

Bottom Ash Data

2023 Week 44

The following analytical report represents bottom ash composite results for week 44 of 2023 (October 29, 2023 to November 4, 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 : **VA23C6750**
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 : VANCO0000051999
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 : ALS Environmental - Vancouver
Account Manager : Ian Chen
Address : 8081 Lougheed Highway
 Burnaby BC Canada V5A 1W9
Telephone : +1 604 253 4188
Date Samples Received : 07-Nov-2023 11:00
Date Analysis Commenced : 12-Nov-2023
Issue Date : 17-Nov-2023 23:05

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>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Organics, Burnaby, British Columbia
Owen Cheng		Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Metals, Burnaby, British Columbia
Sam Silveira	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/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2344-A-1	BA2344-A-2	BA2344-A-3	BA2344-A-4	BA2344-A-5
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-001	VA23C6750-002	VA23C6750-003	VA23C6750-004	VA23C6750-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	29.8	30.6	32.0	30.8	28.8
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	10.4	10.5	10.7	10.8	10.6
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	40600	31000	35200	37400	45000
Antimony	7440-36-0	E440/VA	0.10	mg/kg	127	118	103	95.0	107
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	16.1	15.4	16.5	14.8	15.1
Barium	7440-39-3	E440/VA	0.50	mg/kg	536	447	410	477	477
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.39	0.38	0.38	0.32	0.35
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	8.46	7.21	7.57	6.63	7.76
Boron	7440-42-8	E440/VA	5.0	mg/kg	188	208	188	192	170
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	8.57	8.38	9.61	8.94	9.40
Calcium	7440-70-2	E440/VA	50	mg/kg	151000	151000	153000	148000	147000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	184	162	161	145	288
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	130	311	374	208	380
Copper	7440-50-8	E440/VA	0.50	mg/kg	1750	2860	5140	2840	4190
Iron	7439-89-6	E440/VA	50	mg/kg	68600	54600	61400	63800	57100
Lead	7439-92-1	E440/VA	0.50	mg/kg	299	517	560	887	520
Lithium	7439-93-2	E440/VA	2.0	mg/kg	31.9	34.7	51.8	38.2	28.8
Magnesium	7439-95-4	E440/VA	20	mg/kg	11700	11300	11500	11700	12100
Manganese	7439-96-5	E440/VA	1.0	mg/kg	1120	778	816	970	837
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0752	<0.0500	0.0649	0.0688	0.102
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	36.5	40.9	36.3	39.8	45.5
Nickel	7440-02-0	E440/VA	0.50	mg/kg	505	228	189	209	403
Phosphorus	7723-14-0	E440/VA	50	mg/kg	8320	11300	10100	9300	8950
Potassium	7440-09-7	E440/VA	100	mg/kg	5050	5370	5490	5590	5330
Selenium	7782-49-2	E440/VA	0.20	mg/kg	1.74	0.39	0.35	0.27	0.36
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.01	15.0	6.17	4.35	22.4
Sodium	7440-23-5	E440/VA	50	mg/kg	15700	15000	14600	14800	14700
Strontium	7440-24-6	E440/VA	0.50	mg/kg	319	306	361	277	293



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2344-A-1	BA2344-A-2	BA2344-A-3	BA2344-A-4	BA2344-A-5
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-001	VA23C6750-002	VA23C6750-003	VA23C6750-004	VA23C6750-005
					Result	Result	Result	Result	Result
Metals									
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11200	10500	10900	10900	11000
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	<0.050	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	110	153	175	102	367
Titanium	7440-32-6	E440/VA	1.0	mg/kg	327	200	256	243	287
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	14.5	11.7	11.4	13.2	16.0
Uranium	7440-61-1	E440/VA	0.050	mg/kg	2.52	2.70	2.79	2.71	2.73
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	39.3	36.1	38.7	45.1	41.1
Zinc	7440-66-6	E440/VA	2.0	mg/kg	2730	2950	3540	4080	3930
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.4	3.9	3.4	3.7	4.4
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.7	11.7	11.7	11.7	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.90	6.49	7.57	6.77	7.00
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units	7.05	7.08	6.75	6.84	7.01
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	1.99	2.05	2.10	2.02	2.08
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.096	0.065	0.095	0.075	0.063
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2060	2110	2030	2060	2060
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	0.628	0.891	1.37	0.527	0.584
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.972	0.838	0.977	0.900	0.924
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L	102	104	104	104	104
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	<0.25	0.30	0.34	0.37	<0.25
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2344-A-1	BA2344-A-2	BA2344-A-3	BA2344-A-4	BA2344-A-5
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-001	VA23C6750-002	VA23C6750-003	VA23C6750-004	VA23C6750-005
					Result	Result	Result	Result	Result
TCLP Metals									
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	6.76	6.05	11.0	9.66	4.77
Zirconium, TCLP	7440-67-7	E444/VA	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/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2344-A-6	BA2344-A-7	BA2344-A-8	BA2344-A-9	BA2344-A-10
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-006	VA23C6750-007	VA23C6750-008	VA23C6750-009	VA23C6750-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	---	E144/VA	0.25	%	30.1	29.2	31.4	29.7	31.9
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.7	10.6	10.9	10.7	10.7
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	46800	32600	37900	29600	44400
Antimony	7440-36-0	E440/VA	0.10	mg/kg	109	113	108	106	96.8
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	19.2	17.1	15.2	17.2	17.6
Barium	7440-39-3	E440/VA	0.50	mg/kg	468	545	567	567	445
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.31	0.32	0.39	0.36	0.55
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	7.36	9.72	10.3	8.80	19.0
Boron	7440-42-8	E440/VA	5.0	mg/kg	161	308	166	190	150
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	9.39	8.26	8.77	7.50	14.9
Calcium	7440-70-2	E440/VA	50	mg/kg	150000	149000	152000	146000	148000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	151	138	389	163	162
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	44.3	157	205	53.5	33.5
Copper	7440-50-8	E440/VA	0.50	mg/kg	1960	5310	1880	2080	3000
Iron	7439-89-6	E440/VA	50	mg/kg	46300	63400	48800	73800	49100
Lead	7439-92-1	E440/VA	0.50	mg/kg	403	482	453	363	450
Lithium	7439-93-2	E440/VA	2.0	mg/kg	26.7	58.4	23.4	22.5	25.0
Magnesium	7439-95-4	E440/VA	20	mg/kg	11000	11200	12100	11600	11500
Manganese	7439-96-5	E440/VA	1.0	mg/kg	771	779	944	1090	884
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0761	0.0680	0.0721	0.0619	0.0627
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	35.9	72.4	41.9	38.1	35.8
Nickel	7440-02-0	E440/VA	0.50	mg/kg	141	438	188	186	127
Phosphorus	7723-14-0	E440/VA	50	mg/kg	11200	9210	9870	9640	9480
Potassium	7440-09-7	E440/VA	100	mg/kg	5680	5580	5810	4630	5330
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.42	0.36	0.33	0.33	0.36
Silver	7440-22-4	E440/VA	0.10	mg/kg	5.81	9.39	3.32	2.91	5.06
Sodium	7440-23-5	E440/VA	50	mg/kg	15300	15000	15500	13000	14600
Strontium	7440-24-6	E440/VA	0.50	mg/kg	274	277	292	270	256
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11500	10700	10800	10000	10400



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2344-A-6	BA2344-A-7	BA2344-A-8	BA2344-A-9	BA2344-A-10
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-006	VA23C6750-007	VA23C6750-008	VA23C6750-009	VA23C6750-010
					Result	Result	Result	Result	Result
Metals									
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	0.204	<0.050	<0.050	<0.050
Tin	7440-31-5	E440/VA	2.0	mg/kg	117	293	101	92.3	111
Titanium	7440-32-6	E440/VA	1.0	mg/kg	287	274	288	288	306
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	16.0	14.1	13.7	11.4	12.6
Uranium	7440-61-1	E440/VA	0.050	mg/kg	2.80	2.67	2.84	2.52	2.79
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	39.6	34.9	41.3	39.3	42.5
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3290	27000	3110	3790	2830
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.9	2.6	2.4	1.8	4.2
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.7	11.7	11.7	11.7	11.8
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	7.14	7.39	7.32	7.98	8.25
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.86	2.86	2.86	2.86	2.86
pH, TCLP final	----	EPP444/VA	0.010	pH units	7.03	6.97	7.04	7.03	6.81
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	<2.5	<2.5	<2.5
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	<0.025	<0.025	<0.025
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	2.01	2.04	2.03	2.04	2.02
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.076	0.072	0.093	0.063	0.083
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2040	2130	2110	2100	2090
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	0.671	0.850	0.938	0.572	0.871
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.02	0.922	1.20	1.08	1.16
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L	<5.0	<5.0	<5.0	<5.0	<5.0
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L	<0.25	<0.25	<0.25	<0.25	<0.25
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L	100	106	103	105	107
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	<0.25	0.46	0.46	<0.25	0.32
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L	<0.10	<0.10	<0.10	<0.10	<0.10
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L	<0.050	<0.050	<0.050	<0.050	<0.050



Analytical Results

Sub-Matrix: Soil/Solid

Client sample ID

(Matrix: Soil/Solid)

					BA2344-A-6	BA2344-A-7	BA2344-A-8	BA2344-A-9	BA2344-A-10
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00	01-Nov-2023 00:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-006	VA23C6750-007	VA23C6750-008	VA23C6750-009	VA23C6750-010
					Result	Result	Result	Result	Result
TCLP Metals									
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<0.20	<0.20	<0.20	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	12.4	6.55	7.59	6.01	7.10
Zirconium, TCLP	7440-67-7	E444/VA	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/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2344-A-11	BA2344-A-12	----	----	----
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-011	VA23C6750-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	29.7	28.0	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.8	10.7	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	34800	41200	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	103	85.7	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	16.0	14.9	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	402	419	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.37	0.34	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	7.42	6.46	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	148	177	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	11.1	8.40	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	151000	144000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	136	143	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	82.6	200	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	4900	2070	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	45000	52200	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	441	578	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	30.9	25.9	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	10900	11000	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	654	663	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0668	0.155	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	44.9	39.0	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	176	157	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9240	9580	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	4990	4960	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.28	0.23	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.53	3.40	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	14100	14000	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	279	282	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	10200	10600	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2344-A-11	BA2344-A-12	----	----	----
Client sampling date / time					01-Nov-2023 00:00	01-Nov-2023 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-011	VA23C6750-012	-----	-----	-----
					Result	Result	----	----	----
Metals									
Thallium	7440-28-0	E440/VA	0.050	mg/kg	<0.050	<0.050	----	----	----
Tin	7440-31-5	E440/VA	2.0	mg/kg	116	212	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	242	270	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	10.3	16.4	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	2.67	2.65	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	38.5	39.5	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3150	3470	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.5	5.0	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.8	11.7	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	7.36	7.86	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.86	2.86	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units	7.04	6.99	----	----	----
Antimony, TCLP	7440-36-0	E444/VA	1.00	mg/L	<1.00	<1.00	----	----	----
Arsenic, TCLP	7440-38-2	E444/VA	1.0	mg/L	<1.0	<1.0	----	----	----
Barium, TCLP	7440-39-3	E444/VA	2.5	mg/L	<2.5	<2.5	----	----	----
Beryllium, TCLP	7440-41-7	E444/VA	0.025	mg/L	<0.025	<0.025	----	----	----
Boron, TCLP	7440-42-8	E444/VA	0.50	mg/L	2.23	2.00	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.080	0.109	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2110	2110	----	----	----
Chromium, TCLP	7440-47-3	E444/VA	0.25	mg/L	<0.25	<0.25	----	----	----
Cobalt, TCLP	7440-48-4	E444/VA	0.050	mg/L	0.553	0.612	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.04	0.937	----	----	----
Iron, TCLP	7439-89-6	E444/VA	5.0	mg/L	<5.0	<5.0	----	----	----
Lead, TCLP	7439-92-1	E444/VA	0.25	mg/L	<0.25	<0.25	----	----	----
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L	103	107	----	----	----
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	<0.0010	----	----	----
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	<0.25	<0.25	----	----	----
Selenium, TCLP	7782-49-2	E444/VA	0.10	mg/L	<0.10	<0.10	----	----	----
Silver, TCLP	7440-22-4	E444/VA	0.050	mg/L	<0.050	<0.050	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID		BA2344-A-11	BA2344-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		01-Nov-2023 00:00	01-Nov-2023 00:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C6750-011	VA23C6750-012	-----	-----	-----	-----	-----
TCLP Metals					Result	Result	---	---	---	---	---
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<1.0	---	---	---	---	---
Uranium, TCLP	7440-61-1	E444/VA	0.20	mg/L	<0.20	<0.20	---	---	---	---	---
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	---	---	---	---	---
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	6.15	4.86	---	---	---	---	---
Zirconium, TCLP	7440-67-7	E444/VA	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.



QUALITY CONTROL INTERPRETIVE REPORT

<p>Work Order : VA23C6750</p> <p>Client : Covanta Burnaby Renewable Energy, ULC</p> <p>Contact : Nicole Victor</p> <p>Address : 5150 Riverbend Drive Burnaby BC Canada V3N 4V3</p> <p>Telephone : ----</p> <p>Project : Weekly Bottom Ash - Suite</p> <p>PO : VANCO0000051999</p> <p>C-O-C number : ----</p> <p>Sampler : ----</p> <p>Site : ----</p> <p>Quote number : Standing Offer (BC work)</p> <p>No. of samples received : 12</p> <p>No. of samples analysed : 12</p>	<p>Page : 1 of 16</p> <p>Laboratory : ALS Environmental - Vancouver</p> <p>Account Manager : Ian Chen</p> <p>Address : 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 07-Nov-2023 11:00</p> <p>Issue Date : 17-Nov-2023 23:06</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.

Workorder Comments

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

Summary of Outliers

Outliers : Quality Control Samples

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

Outliers: Reference Material (RM) Samples

- No Reference Material (RM) Sample outliers occur.

Outliers : Analysis Holding Time Compliance (Breaches)

- No Analysis Holding Time Outliers exist.

Outliers : Frequency of Quality Control Samples

- No Quality Control Sample Frequency Outliers occur.



Outliers : Quality Control Samples

Duplicates, Method Blanks, Laboratory Control Samples and Matrix Spikes

Matrix: **Soil/Solid**

Analyte Group	Laboratory sample ID	Client/Ref Sample ID	Analyte	CAS Number	Method	Result	Limits	Comment
Duplicate (DUP) RPDs								
Metals	VA23C6750-001	BA2344-A-1	Cobalt	7440-48-4	E440	35.7 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C6750-001	BA2344-A-1	Iron	7439-89-6	E440	35.1 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C6750-001	BA2344-A-1	Manganese	7439-96-5	E440	37.9 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C6750-001	BA2344-A-1	Nickel	7440-02-0	E440	117 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C6750-001	BA2344-A-1	Selenium	7782-49-2	E440	1.44 % DUP-H	Diff <2x LOR	Low Level DUP DQO exceeded (difference > 2 LOR).
Metals	VA23C6750-001	BA2344-A-1	Silver	7440-22-4	E440	41.5 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C6750-001	BA2344-A-1	Tin	7440-31-5	E440	54.7 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-1	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-10	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-11	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-12	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-2	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-3	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-4	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-5	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-6	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-7	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-8	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2344-A-9	E510	01-Nov-2023	17-Nov-2023	28 days	16 days	✔	17-Nov-2023	28 days	17 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2344-A-1	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2344-A-10	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2344-A-11	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔
Metals : Metals in Soil/Solid by CRC ICPMS										
LDPE bag BA2344-A-12	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-2	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-3	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-4	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-5	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-6	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-7	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-8	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2344-A-9	E440	01-Nov-2023	17-Nov-2023	180 days	16 days	✔	17-Nov-2023	180 days	17 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2344-A-1	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days		



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-10	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-11	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-12	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-2	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-3	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-4	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-5	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-6	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-7	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-8	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2344-A-9	E144	01-Nov-2023	----	----	----		15-Nov-2023	----	15 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-1	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-10	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-11	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-12	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-2	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-3	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-4	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-5	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-6	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-7	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-8	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2344-A-9	E108	01-Nov-2023	17-Nov-2023	30 days	16 days	✔	17-Nov-2023	30 days	17 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2344-A-1	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2344-A-10	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2344-A-11	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2344-A-12	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-2	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-3	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-4	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-5	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-6	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-7	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-8	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2344-A-9	E512	12-Nov-2023	16-Nov-2023	39 days	16 days	✔	17-Nov-2023	39 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-1	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-10	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-11	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-12	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-2	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-3	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-4	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-5	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-6	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-7	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✔	16-Nov-2023	191 days	16 days	✔	



Matrix: Soil/Solid

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-8	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✓	16-Nov-2023	191 days	16 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2344-A-9	E444	12-Nov-2023	16-Nov-2023	191 days	16 days	✓	16-Nov-2023	191 days	16 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-1	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-10	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-11	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-12	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-2	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-3	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-4	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✓	



Matrix: **Soil/Solid**

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

Analyte Group : Analytical Method Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-5	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-6	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-7	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-8	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2344-A-9	EPP444	01-Nov-2023	12-Nov-2023	----	----		----	28 days	11 days	✔

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
Analytical Methods							
Laboratory Duplicates (DUP)							
Mercury in Soil/Solid by CVAAS	E510	1238772	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1238771	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1238774	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1238773	1	14	7.1	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1238772	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1238771	2	14	14.2	10.0	✔
Moisture Content by Gravimetry	E144	1238774	1	12	8.3	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1238773	1	14	7.1	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1239728	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1238772	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1239727	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1238771	1	14	7.1	5.0	✔
Moisture Content by Gravimetry	E144	1238774	1	12	8.3	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1239728	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1239727	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Soil/Solid	EPA 6020B (mod)	This method is intended to liberate metals that may be environmentally available. Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl . Dependent on sample matrix, some metals may be only partially recovered, including Al, Ba, Be, Cr, Sr, Ti, Tl, V, W, and Zr. Silicate minerals are not solubilized. Volatile forms of sulfur (including sulfide) may not be captured, as they may be lost during sampling, storage, or digestion. This method does not adequately recover elemental sulfur, and is unsuitable for assessment of elemental sulfur standards or guidelines. Analysis is by Collision/Reaction Cell ICPMS.
Metals by CRC ICPMS (TCLP)	E444 ALS Environmental - Vancouver	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 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2/1631 Appendix (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO_3 and HCl , followed by CVAAS analysis.
Mercury by CVAAS (TCLP)	E512 ALS Environmental - Vancouver	Soil/Solid	SW 846 -1311/245.1 CVAA ON TCLP LEACHATE	An extract produced by the Toxicity Characteristic Leachate Procedure (TCLP) as per EPA 1311 is analyzed by CVAAS.
Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at $<60^{\circ}\text{C}$) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.

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 Work Order : VA23C6750
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Digestion for Metals and Mercury	EP440 ALS Environmental - Vancouver	Soil/Solid	EPA 200.2 (mod)	Samples are dried, then sieved through a 2 mm sieve, and digested with HNO ₃ and HCl. This method is intended to liberate metals that may be environmentally available.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 ALS Environmental - Vancouver	Soil/Solid	EPA 1311	Preparation of a Toxicity Characteristic Leaching Procedure (TCLP) solid sample involves particle size reduction, homogenization, then determination of appropriate extraction fluid. A measured portion of fresh subsample is placed in an extraction bottle with the appropriate extraction fluid then tumbled in a rotary extractor for 18+/- 2 hours at 23 +/- 2 C. The liquid leachate is filtered to separate from solids then bottled and prepared for analytical tests.

QUALITY CONTROL REPORT

Work Order	: VA23C6750	Page	: 1 of 11
Client	: Covanta Burnaby Renewable Energy, ULC	Laboratory	: ALS Environmental - Vancouver
Contact	: Nicole Victor	Account Manager	: Ian Chen
Address	: 5150 Riverbend Drive Burnaby BC Canada V3N 4V3	Address	: 8081 Lougheed Highway Burnaby, British Columbia Canada V5A 1W9
Telephone	:	Telephone	: +1 604 253 4188
Project	: Weekly Bottom Ash - Suite	Date Samples Received	: 07-Nov-2023 11:00
PO	: VANCO0000051999	Date Analysis Commenced	: 12-Nov-2023
C-O-C number	: ----	Issue Date	: 17-Nov-2023 23:05
Sampler	: ----		
Site	: ----		
Quote number	: Standing Offer (BC work)		
No. of samples received	: 12		
No. of samples analysed	: 12		

This report supersedes any previous report(s) with this reference. Results apply to the sample(s) as submitted. This document shall not be reproduced, except in full.

This Quality Control Report contains the following information:

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

Signatories

This document has been electronically signed by the authorized signatories below. Electronic signing is conducted in accordance with US FDA 21 CFR Part 11.

<i>Signatories</i>	<i>Position</i>	<i>Laboratory Department</i>
Kevin Duarte	Supervisor - Metals ICP Instrumentation	Vancouver Metals, Burnaby, British Columbia
Ophelia Chiu	Department Manager - Organics	Vancouver Organics, Burnaby, British Columbia
Owen Cheng		Vancouver Metals, Burnaby, British Columbia
Robin Weeks	Team Leader - Metals	Vancouver Metals, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia



General Comments

The ALS Quality Control (QC) report is optionally provided to ALS clients upon request. ALS test methods include comprehensive QC checks with every analysis to ensure our high standards of quality are met. Each QC result has a known or expected target value, which is compared against predetermined Data Quality Objectives (DQOs) to provide confidence in the accuracy of associated test results. This report contains detailed results for all QC results applicable to this sample submission. Please refer to the ALS Quality Control Interpretation report (QCI) for applicable method references and methodology summaries.

Key :

Anonymous = Refers to samples which are not part of this work order, but which formed part of the QC process lot.

CAS Number = Chemical Abstracts Service number is a unique identifier assigned to discrete substances.

DQO = Data Quality Objective.

LOR = Limit of Reporting (detection limit).

RPD = Relative Percent Difference

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

Workorder Comments

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



Laboratory Duplicate (DUP) Report

A Laboratory Duplicate (DUP) is a randomly selected intralaboratory replicate sample. Laboratory Duplicates provide information regarding method precision and sample heterogeneity. ALS DQOs for Laboratory Duplicates are expressed as test-specific limits for Relative Percent Difference (RPD), or as an absolute difference limit of 2 times the LOR for low concentration duplicates within ~ 4-10 times the LOR (cut-off is test-specific).

Sub-Matrix: Soil/Solid

					Laboratory Duplicate (DUP) Report						
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	LOR	Unit	Original Result	Duplicate Result	RPD(%) or Difference	Duplicate Limits	Qualifier
Physical Tests (QC Lot: 1238773)											
VA23C6743-001	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	7.58	7.46	1.6%	5%	----
Physical Tests (QC Lot: 1238774)											
VA23C6750-001	BA2344-A-1	Moisture	----	E144	0.25	%	29.8	29.5	1.00%	20%	----
Metals (QC Lot: 1238771)											
VA23C6750-001	BA2344-A-1	Aluminum	7429-90-5	E440	50	mg/kg	40600	48400	17.4%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	127	111	13.4%	30%	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	16.1	14.3	12.0%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	536	531	0.879%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.39	0.35	0.05	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	8.46	6.75	22.5%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	188	225	18.0%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	8.57	8.91	3.96%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	151000	152000	0.421%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	184	161	13.2%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	130	90.3	35.7%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	1750	2040	15.5%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	68600	48100	35.1%	30%	DUP-H
		Lead	7439-92-1	E440	0.50	mg/kg	299	367	20.5%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	31.9	26.5	18.7%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	11700	11500	1.63%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	1120	760	37.9%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	36.5	40.5	10.5%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	505	132	117%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	8320	10700	24.8%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	5050	5080	0.469%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	1.74	# 0.30	1.44	Diff <2x LOR	DUP-H
		Silver	7440-22-4	E440	0.10	mg/kg	3.01	4.59	41.5%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	15700	14400	9.00%	40%	----
		Strontium	7440-24-6	E440	0.50	mg/kg	319	319	0.00314%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	11200	10100	10.3%	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
Metals (QC Lot: 1238771) - continued											
VA23C6750-001	BA2344-A-1	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	110	193	54.7%	40%	DUP-H
		Titanium	7440-32-6	E440	1.0	mg/kg	327	309	5.60%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	14.5	17.3	17.3%	30%	----
		Uranium	7440-61-1	E440	0.050	mg/kg	2.52	2.54	0.703%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	39.3	37.5	4.80%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	2730	2750	0.744%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	2.4	4.3	1.8	Diff <2x LOR	----
Metals (QC Lot: 1238772)											
VA23C6750-001	BA2344-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	0.0752	0.0616	0.0136	Diff <2x LOR	----

Qualifiers

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



Method Blank (MB) Report

A Method Blank is an analyte-free matrix that undergoes sample processing identical to that carried out for test samples. Method Blank results are used to monitor and control for potential contamination from the laboratory environment and reagents. For most tests, the DQO for Method Blanks is for the result to be < LOR.

Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Physical Tests (QCLot: 1238774)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 1238771)						
Aluminum	7429-90-5	E440	50	mg/kg	<50	---
Antimony	7440-36-0	E440	0.1	mg/kg	<0.10	---
Arsenic	7440-38-2	E440	0.1	mg/kg	<0.10	---
Barium	7440-39-3	E440	0.5	mg/kg	<0.50	---
Beryllium	7440-41-7	E440	0.1	mg/kg	<0.10	---
Bismuth	7440-69-9	E440	0.2	mg/kg	<0.20	---
Boron	7440-42-8	E440	5	mg/kg	<5.0	---
Cadmium	7440-43-9	E440	0.02	mg/kg	<0.020	---
Calcium	7440-70-2	E440	50	mg/kg	<50	---
Chromium	7440-47-3	E440	0.5	mg/kg	<0.50	---
Cobalt	7440-48-4	E440	0.1	mg/kg	<0.10	---
Copper	7440-50-8	E440	0.5	mg/kg	<0.50	---
Iron	7439-89-6	E440	50	mg/kg	<50	---
Lead	7439-92-1	E440	0.5	mg/kg	<0.50	---
Lithium	7439-93-2	E440	2	mg/kg	<2.0	---
Magnesium	7439-95-4	E440	20	mg/kg	<20	---
Manganese	7439-96-5	E440	1	mg/kg	<1.0	---
Molybdenum	7439-98-7	E440	0.1	mg/kg	<0.10	---
Nickel	7440-02-0	E440	0.5	mg/kg	<0.50	---
Phosphorus	7723-14-0	E440	50	mg/kg	<50	---
Potassium	7440-09-7	E440	100	mg/kg	<100	---
Selenium	7782-49-2	E440	0.2	mg/kg	<0.20	---
Silver	7440-22-4	E440	0.1	mg/kg	<0.10	---
Sodium	7440-23-5	E440	50	mg/kg	<50	---
Strontium	7440-24-6	E440	0.5	mg/kg	<0.50	---
Sulfur	7704-34-9	E440	1000	mg/kg	<1000	---
Thallium	7440-28-0	E440	0.05	mg/kg	<0.050	---
Tin	7440-31-5	E440	2	mg/kg	<2.0	---
Titanium	7440-32-6	E440	1	mg/kg	<1.0	---
Tungsten	7440-33-7	E440	0.5	mg/kg	<0.50	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1238771) - continued						
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	----
Metals (QCLot: 1238772)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	----
TCLP Metals (QCLot: 1239727)						
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	----
TCLP Metals (QCLot: 1239728)						
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
Physical Tests (QCLot: 1238773)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	100	95.0	105	----
Physical Tests (QCLot: 1238774)									
Moisture	----	E144	0.25	%	50 %	100	90.0	110	----
Metals (QCLot: 1238771)									
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	96.0	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	94.6	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	97.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	93.5	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	90.8	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	86.0	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	94.8	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	91.4	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	96.7	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	93.8	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	89.6	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	89.5	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	92.6	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	92.6	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	99.3	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	93.7	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	92.2	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	93.4	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	93.5	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	98.5	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	91.6	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	82.0	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	94.9	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	93.8	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	88.4	80.0	120	----
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	93.4	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	89.9	80.0	120	----



Sub-Matrix: Soil/Solid

					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	Qualifier
Metals (QCLot: 1238771) - continued									
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.8	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	89.5	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	86.7	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	95.2	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	89.8	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	82.0	80.0	120	----
Metals (QCLot: 1238772)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	99.8	80.0	120	----



Matrix Spike (MS) Report

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

Sub-Matrix: Soil/Solid

					Matrix Spike (MS) Report					
					Spike		Recovery (%)	Recovery Limits (%)		
Laboratory sample ID	Client sample ID	Analyte	CAS Number	Method	Concentration	Target	MS	Low	High	Qualifier
TCLP Metals (QCLot: 1239727)										
VA23C6750-001	BA2344-A-1	Antimony, TCLP	7440-36-0	E444	5.36 mg/L	5 mg/L	107	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.3 mg/L	5 mg/L	106	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.5 mg/L	12.5 mg/L	108	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.254 mg/L	0.25 mg/L	102	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.7 mg/L	10 mg/L	107	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.245 mg/L	0.25 mg/L	98.0	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.28 mg/L	1.25 mg/L	102	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	96.1	50.0	140	----
		Iron, TCLP	7439-89-6	E444	246 mg/L	250 mg/L	98.3	50.0	140	----
		Lead, TCLP	7439-92-1	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	280 mg/L	250 mg/L	112	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.46 mg/L	2.5 mg/L	98.6	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.11 mg/L	5 mg/L	102	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.085 mg/L	0.1 mg/L	84.8	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	5.06 mg/L	5 mg/L	101	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.78 mg/L	0.75 mg/L	104	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	10.0 mg/L	10 mg/L	100	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	79.2	50.0	150	----
TCLP Metals (QCLot: 1239728)										
VA23C6750-001	BA2344-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.4	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	
Metals (QCLot: 1238771)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	101	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	88.7	70.0	130	----
	SCP SS-2	Arsenic	7440-38-2	E440	3.73 mg/kg	104	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	99.0	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	103	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	116	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	91.3	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	105	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	97.9	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	93.3	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	97.4	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	98.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	102	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	105	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	102	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	100	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	99.7	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	98.8	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	109	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	94.6	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	96.1	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	92.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	93.9	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	106	70.0	130	----
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	94.4	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	101	70.0	130	----

Page : 11 of 11
 Work Order : VA23C6750
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1238771) - continued									
	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	81.5	70.0	130	----
Metals (QCLot: 1238772)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	103	70.0	130	----



Report To		Report Format / Distribution		Service Requested (Rush for routine analysis subject to availability)	
Company: Covanta Energy		<input type="checkbox"/> Standard <input type="checkbox"/> Other		<input checked="" type="radio"/> Regular (Standard Turnaround Times - Business Days)	
Contact: Nicole Victor / 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: nvictor@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT	
Phone: 604-521-1025		Email 2: ofetherstonhaugh@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		Analysis Request	
		brent.kirkpatrick@metrovancoouver.org			
		Sarah.Wellman@metrovancoouver.org			

Invoice To Same as Report ?		Client / Project Information		Please indicate below Filtered, Preserved or both (F, P, F/P)													
Hardcopy of Invoice with Report? <input type="checkbox"/> Yes <input type="checkbox"/> No		Job #:															
Company:		PO / AFE: PO# 46693 Weekly Bottom Ash - Suite															
Contact:		LSD: (includes 2:1 pH)															
Address:		Quote #:															
Phone: _____		Fax: _____		ALS Contact:		Sampler:		MET-TCLP-VA (all metals, Hg)		MOISTURE		Chrome 6		MET-CSR+FULL-VA (all metals)		Number of Containers	
Lab Work Order # (lab use only)		VA23C6750															

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	Number of Containers								
1	BA2344-A-1	01-Nov-23	9:00	Soil	X	X		X									1
2	BA2344-A-2	01-Nov-23	9:00	Soil	X	X		X									1
3	BA2344-A-3	01-Nov-23	9:00	Soil	X	X		X									1
4	BA2344-A-4	01-Nov-23	9:00	Soil	X	X		X									1
5	BA2344-A-5	01-Nov-23	9:00	Soil	X	X		X									1
6	BA2344-A-6	01-Nov-23	9:00	Soil	X	X		X									1
7	BA2344-A-7	01-Nov-23	9:00	Soil	X	X		X									1
8	BA2344-A-8	01-Nov-23	9:00	Soil	X	X		X									1
9	BA2344-A-9	01-Nov-23	9:00	Soil	X	X		X									1
10	BA2344-A-10	01-Nov-23	9:00	Soil	X	X		X									1
11	BA2344-A-11	01-Nov-23	9:00	Soil	X	X		X									1
12	BA2344-A-12	01-Nov-23	9:00	Soil	X	X		X									1

**Environmental Division
 Vancouver**
 Work Order Reference
VA23C6750



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): 7 Nov 23	Time (hh:mm): 0800	Received by: JC	Date: 7 Nov 23	Time: 11:00am	Temperature: 20 °C	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF