

## Bottom Ash Data

2023 Week 17

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The following analytical report represents bottom ash composite results for week 17 of 2023 (April 23, 2023 to April 29, 2023).

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** : **VA23A9595**  
**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** : VANCO0000051998  
**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** : Ian Chen  
**Address** : 8081 Lougheed Highway  
                   Burnaby BC Canada V5A 1W9  
**Telephone** : +1 604 253 4188  
**Date Samples Received** : 03-May-2023 13:00  
**Date Analysis Commenced** : 03-May-2023  
**Issue Date** : 11-May-2023 16:35

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
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Parnian Sane	Analyst	Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia



## General Comments

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

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

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

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

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

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

<: less than.

>: greater than.

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

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

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

## Accreditation

<i>Accreditation</i>	<i>Description</i>	<i>Laboratory</i>	<i>Address</i>
A	CALA ISO/IEC 17025:2017	VA Vancouver - Environmental	8081 Lougheed Highway, Burnaby, British Columbia

Applicable accreditations are indicated in the Method/Lab column as superscripts.



## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-1	BA2317-A-2	BA2317-A-3	BA2317-A-4	BA2317-A-5
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-001	VA23A9595-002	VA23A9595-003	VA23A9595-004	VA23A9595-005	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
Moisture	----	E144/VA	A	0.25	%	25.7	25.2	25.6	26.8	24.5
pH (1:2 soil:water)	----	E108/VA	A	0.10	pH units	11.5	11.1	11.4	11.5	11.4
<b>Metals</b>										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	34100	49000	32600	38300	40200
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	130	118	144	134	132
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	23.8	27.1	27.8	24.6	27.6
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	571	731	589	627	524
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.34	0.39	0.48	0.35	0.43
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	9.10	7.91	15.9	12.4	11.7
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	239	176	175	230	185
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	12.2	13.1	11.3	13.2	11.3
Calcium	7440-70-2	E440/VA	A	50	mg/kg	151000	168000	147000	143000	141000
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	218	242	187	232	174
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	41.0	73.4	91.2	156	97.1
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	9550	5350	1790	1900	1480
Iron	7439-89-6	E440/VA	A	50	mg/kg	59300	81200	61800	63400	74500
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	357	1460	472	442	365
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	29.4	23.7	27.1	25.4	23.9
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	11600	14800	12700	12400	13100
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	872	1170	933	961	1120
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.149	0.133	0.129	0.158	0.116
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	145	244	186	77.2	83.3
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	169	164	152	114	117
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	11400	12400	11900	10300	10800
Potassium	7440-09-7	E440/VA	A	100	mg/kg	5170	6100	5920	5620	6040
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	0.46	0.60	0.49	0.38	0.43
Silver	7440-22-4	E440.Ag/VA	A	0.10	mg/kg	----	----	----	6.78	----
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	7.38	6.24	7.57	----	5.10
Sodium	7440-23-5	E440/VA	A	50	mg/kg	14300	17900	16800	16200	17900



## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-1	BA2317-A-2	BA2317-A-3	BA2317-A-4	BA2317-A-5
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-001	VA23A9595-002	VA23A9595-003	VA23A9595-004	VA23A9595-005	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	308	393	284	635	318
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	12400	13400	12200	11600	12200
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	0.057	0.067	<0.050	0.062	<0.050
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	178	150	111	120	109
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	252	383	223	337	339
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	26.1	29.5	22.5	35.4	26.1
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	4.53	5.12	4.48	4.25	4.31
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	45.1	49.1	47.7	50.2	104
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	6460	8660	4040	6400	3460
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	3.3	5.0	2.7	2.5	3.1
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	11.9	11.7	11.8	11.8	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	6.46	6.91	6.62	6.35	6.73
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA		0.010	pH units	6.24	6.49	6.28	6.24	6.37
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	2.45	2.42	2.60	2.64	2.45
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	0.228	0.138	0.193	0.227	0.166
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	2100	2150	2250	2310	2200
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	1.57	1.49	3.48	2.02	2.07
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	0.974	0.926	1.24	0.990	1.06
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	142	133	155	143	146
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	0.60	0.49	0.74	1.04	0.77



## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-1	BA2317-A-2	BA2317-A-3	BA2317-A-4	BA2317-A-5
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-001	VA23A9595-002	VA23A9595-003	VA23A9595-004	VA23A9595-005	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	31.1	15.7	37.0	37.9	30.3
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	<10	<10	<10	<10

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



## Analytical Results

Sub-Matrix: Soil (Matrix: Soil/Solid)					Client sample ID	BA2317-A-6	BA2317-A-7	BA2317-A-8	BA2317-A-9	BA2317-A-10
Client sampling date / time					26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-006	VA23A9595-007	VA23A9595-008	VA23A9595-009	VA23A9595-010	
					Result	Result	Result	Result	Result	
<b>Physical Tests</b>										
Moisture	---	E144/VA	A	0.25	%	27.8	25.8	24.5	25.2	26.3
pH (1:2 soil:water)	---	E108/VA	A	0.10	pH units	11.6	11.6	11.5	11.8	11.3
<b>Metals</b>										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	43500	41100	47500	51300	39100
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	121	133	142	151	157
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	29.5	22.8	25.4	28.0	30.7
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	494	523	617	649	569
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.39	0.36	0.44	0.46	0.39
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	13.2	8.49	10.6	7.96	16.1
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	198	192	231	210	181
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	10.6	11.9	11.8	11.6	14.5
Calcium	7440-70-2	E440/VA	A	50	mg/kg	137000	138000	157000	164000	172000
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	144	206	247	228	213
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	45.1	476	65.8	617	94.5
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	1960	2350	4650	3040	2260
Iron	7439-89-6	E440/VA	A	50	mg/kg	60400	73300	64300	83600	74200
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	939	410	4200	421	785
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	24.8	32.4	26.4	30.6	35.0
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	12000	12300	13800	14100	13400
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	784	1060	1100	1010	923
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.0922	0.0805	0.109	0.121	0.141
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	69.2	97.1	102	109	158
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	601	212	129	132	157
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	11300	10600	13800	11000	12700
Potassium	7440-09-7	E440/VA	A	100	mg/kg	5410	5450	6340	5420	6180
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	0.38	0.39	0.46	0.47	0.48
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	5.36	7.59	11.3	5.93	7.07
Sodium	7440-23-5	E440/VA	A	50	mg/kg	16000	16100	17900	15700	17200
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	279	287	306	324	325
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	10800	11700	13200	13700	14800



## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-6	BA2317-A-7	BA2317-A-8	BA2317-A-9	BA2317-A-10
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-006	VA23A9595-007	VA23A9595-008	VA23A9595-009	VA23A9595-010	
					Result	Result	Result	Result	Result	
<b>Metals</b>										
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	0.053	<0.050	0.061	0.061	0.070
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	153	189	190	117	131
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	253	274	317	375	289
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	18.4	27.3	23.4	23.5	39.2
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	4.19	4.17	4.76	5.12	5.74
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	44.9	45.8	64.5	52.0	50.7
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	3880	3900	4020	3580	5970
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	3.5	3.6	5.2	3.9	3.5
<b>TCLP Metals</b>										
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	11.8	11.8	11.8	11.8	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	7.08	8.29	7.29	8.61	8.41
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	2.89	2.89	2.89	2.89	2.89
pH, TCLP final	----	EPP444/VA		0.010	pH units	6.64	6.28	6.26	6.26	6.37
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	2.45	2.46	2.50	2.57	2.46
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	0.201	0.206	0.194	0.362	0.217
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	2160	2200	2220	2200	2090
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	1.06	2.03	1.50	1.28	1.32
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	0.840	0.856	1.04	1.00	0.855
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	136	145	150	145	131
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	0.46	0.82	0.56	1.00	0.62
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050





## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-6	BA2317-A-7	BA2317-A-8	BA2317-A-9	BA2317-A-10
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00	26-Apr-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-006	VA23A9595-007	VA23A9595-008	VA23A9595-009	VA23A9595-010	
					Result	Result	Result	Result	Result	
<b>TCLP Metals</b>										
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	17.5	34.5	22.4	26.9	16.6
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	<10	<10	<10	<10

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

Please refer to the Accreditation section for an explanation of analyte accreditations.



## Analytical Results

Sub-Matrix: Soil						Client sample ID				
(Matrix: Soil/Solid)						BA2317-A-11	BA2317-A-12	----	----	----
Client sampling date / time						26-Apr-2023 09:00	26-Apr-2023 09:00	---	---	---
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-011	VA23A9595-012	-----	-----	-----	
					Result	Result	---	---	---	
<b>Physical Tests</b>										
Moisture	---	E144/VA	A	0.25	%	24.1	24.7	---	---	---
pH (1:2 soil:water)	---	E108/VA	A	0.10	pH units	11.5	11.8	---	---	---
<b>Metals</b>										
Aluminum	7429-90-5	E440/VA	A	50	mg/kg	46700	34800	---	---	---
Antimony	7440-36-0	E440/VA	A	0.10	mg/kg	135	169	---	---	---
Arsenic	7440-38-2	E440/VA	A	0.10	mg/kg	22.0	30.1	---	---	---
Barium	7440-39-3	E440/VA	A	0.50	mg/kg	576	520	---	---	---
Beryllium	7440-41-7	E440/VA	A	0.10	mg/kg	0.35	0.37	---	---	---
Bismuth	7440-69-9	E440/VA	A	0.20	mg/kg	31.7	9.85	---	---	---
Boron	7440-42-8	E440/VA	A	5.0	mg/kg	186	290	---	---	---
Cadmium	7440-43-9	E440/VA	A	0.020	mg/kg	11.6	19.8	---	---	---
Calcium	7440-70-2	E440/VA	A	50	mg/kg	140000	160000	---	---	---
Chromium	7440-47-3	E440/VA	A	0.50	mg/kg	212	710	---	---	---
Cobalt	7440-48-4	E440/VA	A	0.10	mg/kg	135	197	---	---	---
Copper	7440-50-8	E440/VA	A	0.50	mg/kg	2080	3470	---	---	---
Iron	7439-89-6	E440/VA	A	50	mg/kg	75700	65000	---	---	---
Lead	7439-92-1	E440/VA	A	0.50	mg/kg	366	522	---	---	---
Lithium	7439-93-2	E440/VA	A	2.0	mg/kg	24.3	51.0	---	---	---
Magnesium	7439-95-4	E440/VA	A	20	mg/kg	12800	12700	---	---	---
Manganese	7439-96-5	E440/VA	A	1.0	mg/kg	978	1130	---	---	---
Mercury	7439-97-6	E510/VA	A	0.0500	mg/kg	0.155	0.174	---	---	---
Molybdenum	7439-98-7	E440/VA	A	0.10	mg/kg	174	137	---	---	---
Nickel	7440-02-0	E440/VA	A	0.50	mg/kg	132	708	---	---	---
Phosphorus	7723-14-0	E440/VA	A	50	mg/kg	9920	12500	---	---	---
Potassium	7440-09-7	E440/VA	A	100	mg/kg	5470	5620	---	---	---
Selenium	7782-49-2	E440/VA	A	0.20	mg/kg	0.39	0.47	---	---	---
Silver	7440-22-4	E440/VA	A	0.10	mg/kg	9.19	7.00	---	---	---
Sodium	7440-23-5	E440/VA	A	50	mg/kg	15600	16000	---	---	---
Strontium	7440-24-6	E440/VA	A	0.50	mg/kg	294	322	---	---	---
Sulfur	7704-34-9	E440/VA	A	1000	mg/kg	12100	14300	---	---	---



## Analytical Results

Sub-Matrix: Soil						Client sample ID		BA2317-A-11	BA2317-A-12	----	----	----
(Matrix: Soil/Solid)						Client sampling date / time		26-Apr-2023 09:00	26-Apr-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23A9595-011	VA23A9595-012	-----	-----	-----			
					Result	Result	----	----	----			
<b>Metals</b>												
Thallium	7440-28-0	E440/VA	A	0.050	mg/kg	0.073	0.066	----	----	----		
Tin	7440-31-5	E440/VA	A	2.0	mg/kg	109	144	----	----	----		
Titanium	7440-32-6	E440/VA	A	1.0	mg/kg	369	396	----	----	----		
Tungsten	7440-33-7	E440/VA	A	0.50	mg/kg	42.7	41.7	----	----	----		
Uranium	7440-61-1	E440/VA	A	0.050	mg/kg	4.40	5.35	----	----	----		
Vanadium	7440-62-2	E440/VA	A	0.20	mg/kg	50.2	55.2	----	----	----		
Zinc	7440-66-6	E440/VA	A	2.0	mg/kg	4140	5130	----	----	----		
Zirconium	7440-67-7	E440/VA	A	1.0	mg/kg	3.5	2.0	----	----	----		
<b>TCLP Metals</b>												
pH, TCLP 1st preliminary	----	EPP444/VA		0.010	pH units	11.8	11.8	----	----	----		
pH, TCLP 2nd preliminary	----	EPP444/VA		0.010	pH units	8.47	9.08	----	----	----		
pH, TCLP extraction fluid initial	----	EPP444/VA		0.010	pH units	2.89	2.89	----	----	----		
pH, TCLP final	----	EPP444/VA		0.010	pH units	6.50	6.28	----	----	----		
Antimony, TCLP	7440-36-0	E444/VA	A	1.00	mg/L	<1.00	<1.00	----	----	----		
Arsenic, TCLP	7440-38-2	E444/VA	A	1.0	mg/L	<1.0	<1.0	----	----	----		
Barium, TCLP	7440-39-3	E444/VA	A	2.5	mg/L	<2.5	<2.5	----	----	----		
Beryllium, TCLP	7440-41-7	E444/VA	A	0.025	mg/L	<0.025	<0.025	----	----	----		
Boron, TCLP	7440-42-8	E444/VA	A	0.50	mg/L	2.43	2.51	----	----	----		
Cadmium, TCLP	7440-43-9	E444/VA	A	0.050	mg/L	0.186	0.183	----	----	----		
Calcium, TCLP	7440-70-2	E444/VA	A	10	mg/L	2050	2160	----	----	----		
Chromium, TCLP	7440-47-3	E444/VA	A	0.25	mg/L	<0.25	<0.25	----	----	----		
Cobalt, TCLP	7440-48-4	E444/VA	A	0.050	mg/L	1.07	0.939	----	----	----		
Copper, TCLP	7440-50-8	E444/VA	A	0.050	mg/L	0.944	0.754	----	----	----		
Iron, TCLP	7439-89-6	E444/VA	A	5.0	mg/L	<5.0	<5.0	----	----	----		
Lead, TCLP	7439-92-1	E444/VA	A	0.25	mg/L	<0.25	<0.25	----	----	----		
Magnesium, TCLP	7439-95-4	E444/VA	A	2.5	mg/L	137	144	----	----	----		
Mercury, TCLP	7439-97-6	E512/VA	A	0.0010	mg/L	<0.0010	<0.0010	----	----	----		
Nickel, TCLP	7440-02-0	E444/VA	A	0.25	mg/L	0.52	0.56	----	----	----		
Selenium, TCLP	7782-49-2	E444/VA	A	0.10	mg/L	<0.10	<0.10	----	----	----		
Silver, TCLP	7440-22-4	E444/VA	A	0.050	mg/L	<0.050	<0.050	----	----	----		



## Analytical Results

Sub-Matrix: Soil						Client sample ID		BA2317-A-11	BA2317-A-12	----	----	----
(Matrix: Soil/Solid)						Client sampling date / time		26-Apr-2023 09:00	26-Apr-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit		VA23A9595-011	VA23A9595-012	-----	-----	-----		
TCLP Metals						Result	Result	---	---	---		
Thallium, TCLP	7440-28-0	E444/VA	A	1.0	mg/L	<1.0	<1.0	----	----	----		
Uranium, TCLP	7440-61-1	E444/VA	A	0.20	mg/L	<0.20	<0.20	----	----	----		
Vanadium, TCLP	7440-62-2	E444/VA	A	0.15	mg/L	<0.15	<0.15	----	----	----		
Zinc, TCLP	7440-66-6	E444/VA	A	0.50	mg/L	22.2	37.1	----	----	----		
Zirconium, TCLP	7440-67-7	E444/VA	A	10	mg/L	<10	<10	----	----	----		

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

Please refer to the Accreditation section for an explanation of analyte accreditations.




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## QUALITY CONTROL INTERPRETIVE REPORT

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<p><b>Work Order</b> : <b>VA23A9595</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> : VANCO0000051998</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> : Ian Chen</p> <p><b>Address</b> : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p><b>Telephone</b> : +1 604 253 4188</p> <p><b>Date Samples Received</b> : 03-May-2023 13:00</p> <p><b>Issue Date</b> : 11-May-2023 16:36</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***

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

#### ***Outliers: Reference Material (RM) Samples***

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

***Outliers : Analysis Holding Time Compliance (Breaches)***

- No Analysis Holding Time Outliers exist.

***Outliers : Frequency of Quality Control Samples***

- No Quality Control Sample Frequency Outliers occur.



**Outliers : Quality Control Samples**

*Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes*

Matrix: Soil/Solid

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
<b>Duplicate (DUP) RPDs</b>								
Metals	Anonymous	Anonymous	Antimony	7440-36-0	E440	39.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	Bismuth	7440-69-9	E440	37.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Bismuth	7440-69-9	E440	80.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	Cadmium	7440-43-9	E440	30.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Cadmium	7440-43-9	E440	38.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	Chromium	7440-47-3	E440	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Chromium	7440-47-3	E440	132 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Cobalt	7440-48-4	E440	54.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Copper	7440-50-8	E440	79.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Iron	7439-89-6	E440	49.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	Anonymous	Anonymous	Lead	7439-92-1	E440	62.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Lithium	7439-93-2	E440	61.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Manganese	7439-96-5	E440	41.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Molybdenum	7439-98-7	E440	43.4 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Nickel	7440-02-0	E440	145 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Tungsten	7440-33-7	E440	50.5 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Zinc	7440-66-6	E440	35.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23A9595-012	BA2317-A-12	Zirconium	7440-67-7	E440	2.2 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).



Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
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**Result Qualifiers**

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

Reference Material (RM) Sample								
Metals	QC-MRG2-9284840 03	----	Titanium	7440-32-6	E440	139 % <sup>MES</sup>	70.0-130%	Recovery greater than upper control limit

**Result Qualifiers**

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





## Analysis Holding Time Compliance

This report summarizes extraction / preparation and analysis times and compares each with ALS recommended holding times, which are selected to meet known provincial and /or federal requirements. In the absence of regulatory hold times, ALS establishes recommendations based on guidelines published by organizations such as CCME, US EPA, APHA Standard Methods, ASTM, or Environment Canada (where available). Dates and holding times reported below represent the first dates of extraction or analysis. If subsequent tests or dilutions exceeded holding times, qualifiers are added (refer to COA).

If samples are identified below as having been analyzed or extracted outside of recommended holding times, measurement uncertainties may be increased, and this should be taken into consideration when interpreting results.

Where actual sampling date is not provided on the chain of custody, the date of receipt with time at 00:00 is used for calculation purposes.

Where only the sample date without time is provided on the chain of custody, the sampling date at 00:00 is used for calculation purposes.

Matrix: Soil/Solid

Evaluation: \* = Holding time exceedance ; ✓ = Within Holding Time

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : High Silver in Soil/Solid by CRC ICPMS</b>											
LDPE bag BA2317-A-4	E440.Ag	26-Apr-2023	11-May-2023	180 days	15 days	✓	11-May-2023	165 days	0 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-1	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-10	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-11	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-12	E510	26-Apr-2023	09-May-2023	----	----		10-May-2023	28 days	14 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-2	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✓	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-3	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✓	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-4	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-5	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-6	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-7	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-8	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Mercury in Soil/Solid by CVAAS</b>											
LDPE bag BA2317-A-9	E510	26-Apr-2023	10-May-2023	----	----		10-May-2023	28 days	14 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2317-A-1	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2317-A-10	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICPCS</b>											
LDPE bag BA2317-A-11	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-12	E440	26-Apr-2023	09-May-2023	----	----		10-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-2	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-3	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-4	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-5	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-6	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-7	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-8	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	
<b>Metals : Metals in Soil/Solid by CRC ICMS</b>											
LDPE bag BA2317-A-9	E440	26-Apr-2023	10-May-2023	----	----		11-May-2023	180 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-1	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-10	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-11	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-12	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-2	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-3	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-4	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-5	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	
<b>Physical Tests : Moisture Content by Gravimetry</b>										
LDPE bag BA2317-A-6	E144	26-Apr-2023	----	----	----		09-May-2023	----	----	



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 BA2317-A-7	E144	26-Apr-2023	----	----	----		09-May-2023	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2317-A-8	E144	26-Apr-2023	----	----	----		09-May-2023	----	----		
<b>Physical Tests : Moisture Content by Gravimetry</b>											
LDPE bag BA2317-A-9	E144	26-Apr-2023	----	----	----		09-May-2023	----	----		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-1	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-10	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-11	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-12	E108	26-Apr-2023	09-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-2	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-3	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-4	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-5	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-6	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-7	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-8	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>Physical Tests : pH by Meter (1:2 Soil:Water Extraction)</b>											
LDPE bag BA2317-A-9	E108	26-Apr-2023	10-May-2023	----	----		10-May-2023	30 days	14 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-1	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-10	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-11	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 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>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-12	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-2	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-3	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-4	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-5	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-6	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-7	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-8	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 days	9 days	✔	
<b>TCLP Metals : Mercury by CVAAS (TCLP)</b>											
Glass vial - total (lab preserved) BA2317-A-9	E512	03-May-2023	05-May-2023	----	----		05-May-2023	28 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>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-1	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-10	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-11	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-12	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-2	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-3	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-4	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-5	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-6	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 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>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-7	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-8	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : Metals by CRC ICPMS (TCLP)</b>											
HDPE - total (lab preserved) BA2317-A-9	E444	03-May-2023	05-May-2023	----	----		05-May-2023	180 days	9 days	✔	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-1	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-10	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-11	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-12	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-2	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-3	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----		



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, PFAS) BA2317-A-4	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-5	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-6	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-7	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-8	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	
<b>TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)</b>										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2317-A-9	EPP444	26-Apr-2023	03-May-2023	----	----		----	----	----	

**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>							
Mercury in Soil/Solid by CVAAS	E510	928986	2	31	6.4	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	928985	2	31	6.4	5.0	✔
Moisture Content by Gravimetry	E144	928990	2	23	8.7	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	928987	2	30	6.6	5.0	✔
<b>Laboratory Control Samples (LCS)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	932776	1	1	100.0	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	928986	4	31	12.9	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	928985	4	31	12.9	10.0	✔
Moisture Content by Gravimetry	E144	928990	2	23	8.7	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	928987	2	30	6.6	5.0	✔
<b>Method Blanks (MB)</b>							
High Silver in Soil/Solid by CRC ICPMS	E440.Ag	932776	1	1	100.0	5.0	✔
Mercury by CVAAS (TCLP)	E512	923410	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	928986	2	31	6.4	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	923408	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	928985	2	31	6.4	5.0	✔
Moisture Content by Gravimetry	E144	928990	2	23	8.7	5.0	✔
<b>Matrix Spikes (MS)</b>							
Mercury by CVAAS (TCLP)	E512	923410	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	923408	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 <sub>3</sub> 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.
High Silver in Soil/Solid by CRC ICPMS	E440.Ag  Vancouver - Environmental	Soil/Solid	EPA 6020B (mod)	Samples are sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl. This method is intended to liberate metals that may be environmentally available. Silicate minerals are not solubilized. Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444  Vancouver - Environmental	Soil/Solid	EPA 1311/6020B (mod)	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by Collision/Reaction Cell ICPMS.
Mercury in Soil/Solid by CVAAS	E510  Vancouver - Environmental	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO <sub>3</sub> and HCl, followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512  Vancouver - Environmental	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Leach 1:2 Soil:Water for pH/EC	EP108  Vancouver - Environmental	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
Digestion for Silver	EP440.Ag  Vancouver - Environmental	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO3 and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444  Vancouver - Environmental	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

## QUALITY CONTROL REPORT

<b>Work Order</b>	: <b>VA23A9595</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>	: Ian Chen
<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>	: +1 604 253 4188
<b>Project</b>	: Weekly Bottom Ash - Suite	<b>Date Samples Received</b>	: 03-May-2023 13:00
<b>PO</b>	: VANCO0000051998	<b>Date Analysis Commenced</b>	: 03-May-2023
<b>C-O-C number</b>	: ----	<b>Issue Date</b>	: 11-May-2023 16:35
<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
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Work Order : VA23A9595  
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: 928486)</b>											
VA23A9537-003	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	5.74	5.91	2.9%	5%	----
<b>Physical Tests (QC Lot: 928489)</b>											
VA23A9540-001	Anonymous	Moisture	----	E144	0.25	%	74.1	73.3	1.05%	20%	----
<b>Physical Tests (QC Lot: 928987)</b>											
VA23A9595-012	BA2317-A-12	pH (1:2 soil:water)	----	E108	0.10	pH units	11.8	11.7	0.3%	5%	----
<b>Physical Tests (QC Lot: 928990)</b>											
VA23A9595-012	BA2317-A-12	Moisture	----	E144	0.25	%	24.7	25.1	1.47%	20%	----
<b>Metals (QC Lot: 928484)</b>											
VA23A9537-003	Anonymous	Mercury	7439-97-6	E510	0.0500	mg/kg	0.180	0.190	0.0098	Diff <2x LOR	----
<b>Metals (QC Lot: 928485)</b>											
VA23A9537-003	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	12300	8650	34.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.91	0.60	39.9%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	0.59	0.47	0.12	Diff <2x LOR	----
		Barium	7440-39-3	E440	0.50	mg/kg	38.7	30.5	23.6%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	<0.10	<0.10	0	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	12.1	8.26	37.5%	30%	DUP-H
		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	0.291	0.213	30.9%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	6270	5220	18.2%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	6.99	4.88	35.7%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	0.86	0.66	26.4%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	102	84.4	19.3%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	1850	1730	6.67%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	6.00	3.14	62.5%	40%	DUP-H
		Lithium	7439-93-2	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	1220	1070	13.3%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	52.2	44.1	16.9%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.67	1.21	32.0%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	4.60	3.63	23.7%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	10700	8160	27.3%	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: 928485) - continued</b>											
VA23A9537-003	Anonymous	Potassium	7440-09-7	E440	100	mg/kg	1060	840	22.1%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	1.33	1.00	0.33	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	0.54	0.42	0.12	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	237	191	46	Diff <2x LOR	----
		Strontium	7440-24-6	E440	0.50	mg/kg	23.6	19.1	20.8%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	2900	2300	600	Diff <2x LOR	----
		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	8.1	5.3	2.8	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	48.2	46.0	4.62%	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	0.158	0.123	0.036	Diff <2x LOR	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	3.55	3.31	7.19%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	228	170	29.1%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	6.0	4.5	1.5	Diff <2x LOR	----
<b>Metals (QC Lot: 928985)</b>											
VA23A9595-012	BA2317-A-12	Aluminum	7429-90-5	E440	50	mg/kg	34800	45500	26.7%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	169	134	23.2%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	30.1	25.6	16.0%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	520	554	6.49%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.37	0.41	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.85	23.2	80.8%	30%	DUP-H
		Boron	7440-42-8	E440	5.0	mg/kg	290	304	4.56%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	19.8	13.4	38.2%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	160000	156000	2.63%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	710	144	132%	30%	DUP-H
		Cobalt	7440-48-4	E440	0.10	mg/kg	197	112	54.7%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	3470	1500	79.1%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	65000	39100	49.8%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	522	426	20.4%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	51.0	26.9	61.8%	30%	DUP-H
		Magnesium	7439-95-4	E440	20	mg/kg	12700	13200	3.40%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1130	744	41.4%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	137	87.9	43.4%	40%	DUP-H
Nickel	7440-02-0	E440	0.50	mg/kg	708	113	145%	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: 928985) - continued</b>											
VA23A9595-012	BA2317-A-12	Phosphorus	7723-14-0	E440	50	mg/kg	12500	14100	12.0%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5620	5600	0.241%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.47	0.53	0.06	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	7.00	5.48	24.4%	40%	----
		Sodium	7440-23-5	E440	50	mg/kg	16000	17800	10.2%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	322	306	5.05%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	14300	12800	11.6%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.066	0.056	0.010	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	144	115	22.4%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	396	290	30.9%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	41.7	24.9	50.5%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	5.35	4.75	11.8%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	55.2	48.7	12.5%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	5130	3590	35.3%	30%	DUP-H
Zirconium	7440-67-7	E440	1.0	mg/kg	2.0	# 4.3	2.2	Diff <2x LOR	DUP-H		
<b>Metals (QC Lot: 928986)</b>											
VA23A9595-012	BA2317-A-12	Mercury	7439-97-6	E510	0.0500	mg/kg	0.174	0.140	0.0342	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: 928489)</b>						
Moisture	---	E144	0.25	%	<0.25	---
<b>Physical Tests (QCLot: 928990)</b>						
Moisture	---	E144	0.25	%	<0.25	---
<b>Metals (QCLot: 928484)</b>						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
<b>Metals (QCLot: 928485)</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: 928485) - 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: 928985)</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: 928985) - 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: 928986)</b>						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
<b>Metals (QCLot: 932776)</b>						
Silver	7440-22-4	E440.Ag	0.1	mg/kg	<0.10	----
<b>TCLP Metals (QCLot: 923408)</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	----
Zirconium, TCLP	7440-67-7	E444	10	mg/L	<10	----
<b>TCLP Metals (QCLot: 923410)</b>						

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Work Order : VA23A9595  
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: 923410) - continued</b>						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----



## Laboratory Control Sample (LCS) Report

A Laboratory Control Sample (LCS) is an analyte-free matrix that has been fortified (spiked) with test analytes at known concentration and processed in an identical manner to test samples. LCS results are expressed as percent recovery, and are used to monitor and control test method accuracy and precision, independent of test sample matrix.

Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
<b>Physical Tests (QCLot: 928486)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
<b>Physical Tests (QCLot: 928489)</b>									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
<b>Physical Tests (QCLot: 928987)</b>									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
<b>Physical Tests (QCLot: 928990)</b>									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
<b>Metals (QCLot: 928484)</b>									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
<b>Metals (QCLot: 928485)</b>									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	105	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	107	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	96.9	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	95.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.9	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	98.9	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	98.5	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	102	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	98.1	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	99.9	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	97.0	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	106	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	102	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	100	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	100	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	114	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	103	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	101	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: 928485) - continued</b>									
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	87.3	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	95.5	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	92.5	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	99.1	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	98.6	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	104	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	99.2	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	102	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	104	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	102	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	97.6	80.0	120	----
<b>Metals (QCLot: 928985)</b>									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	101	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	106	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	101	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.4	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	91.3	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	100	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	95.0	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	99.1	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	94.2	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	94.6	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	94.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	102	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	102	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	89.2	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	94.2	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	96.0	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	103	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	95.0	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	102	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	97.7	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	92.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	93.1	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
<b>Metals (QCLot: 928985) - continued</b>									
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	101	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	101	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	96.0	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	102	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	97.4	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	95.2	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	98.8	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	98.2	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	98.9	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	95.8	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	96.3	80.0	120	----
<b>Metals (QCLot: 928986)</b>									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.3	80.0	120	----
<b>Metals (QCLot: 932776)</b>									
Silver	7440-22-4	E440.Ag	0.1	mg/kg	10 mg/kg	82.2	80.0	120	----



### Matrix Spike (MS) Report

A Matrix Spike (MS) is a randomly selected intra-laboratory replicate sample that has been fortified (spiked) with test analytes at known concentration, and processed in an identical manner to test samples. Matrix Spikes provide information regarding analyte recovery and potential matrix effects. MS DQO exceedances due to sample matrix may sometimes be unavoidable; in such cases, test results for the associated sample (or similar samples) may be subject to bias. ND – Recovery not determined, background level >= 1x spike level.

Sub-Matrix: Soil/Solid

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
<b>TCLP Metals (QCLot: 923408)</b>										
VA23A9595-001	BA2317-A-1	Antimony, TCLP	7440-36-0	E444	4.42 mg/L	5 mg/L	88.4	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	4.2 mg/L	5 mg/L	85.1	50.0	140	----
		Barium, TCLP	7440-39-3	E444	10.6 mg/L	12.5 mg/L	84.4	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.216 mg/L	0.25 mg/L	86.2	50.0	140	----
		Boron, TCLP	7440-42-8	E444	8.46 mg/L	10 mg/L	84.6	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.218 mg/L	0.25 mg/L	87.1	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	1.05 mg/L	1.25 mg/L	84.1	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	2.06 mg/L	2.5 mg/L	82.2	50.0	140	----
		Iron, TCLP	7439-89-6	E444	199 mg/L	250 mg/L	79.5	50.0	140	----
		Lead, TCLP	7439-92-1	E444	8.22 mg/L	10 mg/L	82.2	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	216 mg/L	250 mg/L	86.5	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.06 mg/L	2.5 mg/L	82.4	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	4.21 mg/L	5 mg/L	84.2	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.092 mg/L	0.1 mg/L	92.2	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.1 mg/L	5 mg/L	83.0	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.33 mg/L	5 mg/L	86.7	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.65 mg/L	0.75 mg/L	86.8	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	8 mg/L	10 mg/L	79.9	50.0	150	----
<b>TCLP Metals (QCLot: 923410)</b>										
VA23A9595-001	BA2317-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	101	50.0	140	----



## Reference Material (RM) Report

A Reference Material (RM) is a homogenous material with known and well-established analyte concentrations. RMs are processed in an identical manner to test samples, and are used to monitor and control the accuracy and precision of a test method for a typical sample matrix. RM results are expressed as percent recovery of the target analyte concentration. RM targets may be certified target concentrations provided by the RM supplier, or may be ALS long-term mean values (for empirical test methods).

Sub-Matrix:

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: 928484)</b>									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	104	70.0	130	----
<b>Metals (QCLot: 928485)</b>									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	125	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	114	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	109	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	110	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	113	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	142	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	98.8	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	113	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	126	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	110	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	107	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	110	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	107	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	109	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	118	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	117	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	106	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	106	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	113	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	127	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	108	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	104	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	104	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	103	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	# 139	70.0	130	MES



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: 928485) - continued</b>									
	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	116	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	106	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	105	70.0	130	----
<b>Metals (QCLot: 928985)</b>									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	114	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	107	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	101	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	98.4	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	87.4	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	142	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	94.1	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	104	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	115	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	102	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	101	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	102	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	110	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	87.4	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	100	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	107	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	109	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	102	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	102	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	118	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	110	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	107	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	108	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	98.6	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	119	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	112	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: 928985) - continued</b>									
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	109	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	101	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	100	70.0	130	----
<b>Metals (QCLot: 928986)</b>									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	101	70.0	130	----

## Qualifiers

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



ALS Environmental

Chain of Custody / Analytical Request Form

Canada Toll Free: 1 800 668 9878

www.alsglobal.com

COC #

Page of

<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:	Nicole Victor / Dan Skrypnik	<input checked="" type="checkbox"/> PDF	<input type="checkbox"/> Excel	<input type="checkbox"/> Digital	<input type="checkbox"/> Fax
Address:	5150 Riverbend Drive Burnaby BC	Email 1:	nvictor@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Email 2:	ofetherstonhaugh@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Fax:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers
----------	---	---------------------	-----------------	-------------	------------------------------	----------	----------	------------------------------	----------------------

Lab/Work Order # (lab use only)	A9595		ALS Contact:	Sampler:					
BA2317-A-1		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-2		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-3		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-4		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-5		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-6		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-7		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-8		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-9		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-10		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-11		26-Apr-23	9:00	Soil	X	X		X	1
BA2317-A-12		26-Apr-23	9:00	Soil	X	X		X	1

Environmental Division  
Vancouver  
Work Order Reference  
**VA23A9595**

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
	3-May-23	0800	SC	MAY - 3 2023	1300	22 °C				