

Bottom Ash Data

2022 Week 18

The following analytical report represents bottom ash composite results for week 18 of 2022 (May 1, 2022 to May 7, 2022).

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 : **VA22B0082**
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 0000051213
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 : 11-May-2022 11:30
Date Analysis Commenced : 19-May-2022
Issue Date : 25-May-2022 10:43

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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia



General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

Surrogate: An analyte that is similar in behavior to target analyte(s), but that does not occur naturally in environmental samples. For applicable tests, surrogates are added to samples prior to analysis as a check on recovery.

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

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



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2218-A-1	BA2218-A-2	BA2218-A-3	BA2218-A-4	BA2218-A-5
(Matrix: Soil/Solid)					Client sampling date / time	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-001	VA22B0082-002	VA22B0082-003	VA22B0082-004	VA22B0082-005	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.4	19.3	19.6	19.1	20.6	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.3	10.3	10.4	10.4	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	45500	56600	35600	36900	38600	
antimony	7440-36-0	E440	0.10	mg/kg	120	96.7	127	146	112	
arsenic	7440-38-2	E440	0.10	mg/kg	19.3	18.2	22.5	20.4	20.9	
barium	7440-39-3	E440	0.50	mg/kg	539	558	500	516	593	
beryllium	7440-41-7	E440	0.10	mg/kg	0.33	0.33	0.39	0.34	0.35	
bismuth	7440-69-9	E440	0.20	mg/kg	16.8	13.7	8.61	7.33	6.02	
boron	7440-42-8	E440	5.0	mg/kg	210	175	279	156	134	
cadmium	7440-43-9	E440	0.020	mg/kg	9.31	9.66	15.6	14.6	10.2	
calcium	7440-70-2	E440	50	mg/kg	112000	124000	131000	120000	119000	
chromium	7440-47-3	E440	0.50	mg/kg	134	180	1040	261	221	
cobalt	7440-48-4	E440	0.10	mg/kg	221	25.8	59.8	50.8	32.4	
copper	7440-50-8	E440	0.50	mg/kg	2860	1420	2820	2170	2130	
iron	7439-89-6	E440	50	mg/kg	70000	68300	67200	78900	64800	
lead	7439-92-1	E440	0.50	mg/kg	295	296	343	860	369	
lithium	7439-93-2	E440	2.0	mg/kg	21.6	18.9	23.3	41.1	25.6	
magnesium	7439-95-4	E440	20	mg/kg	9680	10300	10400	10900	11400	
manganese	7439-96-5	E440	1.0	mg/kg	2580	793	821	922	944	
mercury	7439-97-6	E510	0.0500	mg/kg	0.195	0.119	0.150	0.305	0.295	
molybdenum	7439-98-7	E440	0.10	mg/kg	44.7	44.1	77.6	56.9	49.6	
nickel	7440-02-0	E440	0.50	mg/kg	126	112	742	212	214	
phosphorus	7723-14-0	E440	50	mg/kg	11000	12800	13500	10300	12800	
potassium	7440-09-7	E440	100	mg/kg	4550	4720	5270	4880	5200	
selenium	7782-49-2	E440	0.20	mg/kg	0.30	0.34	0.41	0.54	0.39	
silver	7440-22-4	E440	0.10	mg/kg	8.66	6.27	6.28	9.19	9.04	
sodium	7440-23-5	E440	50	mg/kg	14200	14700	15300	14200	15300	
strontium	7440-24-6	E440	0.50	mg/kg	337	288	295	299	289	
sulfur	7704-34-9	E440	1000	mg/kg	10200	10900	12700	11600	10200	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2218-A-1	BA2218-A-2	BA2218-A-3	BA2218-A-4	BA2218-A-5
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-001	VA22B0082-002	VA22B0082-003	VA22B0082-004	VA22B0082-005	
					Result	Result	Result	Result	Result	
Metals										
thallium	7440-28-0	E440	0.050	mg/kg	0.065	0.064	0.087	0.078	0.069	
tin	7440-31-5	E440	2.0	mg/kg	100	135	113	134	136	
titanium	7440-32-6	E440	1.0	mg/kg	805	954	506	562	700	
tungsten	7440-33-7	E440	0.50	mg/kg	59.0	53.6	45.3	38.5	59.8	
uranium	7440-61-1	E440	0.050	mg/kg	4.58	4.56	5.08	5.12	4.81	
vanadium	7440-62-2	E440	0.20	mg/kg	45.8	47.6	50.8	47.7	44.3	
zinc	7440-66-6	E440	2.0	mg/kg	3650	2940	14500	7360	3770	
zirconium	7440-67-7	E440	1.0	mg/kg	2.4	2.8	1.9	1.5	1.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.3	11.4	11.4	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.97	9.21	8.85	9.64	9.65	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.13	6.30	6.25	6.18	6.14	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	1.71	1.75	1.86	1.78	1.83	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.183	0.176	0.217	0.164	0.201	
calcium, TCLP	7440-70-2	E444	10	mg/L	1970	2090	2120	2040	2000	
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	0.773	0.888	1.34	1.01	0.975	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.38	0.591	0.982	0.740	0.692	
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	115	118	121	118	118	
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	0.65	1.82	0.51	0.62	0.54	
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	BA2218-A-1	BA2218-A-2	BA2218-A-3	BA2218-A-4	BA2218-A-5
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-001	VA22B0082-002	VA22B0082-003	VA22B0082-004	VA22B0082-005	
					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	59.4	38.3	49.8	49.1	75.0	75.0
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	BA2218-A-6	BA2218-A-7	BA2218-A-8	BA2218-A-9	BA2218-A-10
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-006	VA22B0082-007	VA22B0082-008	VA22B0082-009	VA22B0082-010	
					Result	Result	Result	Result	Result	
Physical Tests										
moisture	----	E144	0.25	%	20.5	19.6	20.8	20.4	21.1	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.3	10.5	10.4	10.4	10.5	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37200	36300	43800	37200	42500	
antimony	7440-36-0	E440	0.10	mg/kg	107	112	113	114	117	
arsenic	7440-38-2	E440	0.10	mg/kg	20.5	19.8	23.6	22.7	25.3	
barium	7440-39-3	E440	0.50	mg/kg	429	556	576	578	487	
beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.37	0.37	0.37	0.36	
bismuth	7440-69-9	E440	0.20	mg/kg	7.13	6.64	7.87	10.1	9.79	
boron	7440-42-8	E440	5.0	mg/kg	184	158	154	220	179	
cadmium	7440-43-9	E440	0.020	mg/kg	12.1	12.8	12.4	10.7	13.2	
calcium	7440-70-2	E440	50	mg/kg	121000	120000	126000	112000	120000	
chromium	7440-47-3	E440	0.50	mg/kg	205	230	176	387	169	
cobalt	7440-48-4	E440	0.10	mg/kg	118	64.7	45.7	115	33.2	
copper	7440-50-8	E440	0.50	mg/kg	1490	6640	2160	4140	2540	
iron	7439-89-6	E440	50	mg/kg	69800	89400	83800	72900	67400	
lead	7439-92-1	E440	0.50	mg/kg	700	350	811	319	462	
lithium	7439-93-2	E440	2.0	mg/kg	23.2	25.9	21.0	25.5	20.5	
magnesium	7439-95-4	E440	20	mg/kg	12000	11700	12200	10400	10900	
manganese	7439-96-5	E440	1.0	mg/kg	1720	2180	1240	829	2180	
mercury	7439-97-6	E510	0.0500	mg/kg	0.121	0.118	0.132	0.181	0.546	
molybdenum	7439-98-7	E440	0.10	mg/kg	41.1	44.4	50.3	50.2	46.2	
nickel	7440-02-0	E440	0.50	mg/kg	322	254	341	235	177	
phosphorus	7723-14-0	E440	50	mg/kg	10600	11000	11300	10100	10200	
potassium	7440-09-7	E440	100	mg/kg	4810	4370	4680	4830	4770	
selenium	7782-49-2	E440	0.20	mg/kg	0.40	0.38	0.44	0.30	0.50	
silver	7440-22-4	E440	0.10	mg/kg	10.7	7.24	6.85	7.81	11.8	
sodium	7440-23-5	E440	50	mg/kg	15200	14200	14600	14800	14400	
strontium	7440-24-6	E440	0.50	mg/kg	280	288	290	277	288	
sulfur	7704-34-9	E440	1000	mg/kg	11900	10600	11700	10400	11800	
thallium	7440-28-0	E440	0.050	mg/kg	0.071	0.076	0.070	0.069	0.077	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2218-A-6	BA2218-A-7	BA2218-A-8	BA2218-A-9	BA2218-A-10
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-006	VA22B0082-007	VA22B0082-008	VA22B0082-009	VA22B0082-010	
					Result	Result	Result	Result	Result	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	152	123	106	114	269	
titanium	7440-32-6	E440	1.0	mg/kg	499	539	690	744	645	
tungsten	7440-33-7	E440	0.50	mg/kg	43.6	60.4	40.6	36.0	47.2	
uranium	7440-61-1	E440	0.050	mg/kg	5.01	5.00	5.04	4.92	4.90	
vanadium	7440-62-2	E440	0.20	mg/kg	47.3	47.8	48.6	45.2	48.6	
zinc	7440-66-6	E440	2.0	mg/kg	3440	10900	3600	4600	4800	
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.5	1.8	1.6	1.7	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	11.4	11.4	11.4	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.19	9.43	8.66	9.52	9.55	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	2.91	2.91	2.91	
pH, TCLP final	----	EPP444	0.010	pH units	6.48	6.32	6.20	6.21	6.20	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	
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	2.10	1.93	1.82	1.72	1.81	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.180	0.184	0.172	0.158	0.178	
calcium, TCLP	7440-70-2	E444	10	mg/L	2330	2090	2050	2020	2040	
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	1.26	0.853	0.798	1.24	1.02	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.805	0.942	1.02	0.156	1.59	
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	127	121	116	123	120	
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	0.71	0.55	0.52	0.56	0.54	
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	BA2218-A-6	BA2218-A-7	BA2218-A-8	BA2218-A-9	BA2218-A-10
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00	05-Apr-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-006	VA22B0082-007	VA22B0082-008	VA22B0082-009	VA22B0082-010	
					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	31.0	29.5	45.7	39.7	37.8	37.8
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					Client sample ID	BA2218-A-11	BA2218-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	05-Apr-2022 09:00	05-Apr-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-011	VA22B0082-012	-----	-----	-----	
					Result	Result	---	---	---	
Physical Tests										
moisture	----	E144	0.25	%	20.4	20.6	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.2	----	----	----	
Metals										
aluminum	7429-90-5	E440	50	mg/kg	37900	34700	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	110	102	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	21.1	20.1	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	527	543	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.35	0.39	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	7.69	12.9	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	188	149	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	13.1	9.91	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	120000	121000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	159	495	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	130	49.2	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	2140	2260	----	----	----	
iron	7439-89-6	E440	50	mg/kg	81500	74800	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	547	406	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	24.8	21.2	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	12100	10700	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	925	928	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	0.228	0.0842	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	891	58.6	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	128	474	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	10200	11000	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4950	4680	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.38	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	7.33	5.56	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14400	15000	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	274	272	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	11200	10400	----	----	----	
thallium	7440-28-0	E440	0.050	mg/kg	0.084	0.091	----	----	----	



Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2218-A-11	BA2218-A-12	----	----	----
Client sampling date / time					05-Apr-2022 09:00	05-Apr-2022 09:00	----	----	----	
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-011	VA22B0082-012	-----	-----	-----	
					Result	Result	---	---	---	
Metals										
tin	7440-31-5	E440	2.0	mg/kg	100	96.8	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	664	509	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	39.3	60.0	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	5.14	4.24	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	46.7	48.3	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	4250	3140	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	1.5	1.5	---	---	---	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.4	11.4	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	9.19	8.94	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.91	2.91	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	5.92	6.29	---	---	---	
antimony, TCLP	7440-36-0	E444	1.00	mg/L	<1.00	<1.00	---	---	---	
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	1.72	1.82	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.190	0.248	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	1930	2010	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.12	0.840	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	1.64	0.971	---	---	---	
iron, TCLP	7439-89-6	E444	5.0	mg/L	10.7	<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	112	119	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.98	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	BA2218-A-11	BA2218-A-12	----	----	----
					Client sampling date / time	05-Apr-2022 09:00	05-Apr-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22B0082-011	VA22B0082-012	-----	-----	-----	
					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	56.2	33.6	----	----	----	
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	: VA22B0082	Page	: 1 of 16
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	: 11-May-2022 11:30
PO	: VANCO 0000051213	Issue Date	: 25-May-2022 10:43
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 Service number is a unique identifier assigned to discrete substances.

DQO: Data Quality Objective.

LOR: Limit of Reporting (detection limit).

RPD: Relative Percent Difference.

Workorder Comments

Holding times are displayed as "----" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- Analysis Holding Time Outliers exist - please see following pages for full details.

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	Anonymous	Anonymous	lead	7439-92-1	E440	58.1 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



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 BA2218-A-1	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-10	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-11	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-12	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-2	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-3	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2218-A-4	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	* EHTR-FM



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 BA2218-A-5	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	*	EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2218-A-6	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	*	EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2218-A-7	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	*	EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2218-A-8	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	*	EHTR-FM
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2218-A-9	E510	05-Apr-2022	20-May-2022	----	----		20-May-2022	28 days	45 days	*	EHTR-FM
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2218-A-1	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✓	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2218-A-10	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✓	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2218-A-11	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✓	
Metals : Metals in Soil/Solid by CRC ICNMS											
LDPE bag BA2218-A-12	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 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 BA2218-A-2	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-3	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-4	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-5	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-6	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-7	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-8	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Metals : Metals in Soil/Solid by CRC ICPCS											
LDPE bag BA2218-A-9	E440	05-Apr-2022	20-May-2022	----	----		20-May-2022	180 days	45 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2218-A-1	E144	05-Apr-2022	----	----	----		19-May-2022	----	----		



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 BA2218-A-10	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-11	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-12	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-2	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-3	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-4	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-5	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-6	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2218-A-7	E144	05-Apr-2022	----	----	----		19-May-2022	----	----	



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 BA2218-A-8	E144	05-Apr-2022	----	----	----		19-May-2022	----	----		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2218-A-9	E144	05-Apr-2022	----	----	----		19-May-2022	----	----		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-1	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-10	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-11	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-12	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-2	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-3	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-4	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM



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 BA2218-A-5	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-6	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-7	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-8	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2218-A-9	E108	05-Apr-2022	20-May-2022	----	----		20-May-2022	30 days	45 days	*	EHTR-FM
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-1	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-10	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-11	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✓	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-12	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 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) BA2218-A-2	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-3	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-4	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-5	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-6	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-7	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-8	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2218-A-9	E512	19-May-2022	----	----	----		23-May-2022	28 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-1	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 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) BA2218-A-10	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-11	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-12	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-2	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-3	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-4	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-5	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-6	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2218-A-7	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 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) BA2218-A-8	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✓
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2218-A-9	E444	19-May-2022	----	----	----		23-May-2022	180 days	48 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-1	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-10	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-11	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-12	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-2	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-3	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-4	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----	



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) BA2218-A-5	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-6	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-7	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-8	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----		
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2218-A-9	EPP444	05-Apr-2022	19-May-2022	----	----		----	----	----		

Legend & Qualifier Definitions

EHTR-FM: Exceeded ALS recommended hold time prior to sample receipt. Field Measurement recommended

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	493367	1	17	5.8	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	493366	1	17	5.8	5.0	✔
Moisture Content by Gravimetry	E144	493369	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	493368	1	17	5.8	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	493367	2	17	11.7	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	493366	2	17	11.7	10.0	✔
Moisture Content by Gravimetry	E144	493369	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	493368	1	17	5.8	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	496141	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	493367	1	17	5.8	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	496142	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	493366	1	17	5.8	5.0	✔
Moisture Content by Gravimetry	E144	493369	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	496141	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	496142	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. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510 Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.

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Work Order : VA22B0082
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	: VA22B0082	Page	: 1 of 11
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	: 11-May-2022 11:30
PO	: VANCO 0000051213	Date Analysis Commenced	: 19-May-2022
C-O-C number	: ----	Issue Date	: 25-May-2022 10:43
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

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 Percent Difference (RPD) and Data Quality Objectives
- Matrix Spike (MS) Report; Recovery and Data Quality Objectives
- Reference Material (RM) Report; Recovery and Data Quality Objectives
- Method Blank (MB) Report; Recovery and Data Quality Objectives
- Laboratory Control Sample (LCS) Report; Recovery and Data Quality Objectives

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	Vancouver Metals, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia

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Work Order : VA22B0082
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 Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

Workorder Comments

Holding times are displayed as "---" if no guidance exists from CCME, Canadian provinces, or broadly recognized international references.



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: 493368)											
VA22A9901-038	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.63	6.66	0.5%	5%	----
Physical Tests (QC Lot: 493369)											
VA22B0082-001	BA2218-A-1	moisture	----	E144	0.25	%	20.4	19.3	5.44%	20%	----
Metals (QC Lot: 493366)											
VA22A9901-038	Anonymous	aluminum	7429-90-5	E440	50	mg/kg	7010	8170	15.4%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	0.11	<0.10	0.008	Diff <2x LOR	----
		arsenic	7440-38-2	E440	0.10	mg/kg	0.54	0.74	0.19	Diff <2x LOR	----
		barium	7440-39-3	E440	0.50	mg/kg	30.2	34.9	14.2%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.12	0.14	0.02	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	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	0.033	0.039	0.006	Diff <2x LOR	----
		calcium	7440-70-2	E440	50	mg/kg	1990	2060	3.16%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	5.30	6.65	22.6%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	4.42	4.55	2.93%	30%	----
		copper	7440-50-8	E440	0.50	mg/kg	16.7	21.6	25.9%	30%	----
		iron	7439-89-6	E440	50	mg/kg	11900	13400	11.9%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	3.84	2.11	58.1%	40%	DUP-H
		lithium	7439-93-2	E440	2.0	mg/kg	3.0	3.2	0.1	Diff <2x LOR	----
		magnesium	7439-95-4	E440	20	mg/kg	3330	3730	11.2%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	185	230	21.8%	30%	----
		molybdenum	7439-98-7	E440	0.10	mg/kg	0.21	0.25	0.04	Diff <2x LOR	----
		nickel	7440-02-0	E440	0.50	mg/kg	5.90	7.16	19.3%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	516	532	3.15%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	260	330	70	Diff <2x LOR	----
		selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		sodium	7440-23-5	E440	50	mg/kg	275	306	10.8%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	22.7	27.4	18.6%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<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: 493366) - continued											
VA22A9901-038	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	569	659	14.6%	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	0.191	0.276	0.085	Diff <2x LOR	----
		vanadium	7440-62-2	E440	0.20	mg/kg	32.7	36.8	12.0%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	25.9	33.7	26.1%	30%	----
		zirconium	7440-67-7	E440	1.0	mg/kg	6.0	8.1	29.0%	30%	----
Metals (QC Lot: 493367)											
VA22A9901-038	Anonymous	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: 493369)						
moisture	----	E144	0.25	%	<0.25	----
Metals (QCLot: 493366)						
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: 493366) - 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: 493367)						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 496141)						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 496142)						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<1.00	----
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: 493368)									
pH (1:2 soil:water)	---	E108	---	pH units	6 pH units	100	95.0	105	---
Physical Tests (QCLot: 493369)									
moisture	---	E144	0.25	%	50 %	100	90.0	110	---
Metals (QCLot: 493366)									
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	112	80.0	120	---
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	103	80.0	120	---
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	104	80.0	120	---
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	105	80.0	120	---
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	---
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	103	80.0	120	---
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	104	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	102	80.0	120	---
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	---
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	---
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	106	80.0	120	---
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	107	80.0	120	---
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	---
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	100	80.0	120	---
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	103	80.0	120	---
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	106	80.0	120	---
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	---
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	103	80.0	120	---
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	107	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	95.7	80.0	120	---
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	103	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	103	80.0	120	---
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	107	80.0	120	---
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	104	80.0	120	---
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	102	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: 493366) - continued									
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	104	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	110	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	105	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	104	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.2	80.0	120	----
Metals (QCLot: 493367)									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	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**

Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	Target	MS	Low	High	
TCLP Metals (QCLot: 496141)										
VA22B0082-001	BA2218-A-1	mercury, TCLP	7439-97-6	E512	0.0007 mg/L	0.001 mg/L	73.2	50.0	140	----
TCLP Metals (QCLot: 496142)										
VA22B0082-001	BA2218-A-1	antimony, TCLP	7440-36-0	E444	5.21 mg/L	5 mg/L	104	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	4.2 mg/L	5 mg/L	84.4	50.0	140	----
		barium, TCLP	7440-39-3	E444	10.5 mg/L	12.5 mg/L	84.1	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.224 mg/L	0.25 mg/L	89.8	50.0	140	----
		boron, TCLP	7440-42-8	E444	8.20 mg/L	10 mg/L	82.0	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.198 mg/L	0.25 mg/L	79.2	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	1.03 mg/L	1.25 mg/L	82.5	50.0	140	----
		cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		copper, TCLP	7440-50-8	E444	1.85 mg/L	2.5 mg/L	74.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	203 mg/L	250 mg/L	81.2	50.0	140	----
		lead, TCLP	7439-92-1	E444	8.92 mg/L	10 mg/L	89.2	50.0	140	----
		magnesium, TCLP	7439-95-4	E444	211 mg/L	250 mg/L	84.6	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.00 mg/L	2.5 mg/L	79.9	50.0	140	----
		selenium, TCLP	7782-49-2	E444	4.44 mg/L	5 mg/L	88.9	50.0	140	----
		silver, TCLP	7440-22-4	E444	0.103 mg/L	0.1 mg/L	103	50.0	140	----
		thallium, TCLP	7440-28-0	E444	4.6 mg/L	5 mg/L	92.4	50.0	140	----
		uranium, TCLP	7440-61-1	E444	4.67 mg/L	5 mg/L	93.5	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.63 mg/L	0.75 mg/L	84.7	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	92.1	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:

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: 493366)									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	113	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	102	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	105	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	109	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	123	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	104	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	99.8	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	106	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	103	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	102	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	99.7	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	104	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	111	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	101	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	104	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	104	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	93.3	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	116	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	107	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	106	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	109	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	102	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	114	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	113	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	105	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	104	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	100	70.0	130	----

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 Work Order : VA22B0082
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

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: 493367)									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----



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 Skrypynk	<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
	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypynk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
			brent.kirkpatrick@metrovancover.org		
			Sarah.Wellman@metrovancover.org		

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
1	BA2218-A-1	05-Apr-22	9:00	Soil	X	X		X	1
2	BA2218-A-2	05-Apr-22	9:00	Soil	X	X		X	1
3	BA2218-A-3	05-Apr-22	9:00	Soil	X	X		X	1
4	BA2218-A-4	05-Apr-22	9:00	Soil	X	X		X	1
5	BA2218-A-5	05-Apr-22	9:00	Soil	X	X		X	1
6	BA2218-A-6	05-Apr-22	9:00	Soil	X	X		X	1
7	BA2218-A-7	05-Apr-22	9:00	Soil	X	X		X	1
8	BA2218-A-8	05-Apr-22	9:00	Soil	X	X		X	1
9	BA2218-A-9	05-Apr-22	9:00	Soil	X	X		X	1
10	BA2218-A-10	05-Apr-22	9:00	Soil	X	X		X	1
11	BA2218-A-11	05-Apr-22	9:00	Soil	X	X		X	1
12	BA2218-A-12	05-Apr-22	9:00	Soil	X	X		X	1

Environmental Division
 Vancouver
 Work Order Reference
VA22B0082

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)				
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
Xanem	11/05/22	9:00				20.20C	[Signature]	May 11, 2022	11:30	[Signature]