

## Bottom Ash Data

2022 Week 42

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The following analytical report represents bottom ash composite results for week 42 of 2022 (October 16, 2022 to October 22, 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** : **VA22C5774**  
**Client** : **Covanta Burnaby Renewable Energy, ULC**  
**Contact** : Nicole Victor  
**Address** : 5150 Riverbend Drive  
                   Burnaby BC Canada V3N 4V3  
**Telephone** : ----  
**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** : 25-Oct-2022 13:00  
**Date Analysis Commenced** : 27-Oct-2022  
**Issue Date** : 08-Nov-2022 13:58

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>
Alex Thornton	Analyst	Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jon Fisher	Department Manager - Inorganics	Metals, Waterloo, Ontario
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Qammar Almas	Lab Assistant	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	BA2242-A-1	BA2242-A-2	BA2242-A-3	BA2242-A-4	BA2242-A-5
(Matrix: Soil/Solid)					Client sampling date / time	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-001	VA22C5774-002	VA22C5774-003	VA22C5774-004	VA22C5774-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.4	19.6	21.4	22.0	21.5	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.6	10.8	10.7	10.7	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	35300	53000	41300	27800	24200	
antimony	7440-36-0	E440	0.10	mg/kg	157	89.8	128	161	102	
arsenic	7440-38-2	E440	0.10	mg/kg	28.1	22.7	28.7	32.3	25.3	
barium	7440-39-3	E440	0.50	mg/kg	479	509	330	322	299	
beryllium	7440-41-7	E440	0.10	mg/kg	0.52	0.36	0.32	0.35	0.33	
bismuth	7440-69-9	E440	0.20	mg/kg	8.59	10.5	10.6	11.1	12.3	
boron	7440-42-8	E440	5.0	mg/kg	218	185	198	182	174	
cadmium	7440-43-9	E440	0.020	mg/kg	11.1	6.87	10.3	12.2	8.72	
calcium	7440-70-2	E440	50	mg/kg	121000	117000	137000	144000	129000	
chromium	7440-47-3	E440	0.50	mg/kg	157	142	156	172	145	
cobalt	7440-48-4	E440	0.10	mg/kg	66.7	26.1	35.4	224	25.4	
copper	7440-50-8	E440	0.50	mg/kg	8330	1130	1740	2700	9770	
iron	7439-89-6	E440	50	mg/kg	47700	40500	41900	43700	42800	
lead	7439-92-1	E440	0.50	mg/kg	596	310	495	820	661	
lithium	7439-93-2	E440	2.0	mg/kg	23.3	20.9	23.0	40.6	19.4	
magnesium	7439-95-4	E440	20	mg/kg	10900	11000	11100	11800	10500	
manganese	7439-96-5	E440	1.0	mg/kg	784	960	796	678	700	
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	18.5	16.3	17.6	20.1	20.1	
nickel	7440-02-0	E440	0.50	mg/kg	145	94.7	111	193	143	
phosphorus	7723-14-0	E440	50	mg/kg	10100	10300	12500	12000	10800	
potassium	7440-09-7	E440	100	mg/kg	5090	5520	5530	5550	5140	
selenium	7782-49-2	E440	0.20	mg/kg	0.47	0.38	0.68	0.53	0.34	
silver	7440-22-4	E440	0.10	mg/kg	8.11	4.00	6.20	6.43	5.14	
sodium	7440-23-5	E440	50	mg/kg	15300	16200	16100	16000	15500	
strontium	7440-24-6	E440	0.50	mg/kg	275	268	288	312	285	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2242-A-1	BA2242-A-2	BA2242-A-3	BA2242-A-4	BA2242-A-5
Client sampling date / time					19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-001	VA22C5774-002	VA22C5774-003	VA22C5774-004	VA22C5774-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
sulfur	7704-34-9	E440	1000	mg/kg	13000	11000	13800	14700	11800	
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	200	92.2	111	119	117	
titanium	7440-32-6	E440	1.0	mg/kg	436	541	306	226	155	
tungsten	7440-33-7	E440	0.50	mg/kg	6.74	4.25	6.76	7.04	4.27	
uranium	7440-61-1	E440	0.050	mg/kg	3.46	3.00	3.92	4.31	3.36	
vanadium	7440-62-2	E440	0.20	mg/kg	54.0	36.1	43.1	45.7	38.2	
zinc	7440-66-6	E440	2.0	mg/kg	4960	2750	3810	4210	6430	
zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	2.0	1.4	<1.0	1.8	
<b>Speciated Metals</b>										
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	----	----	----	----	
<b>TCLP Metals</b>										
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	8.96	8.59	8.85	9.19	8.38	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.94	6.57	6.46	6.62	6.55	
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	2.37	2.50	2.42	2.50	2.41	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.111	0.125	0.410	0.118	0.152	
calcium, TCLP	7440-70-2	E444	10	mg/L	2140	2190	2140	2220	2170	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	1.73	1.44	1.51	0.880	1.37	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.871	0.805	1.12	0.714	2.81	
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	133	131	130	134	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2242-A-1	BA2242-A-2	BA2242-A-3	BA2242-A-4	BA2242-A-5
Client sampling date / time					19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-001	VA22C5774-002	VA22C5774-003	VA22C5774-004	VA22C5774-005	
TCLP Metals					Result	Result	Result	Result	Result	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.40	0.47	0.46	0.43	0.55	
selenium, TCLP	7782-49-2	E444	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10	
silver, TCLP	7440-22-4	E444	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	37.1	21.9	23.8	20.2	28.5	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2242-A-6	BA2242-A-7	BA2242-A-8	BA2242-A-9	BA2242-A-10
Client sampling date / time					19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-006	VA22C5774-007	VA22C5774-008	VA22C5774-009	VA22C5774-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.1	21.6	21.0	21.4	21.4	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	10.7	10.6	10.8	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	36600	38900	47300	63400	30500	
antimony	7440-36-0	E440	0.10	mg/kg	101	121	104	92.2	121	
arsenic	7440-38-2	E440	0.10	mg/kg	26.0	28.4	24.4	23.3	29.3	
barium	7440-39-3	E440	0.50	mg/kg	420	410	440	457	295	
beryllium	7440-41-7	E440	0.10	mg/kg	0.38	0.33	0.33	0.32	0.30	
bismuth	7440-69-9	E440	0.20	mg/kg	7.64	8.35	6.62	6.58	9.53	
boron	7440-42-8	E440	5.0	mg/kg	205	157	182	171	190	
cadmium	7440-43-9	E440	0.020	mg/kg	7.66	8.49	7.85	6.70	10.6	
calcium	7440-70-2	E440	50	mg/kg	131000	127000	123000	129000	120000	
chromium	7440-47-3	E440	0.50	mg/kg	134	151	128	169	151	
cobalt	7440-48-4	E440	0.10	mg/kg	134	82.6	45.4	29.6	54.6	
copper	7440-50-8	E440	0.50	mg/kg	7190	1220	1340	1220	1950	
iron	7439-89-6	E440	50	mg/kg	61000	52000	39600	48500	53800	
lead	7439-92-1	E440	0.50	mg/kg	332	1200	459	293	554	
lithium	7439-93-2	E440	2.0	mg/kg	24.4	28.0	20.8	22.5	22.2	
magnesium	7439-95-4	E440	20	mg/kg	9920	11100	10800	9830	10900	
manganese	7439-96-5	E440	1.0	mg/kg	754	810	640	605	715	
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	17.5	23.6	14.3	21.1	21.5	
nickel	7440-02-0	E440	0.50	mg/kg	362	157	91.3	144	107	
phosphorus	7723-14-0	E440	50	mg/kg	12300	10600	13700	13600	12200	
potassium	7440-09-7	E440	100	mg/kg	4960	5560	5190	4790	5130	
selenium	7782-49-2	E440	0.20	mg/kg	0.35	0.38	0.33	0.35	0.45	
silver	7440-22-4	E440	0.10	mg/kg	4.23	9.14	3.83	9.25	5.34	
sodium	7440-23-5	E440	50	mg/kg	15300	16100	14800	14800	15000	
strontium	7440-24-6	E440	0.50	mg/kg	281	292	287	291	276	
sulfur	7704-34-9	E440	1000	mg/kg	11700	12800	11500	11700	13600	



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2242-A-6	BA2242-A-7	BA2242-A-8	BA2242-A-9	BA2242-A-10
(Matrix: Soil/Solid)					Client sampling date / time	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-006	VA22C5774-007	VA22C5774-008	VA22C5774-009	VA22C5774-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
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	82.2	111	85.3	192	148	
titanium	7440-32-6	E440	1.0	mg/kg	229	372	357	358	192	
tungsten	7440-33-7	E440	0.50	mg/kg	9.45	13.8	8.18	3.87	8.23	
uranium	7440-61-1	E440	0.050	mg/kg	3.33	3.59	4.00	3.07	3.53	
vanadium	7440-62-2	E440	0.20	mg/kg	40.7	44.8	43.0	40.2	39.9	
zinc	7440-66-6	E440	2.0	mg/kg	5810	3440	2740	3610	3860	
zirconium	7440-67-7	E440	1.0	mg/kg	2.7	1.4	1.8	3.8	1.1	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	11.5	11.5	11.5	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.60	8.38	8.34	8.82	8.57	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	2.88	2.88	2.88	
pH, TCLP final	----	EPP444	0.010	pH units	6.55	6.39	6.51	6.55	6.47	
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	2.45	2.31	3.04	2.48	2.46	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.131	0.121	0.103	0.111	0.131	
calcium, TCLP	7440-70-2	E444	10	mg/L	2100	2080	2170	2190	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	0.804	1.06	1.20	1.52	1.48	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.934	0.869	0.791	0.736	0.716	
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	128	124	130	131	130	
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	0.88	0.44	0.42	0.58	0.45	
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					Client sample ID	BA2242-A-6	BA2242-A-7	BA2242-A-8	BA2242-A-9	BA2242-A-10
(Matrix: Soil/Solid)					Client sampling date / time	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00	19-Oct-2022 09:00
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-006	VA22C5774-007	VA22C5774-008	VA22C5774-009	VA22C5774-010	
TCLP Metals					Result	Result	Result	Result	Result	
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20	
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	
zinc, TCLP	7440-66-6	E444	0.50	mg/L	25.2	27.9	23.1	23.4	27.2	
zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	<10	<10	<10	<10	

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



## Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2242-A-11	BA2242-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time	19-Oct-2022 09:00	19-Oct-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-011	VA22C5774-012	-----	-----	-----	
					Result	Result	----	----	----	
<b>Physical Tests</b>										
moisture	----	E144	0.25	%	22.0	21.2	----	----	----	
pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.7	----	----	----	
<b>Metals</b>										
aluminum	7429-90-5	E440	50	mg/kg	26400	26100	----	----	----	
antimony	7440-36-0	E440	0.10	mg/kg	105	144	----	----	----	
arsenic	7440-38-2	E440	0.10	mg/kg	30.2	37.3	----	----	----	
barium	7440-39-3	E440	0.50	mg/kg	275	289	----	----	----	
beryllium	7440-41-7	E440	0.10	mg/kg	0.29	0.32	----	----	----	
bismuth	7440-69-9	E440	0.20	mg/kg	8.04	10.9	----	----	----	
boron	7440-42-8	E440	5.0	mg/kg	154	188	----	----	----	
cadmium	7440-43-9	E440	0.020	mg/kg	9.49	11.8	----	----	----	
calcium	7440-70-2	E440	50	mg/kg	118000	135000	----	----	----	
chromium	7440-47-3	E440	0.50	mg/kg	489	170	----	----	----	
cobalt	7440-48-4	E440	0.10	mg/kg	48.5	93.0	----	----	----	
copper	7440-50-8	E440	0.50	mg/kg	7090	7360	----	----	----	
iron	7439-89-6	E440	50	mg/kg	62700	40900	----	----	----	
lead	7439-92-1	E440	0.50	mg/kg	844	495	----	----	----	
lithium	7439-93-2	E440	2.0	mg/kg	20.6	22.8	----	----	----	
magnesium	7439-95-4	E440	20	mg/kg	10400	11700	----	----	----	
manganese	7439-96-5	E440	1.0	mg/kg	862	750	----	----	----	
mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	----	----	----	
molybdenum	7439-98-7	E440	0.10	mg/kg	21.4	21.5	----	----	----	
nickel	7440-02-0	E440	0.50	mg/kg	152	364	----	----	----	
phosphorus	7723-14-0	E440	50	mg/kg	11700	12800	----	----	----	
potassium	7440-09-7	E440	100	mg/kg	4840	5490	----	----	----	
selenium	7782-49-2	E440	0.20	mg/kg	0.39	0.50	----	----	----	
silver	7440-22-4	E440	0.10	mg/kg	4.69	15.8	----	----	----	
sodium	7440-23-5	E440	50	mg/kg	14100	15400	----	----	----	
strontium	7440-24-6	E440	0.50	mg/kg	253	285	----	----	----	
sulfur	7704-34-9	E440	1000	mg/kg	12000	14900	----	----	----	



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2242-A-11	BA2242-A-12	----	----	----
Client sampling date / time					19-Oct-2022 09:00	19-Oct-2022 09:00	---	---	---	
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-011	VA22C5774-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Metals</b>										
thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	---	---	---	
tin	7440-31-5	E440	2.0	mg/kg	112	155	---	---	---	
titanium	7440-32-6	E440	1.0	mg/kg	168	186	---	---	---	
tungsten	7440-33-7	E440	0.50	mg/kg	6.31	7.87	---	---	---	
uranium	7440-61-1	E440	0.050	mg/kg	3.28	4.00	---	---	---	
vanadium	7440-62-2	E440	0.20	mg/kg	41.6	43.4	---	---	---	
zinc	7440-66-6	E440	2.0	mg/kg	3970	5450	---	---	---	
zirconium	7440-67-7	E440	1.0	mg/kg	2.2	<1.0	---	---	---	
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444	0.010	pH units	11.5	11.5	---	---	---	
pH, TCLP 2nd preliminary	----	EPP444	0.010	pH units	8.60	8.76	---	---	---	
pH, TCLP extraction fluid initial	----	EPP444	0.010	pH units	2.88	2.88	---	---	---	
pH, TCLP final	----	EPP444	0.010	pH units	6.45	6.48	---	---	---	
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	2.44	2.41	---	---	---	
cadmium, TCLP	7440-43-9	E444	0.050	mg/L	0.776	0.107	---	---	---	
calcium, TCLP	7440-70-2	E444	10	mg/L	2120	2180	---	---	---	
chromium, TCLP	7440-47-3	E444	0.25	mg/L	<0.25	<0.25	---	---	---	
cobalt, TCLP	7440-48-4	E444	0.050	mg/L	0.942	1.06	---	---	---	
copper, TCLP	7440-50-8	E444	0.050	mg/L	0.878	0.705	---	---	---	
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	129	129	---	---	---	
mercury, TCLP	7439-97-6	E512	0.0010	mg/L	<0.0010	<0.0010	---	---	---	
nickel, TCLP	7440-02-0	E444	0.25	mg/L	0.52	0.51	---	---	---	
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	---	---	---	



## Analytical Results

Sub-Matrix: Soil					Client sample ID		BA2242-A-11	BA2242-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		19-Oct-2022 09:00	19-Oct-2022 09:00	----	----	----
Analyte	CAS Number	Method	LOR	Unit	VA22C5774-011	VA22C5774-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
thallium, TCLP	7440-28-0	E444	1.0	mg/L	<1.0	<1.0	---	---	---	---	---
uranium, TCLP	7440-61-1	E444	0.20	mg/L	<0.20	<0.20	---	---	---	---	---
vanadium, TCLP	7440-62-2	E444	0.15	mg/L	<0.15	<0.15	---	---	---	---	---
zinc, TCLP	7440-66-6	E444	0.50	mg/L	34.5	17.1	---	---	---	---	---
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.




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>VA22C5774</b></p> <p><b>Client</b> : <b>Covanta Burnaby Renewable Energy, ULC</b></p> <p><b>Contact</b> : Nicole Victor</p> <p><b>Address</b> : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p><b>Telephone</b> : ----</p> <p><b>Project</b> : Weekly Bottom Ash - Suite</p> <p><b>PO</b> : VANCO 0000051213</p> <p><b>C-O-C number</b> : ----</p> <p><b>Sampler</b> : ----</p> <p><b>Site</b> : ----</p> <p><b>Quote number</b> : Standing Offer (BC work)</p> <p><b>No. of samples received</b> : 12</p> <p><b>No. of samples analysed</b> : 12</p>	<p><b>Page</b> : 1 of 17</p> <p><b>Laboratory</b> : Vancouver - Environmental</p> <p><b>Account Manager</b> : Brent Mack</p> <p><b>Address</b> : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p><b>Telephone</b> : 778-370-3279</p> <p><b>Date Samples Received</b> : 25-Oct-2022 13:00</p> <p><b>Issue Date</b> : 08-Nov-2022 13:58</p>
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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.
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### ***Workorder Comments***

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

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### ***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
<b>Duplicate (DUP) RPDs</b>								
Metals	VA22C5774-002	BA2242-A-2	aluminum	7429-90-5	E440	56.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	antimony	7440-36-0	E440	31.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	antimony	7440-36-0	E440	37.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	beryllium	7440-41-7	E440	0.22 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA22C5774-001	BA2242-A-1	bismuth	7440-69-9	E440	44.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	cadmium	7440-43-9	E440	70.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	chromium	7440-47-3	E440	48.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	cobalt	7440-48-4	E440	103 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	cobalt	7440-48-4	E440	60.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	copper	7440-50-8	E440	134 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	copper	7440-50-8	E440	134 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	manganese	7439-96-5	E440	31.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	manganese	7439-96-5	E440	44.6 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	nickel	7440-02-0	E440	114 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	silver	7440-22-4	E440	57.8 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	tin	7440-31-5	E440	60.4 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	tin	7440-31-5	E440	52.0 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	titanium	7440-32-6	E440	89.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.



Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Duplicate (DUP) RPDs - Continued</b>								
Metals	VA22C5774-001	BA2242-A-1	titanium	7440-32-6	E440	82.2 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	tungsten	7440-33-7	E440	148 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-002	BA2242-A-2	zinc	7440-66-6	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA22C5774-001	BA2242-A-1	zinc	7440-66-6	E440	34.3 % 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-MRG2-7208690 02	----	lithium	7439-93-2	E440	74.0 % MES	80.0-120%	Recovery less than lower control limit
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**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	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-2	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-3	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-4	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-5	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-6	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-7	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓
<b>Metals : Mercury in Soil/Solid by CVAAS</b>										
LDPE bag BA2242-A-8	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✓



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2242-A-9	E510	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	28 days	10 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2242-A-1	E510	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2242-A-10	E510	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2242-A-11	E510	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2242-A-12	E510	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	28 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICNMS</b>											
LDPE bag BA2242-A-2	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICNMS</b>											
LDPE bag BA2242-A-3	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICNMS</b>											
LDPE bag BA2242-A-4	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICNMS</b>											
LDPE bag BA2242-A-5	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-6	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-7	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-8	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-9	E440	19-Oct-2022	28-Oct-2022	----	----		29-Oct-2022	180 days	10 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-1	E440	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-10	E440	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-11	E440	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2242-A-12	E440	19-Oct-2022	01-Nov-2022	----	----		02-Nov-2022	180 days	15 days	✔	
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2242-A-1	E144	19-Oct-2022	----	----	----		27-Oct-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	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-10	E144	19-Oct-2022	----	----	----		28-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-11	E144	19-Oct-2022	----	----	----		28-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-12	E144	19-Oct-2022	----	----	----		28-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-2	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-3	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-4	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-5	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-6	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2242-A-7	E144	19-Oct-2022	----	----	----		27-Oct-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		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2242-A-8	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2242-A-9	E144	19-Oct-2022	----	----	----		27-Oct-2022	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-1	E108	19-Oct-2022	01-Nov-2022	----	----		01-Nov-2022	30 days	14 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-10	E108	19-Oct-2022	01-Nov-2022	----	----		01-Nov-2022	30 days	14 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-11	E108	19-Oct-2022	01-Nov-2022	----	----		01-Nov-2022	30 days	14 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-12	E108	19-Oct-2022	01-Nov-2022	----	----		01-Nov-2022	30 days	14 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-2	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-3	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days		✔
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-4	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days		✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-5	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-6	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-7	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-8	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2242-A-9	E108	19-Oct-2022	28-Oct-2022	----	----		28-Oct-2022	30 days	9 days	✔	
<b>Speciated Metals : Hexavalent Chromium (Cr VI) by IC</b>											
Glass soil jar/Teflon lined cap BA2242-A-1	E532	19-Oct-2022	04-Nov-2022	30 days	16 days	✔	07-Nov-2022	7 days	3 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-1	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-10	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-11	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-12	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-2	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-3	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-4	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-5	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-6	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-7	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-8	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2242-A-9	E512	04-Nov-2022	06-Nov-2022	----	----		08-Nov-2022	28 days	20 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-1	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-10	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-11	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-12	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-2	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-3	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-4	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-5	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2242-A-6	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔	





Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2242-A-7	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2242-A-8	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>										
HDPE - total (lab preserved) BA2242-A-9	E444	04-Nov-2022	06-Nov-2022	----	----		06-Nov-2022	180 days	18 days	✔
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-1	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-10	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-11	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-12	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-2	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-3	EPP444	19-Oct-2022	04-Nov-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	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-4	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-5	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-6	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-7	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-8	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI) BA2242-A-9	EPP444	19-Oct-2022	04-Nov-2022	----	----		----	----	----	

**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 (%)		
			QC	Regular	Actual	Expected	Evaluation
<b>Analytical Methods</b>							
<b>Laboratory Duplicates (DUP)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	729673	1	5	20.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	718854	2	34	5.8	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	720870	2	28	7.1	5.0	✔
Moisture Content by Gravimetry	E144	720874	2	25	8.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	720871	2	28	7.1	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	729673	2	5	40.0	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	718854	4	34	11.7	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	720870	4	28	14.2	10.0	✔
Moisture Content by Gravimetry	E144	720874	2	25	8.0	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	720871	2	28	7.1	5.0	✔
<b>Method Blanks (MB)</b>							
Hexavalent Chromium (Cr VI) by IC	E532	729673	1	5	20.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	732792	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	718854	2	34	5.8	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	732793	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	720870	2	28	7.1	5.0	✔
Moisture Content by Gravimetry	E144	720874	2	25	8.0	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	732792	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	732793	1	12	8.3	5.0	✔



## Methodology References and Summaries

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

Analytical Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
pH by Meter (1:2 Soil:Water Extraction)	E108  Vancouver - Environmental	Soil/Solid	BC Lab Manual	pH is determined by potentiometric measurement with a pH electrode at ambient laboratory temperature (normally $20 \pm 5^{\circ}\text{C}$ ), and is carried out in accordance with procedures described in the BC Lab Manual (prescriptive method). The procedure involves mixing the dried (at $<60^{\circ}\text{C}$ ) and sieved (10mesh/2mm) sample with ultra pure water at a 1:2 ratio of sediment to water. The pH is then measured by a standard pH probe.
Moisture Content by Gravimetry	E144  Vancouver - Environmental	Soil/Solid	CCME PHC in Soil - Tier 1	Moisture is measured gravimetrically by drying the sample at $105^{\circ}\text{C}$ . 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 $\text{HNO}_3$ and $\text{HCl}$ .  Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, 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 $\text{HNO}_3$ and $\text{HCl}$ , 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.
Hexavalent Chromium (Cr VI) by IC	E532  Waterloo - Environmental	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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<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 <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532  Waterloo - Environmental	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
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

<b>Work Order</b>	: <b>VA22C5774</b>	<b>Page</b>	: 1 of 16
<b>Client</b>	: Covanta Burnaby Renewable Energy, ULC	<b>Laboratory</b>	: Vancouver - Environmental
<b>Contact</b>	: Nicole Victor	<b>Account Manager</b>	: Brent Mack
<b>Address</b>	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	<b>Address</b>	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
<b>Telephone</b>	:	<b>Telephone</b>	: 778-370-3279
<b>Project</b>	: Weekly Bottom Ash - Suite	<b>Date Samples Received</b>	: 25-Oct-2022 13:00
<b>PO</b>	: VANCO 0000051213	<b>Date Analysis Commenced</b>	: 27-Oct-2022
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 08-Nov-2022 13:58
<b>Sampler</b>	: ----            ----		
<b>Site</b>	: ----		
<b>Quote number</b>	: Standing Offer (BC work)		
<b>No. of samples received</b>	: 12		
<b>No. of samples analysed</b>	: 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>
Alex Thornton	Analyst	Vancouver Metals, Burnaby, British Columbia
Hamideh Moradi	Analyst	Vancouver Metals, Burnaby, British Columbia
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Jon Fisher	Department Manager - Inorganics	Waterloo Metals, Waterloo, Ontario
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Qammar Almas	Lab Assistant	Vancouver Metals, Burnaby, British Columbia

Page : 2 of 16  
Work Order : VA22C5774  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : Weekly Bottom Ash - Suite

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## **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**

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

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### 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
<b>Physical Tests (QC Lot: 718859)</b>											
VA22C5774-002	BA2242-A-2	pH (1:2 soil:water)	----	E108	0.10	pH units	10.6	10.8	1.4%	5%	----
<b>Physical Tests (QC Lot: 718876)</b>											
VA22C5773-036	Anonymous	moisture	----	E144	0.25	%	35.0	36.8	5.14%	20%	----
<b>Physical Tests (QC Lot: 720871)</b>											
VA22C5774-001	BA2242-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.8	10.8	0.1%	5%	----
<b>Physical Tests (QC Lot: 720874)</b>											
VA22C5774-010	BA2242-A-10	moisture	----	E144	0.25	%	21.4	20.0	6.92%	20%	----
<b>Metals (QC Lot: 718854)</b>											
VA22C5773-033	Anonymous	mercury	7439-97-6	E510	0.0050	mg/kg	0.0378	0.0312	19.1%	40%	----
<b>Metals (QC Lot: 718855)</b>											
VA22C5774-002	BA2242-A-2	aluminum	7429-90-5	E440	50	mg/kg	53000	29600	56.6%	40%	DUP-H
		antimony	7440-36-0	E440	0.10	mg/kg	89.8	123	31.4%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	22.7	29.4	25.4%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	509	351	36.8%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.36	0.36	0.004	Diff <2x LOR	----
		bismuth	7440-69-9	E440	0.20	mg/kg	10.5	10.8	2.32%	30%	----
		boron	7440-42-8	E440	5.0	mg/kg	185	168	9.67%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	6.87	14.3	70.2%	30%	DUP-H
		calcium	7440-70-2	E440	50	mg/kg	117000	138000	16.6%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	142	233	48.3%	30%	DUP-H
		cobalt	7440-48-4	E440	0.10	mg/kg	26.1	81.3	103%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	1130	5780	134%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	40500	49900	20.7%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	310	419	30.0%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	20.9	24.3	14.8%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	11000	10600	3.23%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	960	699	31.5%	30%	DUP-H
		molybdenum	7439-98-7	E440	0.10	mg/kg	16.3	19.7	18.8%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	94.7	345	114%	30%	DUP-H
		phosphorus	7723-14-0	E440	50	mg/kg	10300	11900	14.7%	30%	----





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
<b>Metals (QC Lot: 718855) - continued</b>											
VA22C5774-002	BA2242-A-2	potassium	7440-09-7	E440	100	mg/kg	5520	6180	11.3%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.38	0.44	0.06	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	4.00	7.26	57.8%	40%	DUP-H
		sodium	7440-23-5	E440	50	mg/kg	16200	17400	7.04%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	268	308	14.0%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	11000	13700	22.4%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	92.2	172	60.4%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	541	206	89.6%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	4.25	5.20	20.0%	30%	----
		uranium	7440-61-1	E440	0.050	mg/kg	3.00	3.75	22.1%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	36.1	42.0	15.3%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	2750	3750	30.8%	30%	DUP-H
zirconium	7440-67-7	E440	1.0	mg/kg	2.0	1.3	0.7	Diff <2x LOR	----		
<b>Metals (QC Lot: 720869)</b>											
VA22C5774-001	BA2242-A-1	mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	<0.0500	0	Diff <2x LOR	----
<b>Metals (QC Lot: 720870)</b>											
VA22C5774-001	BA2242-A-1	aluminum	7429-90-5	E440	50	mg/kg	35300	30700	14.1%	40%	----
		antimony	7440-36-0	E440	0.10	mg/kg	157	108	37.3%	30%	DUP-H
		arsenic	7440-38-2	E440	0.10	mg/kg	28.1	31.1	10.2%	30%	----
		barium	7440-39-3	E440	0.50	mg/kg	479	329	37.2%	40%	----
		beryllium	7440-41-7	E440	0.10	mg/kg	0.52	# 0.30	0.22	Diff <2x LOR	DUP-H
		bismuth	7440-69-9	E440	0.20	mg/kg	8.59	13.4	44.1%	30%	DUP-H
		boron	7440-42-8	E440	5.0	mg/kg	218	174	22.2%	30%	----
		cadmium	7440-43-9	E440	0.020	mg/kg	11.1	9.22	18.7%	30%	----
		calcium	7440-70-2	E440	50	mg/kg	121000	116000	4.09%	30%	----
		chromium	7440-47-3	E440	0.50	mg/kg	157	176	11.6%	30%	----
		cobalt	7440-48-4	E440	0.10	mg/kg	66.7	124	60.0%	30%	DUP-H
		copper	7440-50-8	E440	0.50	mg/kg	8330	1650	134%	30%	DUP-H
		iron	7439-89-6	E440	50	mg/kg	47700	50500	5.56%	30%	----
		lead	7439-92-1	E440	0.50	mg/kg	596	531	11.5%	40%	----
		lithium	7439-93-2	E440	2.0	mg/kg	23.3	22.8	2.10%	30%	----
		magnesium	7439-95-4	E440	20	mg/kg	10900	10200	6.70%	30%	----
		manganese	7439-96-5	E440	1.0	mg/kg	784	1230	44.6%	30%	DUP-H



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
<b>Metals (QC Lot: 720870) - continued</b>											
VA22C5774-001	BA2242-A-1	molybdenum	7439-98-7	E440	0.10	mg/kg	18.5	18.2	1.85%	40%	----
		nickel	7440-02-0	E440	0.50	mg/kg	145	138	5.13%	30%	----
		phosphorus	7723-14-0	E440	50	mg/kg	10100	12800	23.0%	30%	----
		potassium	7440-09-7	E440	100	mg/kg	5090	4960	2.78%	40%	----
		selenium	7782-49-2	E440	0.20	mg/kg	0.47	0.40	0.07	Diff <2x LOR	----
		silver	7440-22-4	E440	0.10	mg/kg	8.11	7.34	10.0%	40%	----
		sodium	7440-23-5	E440	50	mg/kg	15300	15400	0.602%	40%	----
		strontium	7440-24-6	E440	0.50	mg/kg	275	253	8.10%	40%	----
		sulfur	7704-34-9	E440	1000	mg/kg	13000	13000	0.185%	30%	----
		thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		tin	7440-31-5	E440	2.0	mg/kg	200	118	52.0%	40%	DUP-H
		titanium	7440-32-6	E440	1.0	mg/kg	436	182	82.2%	40%	DUP-H
		tungsten	7440-33-7	E440	0.50	mg/kg	6.74	45.4	148%	30%	DUP-H
		uranium	7440-61-1	E440	0.050	mg/kg	3.46	3.15	9.19%	30%	----
		vanadium	7440-62-2	E440	0.20	mg/kg	54.0	43.1	22.3%	30%	----
		zinc	7440-66-6	E440	2.0	mg/kg	4960	3510	34.3%	30%	DUP-H
		zirconium	7440-67-7	E440	1.0	mg/kg	<1.0	1.4	0.4	Diff <2x LOR	----
<b>Speciated Metals (QC Lot: 729673)</b>											
VA22C5774-001	BA2242-A-1	chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10	<0.10	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
<b>Physical Tests (QCLot: 718876)</b>						
moisture	---	E144	0.25	%	<0.25	---
<b>Physical Tests (QCLot: 720874)</b>						
moisture	---	E144	0.25	%	<0.25	---
<b>Metals (QCLot: 718854)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
<b>Metals (QCLot: 718855)</b>						
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	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 718855) - continued</b>						
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	----
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	----
<b>Metals (QCLot: 720869)</b>						
mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 720870)</b>						
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	----



Sub-Matrix: **Soil/Solid**

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
<b>Metals (QCLot: 720870) - continued</b>						
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	----
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	----
<b>Speciated Metals (QCLot: 729673)</b>						
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 732792)</b>						
mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
<b>TCLP Metals (QCLot: 732793)</b>						
antimony, TCLP	7440-36-0	E444	0.1	mg/L	<0.10	----
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	----

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Work Order : VA22C5774  
Client : Covanta Burnaby Renewable Energy, ULC  
Project : Weekly Bottom Ash - Suite



Sub-Matrix: **Soil/Solid**

<i>Analyte</i>	<i>CAS Number</i>	<i>Method</i>	<i>LOR</i>	<i>Unit</i>	<i>Result</i>	<i>Qualifier</i>
<b>TCLP Metals (QCLot: 732793) - continued</b>						
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	
<b>Physical Tests (QCLot: 718859)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.2	95.0	105	----
<b>Physical Tests (QCLot: 718876)</b>									
moisture	----	E144	0.25	%	50 %	99.5	90.0	110	----
<b>Physical Tests (QCLot: 720871)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
<b>Physical Tests (QCLot: 720874)</b>									
moisture	----	E144	0.25	%	50 %	99.6	90.0	110	----
<b>Metals (QCLot: 718854)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	90.0	80.0	120	----
<b>Metals (QCLot: 718855)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	92.6	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	99.2	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	93.4	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	89.9	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.9	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	82.3	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	93.7	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.5	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	91.6	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.4	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	90.8	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	85.6	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.2	80.0	120	----
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	91.7	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.5	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.1	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	91.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	92.0	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	93.0	80.0	120	----
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.1	80.0	120	----



Sub-Matrix: Soil/Solid

Laboratory Control Sample (LCS) Report

Analyte	CAS Number	Method	LOR	Unit	Spike	Recovery (%)	Recovery Limits (%)		Qualifier
					Concentration	LCS	Low	High	
<b>Metals (QCLot: 718855) - continued</b>									
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	86.5	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	97.4	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	98.3	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.4	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	103	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	89.2	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	86.5	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	87.0	80.0	120	----
uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.1	80.0	120	----
vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	92.9	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	91.1	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	92.1	80.0	120	----
<b>Metals (QCLot: 720869)</b>									
mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	85.0	80.0	120	----
<b>Metals (QCLot: 720870)</b>									
aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	95.5	80.0	120	----
antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	92.6	80.0	120	----
arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	96.1	80.0	120	----
barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	90.2	80.0	120	----
beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	92.0	80.0	120	----
bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	91.5	80.0	120	----
boron	7440-42-8	E440	5	mg/kg	100 mg/kg	86.2	80.0	120	----
cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	90.1	80.0	120	----
calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	86.1	80.0	120	----
chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	89.9	80.0	120	----
cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	87.8	80.0	120	----
copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	88.6	80.0	120	----
iron	7439-89-6	E440	50	mg/kg	100 mg/kg	94.2	80.0	120	----
lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	92.2	80.0	120	----
lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	# 74.0	80.0	120	MES
magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	90.0	80.0	120	----
manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	91.2	80.0	120	----
molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.5	80.0	120	----
nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	89.4	80.0	120	----
phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	91.8	80.0	120	----
potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	89.3	80.0	120	----





Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Metals (QCLot: 720870) - continued</b>									
selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.8	80.0	120	----
silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	81.5	80.0	120	----
sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	91.6	80.0	120	----
strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	86.7	80.0	120	----
sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	87.2	80.0	120	----
thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	90.0	80.0	120	----
tin	7440-31-5	E440	2	mg/kg	50 mg/kg	89.6	80.0	120	----
titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	89.5	80.0	120	----
tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	96.1	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	91.7	80.0	120	----
zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	86.9	80.0	120	----
zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	91.1	80.0	120	----
<b>Speciated Metals (QCLot: 729673)</b>									
chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	80.7	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
<b>TCLP Metals (QCLot: 732792)</b>										
VA22C5774-001	BA2242-A-1	mercury, TCLP	7439-97-6	E512	0.0009 mg/L	0.001 mg/L	94.4	50.0	140	----
<b>TCLP Metals (QCLot: 732793)</b>										
VA22C5774-001	BA2242-A-1	antimony, TCLP	7440-36-0	E444	5.46 mg/L	5 mg/L	109	50.0	140	----
		arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	102	50.0	140	----
		barium, TCLP	7440-39-3	E444	12.8 mg/L	12.5 mg/L	102	50.0	140	----
		beryllium, TCLP	7440-41-7	E444	0.250 mg/L	0.25 mg/L	99.9	50.0	140	----
		boron, TCLP	7440-42-8	E444	10.2 mg/L	10 mg/L	102	50.0	140	----
		cadmium, TCLP	7440-43-9	E444	0.254 mg/L	0.25 mg/L	102	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	1.23 mg/L	1.25 mg/L	98.1	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	2.40 mg/L	2.5 mg/L	96.0	50.0	140	----
		iron, TCLP	7439-89-6	E444	252 mg/L	250 mg/L	101	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	248 mg/L	250 mg/L	99.3	50.0	140	----
		nickel, TCLP	7440-02-0	E444	2.40 mg/L	2.5 mg/L	96.2	50.0	140	----
		selenium, TCLP	7782-49-2	E444	5.06 mg/L	5 mg/L	101	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	5.0 mg/L	5 mg/L	101	50.0	140	----
		uranium, TCLP	7440-61-1	E444	5.31 mg/L	5 mg/L	106	50.0	150	----
		vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	100	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	99.1	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	
<b>Metals (QCLot: 718854)</b>									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----
<b>Metals (QCLot: 718855)</b>									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	102	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	100	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	100	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	91.8	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	110	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	113	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	94.0	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	98.8	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	111	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	99.5	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	96.2	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	108	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	108	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	101	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	99.3	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	97.3	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	112	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	103	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	105	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	95.8	70.0	130	----
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	115	70.0	130	----



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	
<b>Metals (QCLot: 718855) - continued</b>									
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	111	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	96.1	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	96.6	70.0	130	----
<b>Metals (QCLot: 720869)</b>									
	SCP SS-2	mercury	7439-97-6	E510	0.059 mg/kg	95.1	70.0	130	----
<b>Metals (QCLot: 720870)</b>									
	SCP SS-2	aluminum	7429-90-5	E440	9817 mg/kg	98.4	70.0	130	----
	SCP SS-2	antimony	7440-36-0	E440	3.99 mg/kg	86.2	70.0	130	----
	SCP SS-2	arsenic	7440-38-2	E440	3.73 mg/kg	92.1	70.0	130	----
	SCP SS-2	barium	7440-39-3	E440	105 mg/kg	93.3	70.0	130	----
	SCP SS-2	beryllium	7440-41-7	E440	0.349 mg/kg	86.2	70.0	130	----
	SCP SS-2	boron	7440-42-8	E440	8.5 mg/kg	101	40.0	160	----
	SCP SS-2	cadmium	7440-43-9	E440	0.91 mg/kg	93.4	70.0	130	----
	SCP SS-2	calcium	7440-70-2	E440	31082 mg/kg	85.7	70.0	130	----
	SCP SS-2	chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
	SCP SS-2	cobalt	7440-48-4	E440	6.9 mg/kg	95.4	70.0	130	----
	SCP SS-2	copper	7440-50-8	E440	123 mg/kg	98.0	70.0	130	----
	SCP SS-2	iron	7439-89-6	E440	23558 mg/kg	96.7	70.0	130	----
	SCP SS-2	lead	7439-92-1	E440	267 mg/kg	89.8	70.0	130	----
	SCP SS-2	lithium	7439-93-2	E440	9.5 mg/kg	84.7	70.0	130	----
	SCP SS-2	magnesium	7439-95-4	E440	5509 mg/kg	94.7	70.0	130	----
	SCP SS-2	manganese	7439-96-5	E440	269 mg/kg	98.0	70.0	130	----
	SCP SS-2	molybdenum	7439-98-7	E440	1.03 mg/kg	87.0	70.0	130	----
	SCP SS-2	nickel	7440-02-0	E440	26.7 mg/kg	94.8	70.0	130	----
	SCP SS-2	phosphorus	7723-14-0	E440	752 mg/kg	90.3	70.0	130	----
	SCP SS-2	potassium	7440-09-7	E440	1587 mg/kg	101	70.0	130	----
	SCP SS-2	sodium	7440-23-5	E440	797 mg/kg	96.9	70.0	130	----
	SCP SS-2	strontium	7440-24-6	E440	86.1 mg/kg	84.2	70.0	130	----
	SCP SS-2	thallium	7440-28-0	E440	0.0786 mg/kg	121	40.0	160	----
	SCP SS-2	tin	7440-31-5	E440	10.6 mg/kg	85.6	70.0	130	----

Page : 16 of 16  
 Work Order : VA22C5774  
 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	
<b>Metals (QCLot: 720870) - continued</b>									
	SCP SS-2	titanium	7440-32-6	E440	839 mg/kg	104	70.0	130	----
	SCP SS-2	uranium	7440-61-1	E440	0.52 mg/kg	93.8	70.0	130	----
	SCP SS-2	vanadium	7440-62-2	E440	32.7 mg/kg	98.7	70.0	130	----
	SCP SS-2	zinc	7440-66-6	E440	297 mg/kg	93.2	70.0	130	----
	SCP SS-2	zirconium	7440-67-7	E440	5.73 mg/kg	82.0	70.0	130	----
<b>Speciated Metals (QCLot: 729673)</b>									
	RM	chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	91.0	70.0	130	----



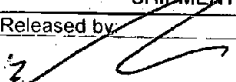

<b>Report To</b>			<b>Report Format / Distribution</b>			<b>Service Requested</b> (Rush for routine analysis subject to availability)					
Company: Covanta Energy			<input type="checkbox"/> Standard <input type="checkbox"/> Other			<input checked="" type="radio"/> Regular (Standard Turnaround Times -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

<b>Invoice To</b> Same as Report ?			<b>Client / Project Information</b>			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 #:			<table border="1"> <tr> <td rowspan="4">MET-TCLP-VA (all metals, Hg)</td> <td rowspan="4">MOISTURE</td> <td rowspan="4">Chrome 6</td> <td rowspan="4">MET-CSR+FULL-VA (all metals)</td> <td colspan="6"></td> <td rowspan="4">Number of Containers</td> </tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> <tr><td colspan="6"></td></tr> </table>						MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)							Number of Containers																		
MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)													Number of Containers																								
Company:			PO / AFE: PO# 46693 Weekly Bottom Ash - Suite																																					
Contact:			LSD: (includes 2:1 pH)																																					
Address:			Quote #:																																					
Phone:			Fax:																																					

Lab Work Order # (lab use only)		ALS Contact:	Sampler:									
Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)				Number of Containers
BA2242-A-1	Environmental Division Vancouver Work Order Reference <b>VA22C5774</b>  Telephone : +1 604 253 4188	19-Oct-22	9:00	Soil	X	X	X	X				1
BA2242-A-2		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-3		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-4		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-5		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-6		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-7		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-8		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-9		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-10		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-11		19-Oct-22	9:00	Soil	X	X		X				1
BA2242-A-12		19-Oct-22	9:00	Soil	X	X		X				1

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
	25-Oct-22	0800		10/25/22	1300	17 °C				Yes / No ? If Yes add SIF