70.0	130	----

Page : 11 of 11
 Work Order : VA21B9169
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



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: 292447)									
QC-292447-003	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	85.8	70.0	130	----



Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

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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 Burnaby BC	Email 1:	smckinney@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	rjohnson4@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

Analysis Request	
Email 4: brent.kirkpatrick@metrovancover.org Sarah.Wellman@metrovancover.org	

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

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
	Lab Work Order # (lab use only) 9169	ALS Contact:	Sampler:						
BA2136-A-1		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-2		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-3		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-4		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-5		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-6		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-7		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-8		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-9		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-10		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-11		01-Sep-21	9:00	Soil	X	X		X	1
BA2136-A-12		01-Sep-21	9:00	Soil	X	X		X	1

Environmental Division
Vancouver
Work Order Reference
VA21B9169

Telephone : + 1 604 253 4168

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

Failure to complete all portions of this form may delay analysis. Please fill in this form LEGIBLY.
By the use of this form the user acknowledges and agrees with the Terms and Conditions as provided on a separate Excel tab.
Also provided on another Excel tab are the ALS location addresses, phone numbers and sample container / preservation / holding time table for common analyses.

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	7-SEP-21	0800				22°C	JW	Sept 7/21	11:55	

2 buckets

GENE 20.00 Front