

Bottom Ash Data

2023 Week 38

The following analytical report represents bottom ash composite results for week 38 of 2023 (September 17, 2023 to September 23, 2023).

The bottom ash meets the conditions of Metro Vancouver's 2020 Bottom Ash Management Plan and is suitable for disposal.



CERTIFICATE OF ANALYSIS

<p>Work Order : VA23C2833</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 : VANCO0000051998</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 11</p> <p>Laboratory : ALS Environmental - Vancouver</p> <p>Account Manager : Ian Chen</p> <p>Address : 8081 Lougheed Highway Burnaby BC Canada V5A 1W9</p> <p>Telephone : +1 604 253 4188</p> <p>Date Samples Received : 26-Sep-2023 13:17</p> <p>Date Analysis Commenced : 27-Sep-2023</p> <p>Issue Date : 06-Oct-2023 16:53</p>
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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
Kim Jensen	Department Manager - Metals	Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	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.

Qualifiers

<i>Qualifier</i>	<i>Description</i>
DLM	Detection Limit Adjusted due to sample matrix effects (e.g. chemical interference, colour, turbidity).



Analytical Results

Sub-Matrix: Soil					Client sample ID				
(Matrix: Soil/Solid)					BA2338-A-1	BA2338-A-2	BA2338-A-3	BA2338-A-4	BA2338-A-5
Client sampling date / time					20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-001	VA23C2833-002	VA23C2833-003	VA23C2833-004	VA23C2833-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	25.2	24.8	24.2	25.2	24.4
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	10.4	10.4	10.5	10.4	10.3
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	38800	55000	40200	41600	38400
Antimony	7440-36-0	E440/VA	0.10	mg/kg	161	117	131	146	187
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	31.6	20.9	22.7	25.1	28.2
Barium	7440-39-3	E440/VA	0.50	mg/kg	703	641	490	517	512
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.40	0.43	0.38	0.35	0.31
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	9.91	8.93	13.8	20.4	14.0
Boron	7440-42-8	E440/VA	5.0	mg/kg	290	275	199	203	169
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	9.82	8.32	14.2	19.8	9.02
Calcium	7440-70-2	E440/VA	50	mg/kg	179000	184000	189000	192000	176000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	179	170	161	178	159
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	61.8	324	41.3	340	49.5
Copper	7440-50-8	E440/VA	0.50	mg/kg	2690	3610	2720	4250	7180
Iron	7439-89-6	E440/VA	50	mg/kg	66000	47200	48400	52600	82900
Lead	7439-92-1	E440/VA	0.50	mg/kg	670	706	449	628	6980
Lithium	7439-93-2	E440/VA	2.0	mg/kg	32.3	80.0	31.7	37.3	28.0
Magnesium	7439-95-4	E440/VA	20	mg/kg	13900	14300	14400	14700	13300
Manganese	7439-96-5	E440/VA	1.0	mg/kg	926	1300	836	913	1060
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	<0.0500	0.0618	0.102	0.140	0.0768
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	50.9	29.5	32.2	43.0	35.6
Nickel	7440-02-0	E440/VA	0.50	mg/kg	178	979	147	185	<410 ^{DLM}
Phosphorus	7723-14-0	E440/VA	50	mg/kg	10400	11200	12000	12400	11600
Potassium	7440-09-7	E440/VA	100	mg/kg	7080	6980	7350	7760	6320
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.36	0.33	0.41	0.44	0.56
Silver	7440-22-4	E440/VA	0.10	mg/kg	16.4	3.78	5.34	6.84	11.5
Sodium	7440-23-5	E440/VA	50	mg/kg	20800	22100	20700	21200	18200
Strontium	7440-24-6	E440/VA	0.50	mg/kg	334	385	336	360	313



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2338-A-1	BA2338-A-2	BA2338-A-3	BA2338-A-4	BA2338-A-5
(Matrix: Soil/Solid)					Client sampling date / time	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-001	VA23C2833-002	VA23C2833-003	VA23C2833-004	VA23C2833-005	
					Result	Result	Result	Result	Result	
Metals										
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12900	11600	13200	13500	12000	
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	104	83.7	102	191	154	
Titanium	7440-32-6	E440/VA	1.0	mg/kg	267	312	187	252	276	
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	4.56	5.81	4.27	4.91	7.86	
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.81	3.51	4.03	4.26	3.48	
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	46.3	44.7	51.2	47.1	45.8	
Zinc	7440-66-6	E440/VA	2.0	mg/kg	4430	6500	6090	7070	4340	
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.1	3.1	3.0	3.2	2.8	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.4	11.5	11.5	11.5	11.4	
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.16	6.03	6.17	6.13	5.89	
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	6.33	6.71	6.55	6.52	6.73	
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	2.61	2.31	2.47	2.39	2.37	
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.162	0.090	0.095	0.094	0.106	
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2220	2000	2040	2010	2050	
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	0.872	0.764	0.768	0.656	1.14	
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.21	1.02	1.16	0.945	1.24	
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	124	107	109	110	112	
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	0.47	0.29	0.35	0.32	0.34	
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 (Matrix: Soil/Solid)					Client sample ID	BA2338-A-1	BA2338-A-2	BA2338-A-3	BA2338-A-4	BA2338-A-5
Client sampling date / time					20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-001	VA23C2833-002	VA23C2833-003	VA23C2833-004	VA23C2833-005	
					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	<0.050
Thallium, TCLP	7440-28-0	E444/VA	1.0	mg/L	<1.0	<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	<0.20
Vanadium, TCLP	7440-62-2	E444/VA	0.15	mg/L	<0.15	<0.15	<0.15	<0.15	<0.15	<0.15
Zinc, TCLP	7440-66-6	E444/VA	0.50	mg/L	19.3	12.6	18.2	11.1	9.37	
Zirconium, TCLP	7440-67-7	E444/VA	10	mg/L	<10	<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	BA2338-A-6	BA2338-A-7	BA2338-A-8	BA2338-A-9	BA2338-A-10
Client sampling date / time					20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-006	VA23C2833-007	VA23C2833-008	VA23C2833-009	VA23C2833-010	
					Result	Result	Result	Result	Result	
Physical Tests										
Moisture	---	E144/VA	0.25	%	24.2	27.3	25.8	26.6	26.1	
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.4	10.7	10.7	10.4	10.6	
Metals										
Aluminum	7429-90-5	E440/VA	50	mg/kg	41000	39200	44200	40900	45600	
Antimony	7440-36-0	E440/VA	0.10	mg/kg	128	139	130	113	131	
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	23.4	17.9	20.5	20.8	22.8	
Barium	7440-39-3	E440/VA	0.50	mg/kg	576	714	534	430	542	
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.36	0.33	0.32	0.33	0.31	
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	12.8	29.9	13.9	59.1	17.2	
Boron	7440-42-8	E440/VA	5.0	mg/kg	195	198	158	157	198	
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	12.1	8.77	11.0	11.9	10.0	
Calcium	7440-70-2	E440/VA	50	mg/kg	182000	177000	183000	179000	177000	
Chromium	7440-47-3	E440/VA	0.50	mg/kg	154	170	324	234	241	
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	67.8	74.1	212	70.5	195	
Copper	7440-50-8	E440/VA	0.50	mg/kg	6110	7040	3600	10600	2180	
Iron	7439-89-6	E440/VA	50	mg/kg	54600	55500	45600	69500	54300	
Lead	7439-92-1	E440/VA	0.50	mg/kg	1160	479	463	760	810	
Lithium	7439-93-2	E440/VA	2.0	mg/kg	38.3	34.3	48.1	34.4	37.8	
Magnesium	7439-95-4	E440/VA	20	mg/kg	13800	14200	14500	13500	13300	
Manganese	7439-96-5	E440/VA	1.0	mg/kg	925	1000	1450	1140	994	
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.113	<0.0500	<0.0500	0.0500	0.0646	
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	53.9	64.2	50.5	54.2	44.4	
Nickel	7440-02-0	E440/VA	0.50	mg/kg	229	179	195	192	262	
Phosphorus	7723-14-0	E440/VA	50	mg/kg	11800	12200	11000	11300	11600	
Potassium	7440-09-7	E440/VA	100	mg/kg	7660	6720	7370	7050	7110	
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.38	0.42	0.38	0.44	0.37	
Silver	7440-22-4	E440/VA	0.10	mg/kg	6.88	3.00	3.59	3.68	3.75	
Sodium	7440-23-5	E440/VA	50	mg/kg	21400	20500	20700	19600	20600	
Strontium	7440-24-6	E440/VA	0.50	mg/kg	407	335	336	289	354	
Sulfur	7704-34-9	E440/VA	1000	mg/kg	12900	12600	13900	14000	13200	



Analytical Results

Sub-Matrix: Soil					Client sample ID	BA2338-A-6	BA2338-A-7	BA2338-A-8	BA2338-A-9	BA2338-A-10
(Matrix: Soil/Solid)					Client sampling date / time	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-006	VA23C2833-007	VA23C2833-008	VA23C2833-009	VA23C2833-010	
					Result	Result	Result	Result	Result	
Metals										
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	148	111	103	776	120	
Titanium	7440-32-6	E440/VA	1.0	mg/kg	214	266	229	241	249	
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	4.02	7.35	6.01	4.68	3.97	
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.88	3.31	3.82	3.69	3.71	
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	43.6	40.0	43.2	41.2	43.5	
Zinc	7440-66-6	E440/VA	2.0	mg/kg	7290	4460	5410	4680	5280	
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.9	2.5	3.4	2.2	2.8	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.5	11.6	11.6	11.5	11.6	
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.08	6.78	6.64	6.58	6.72	
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	6.14	6.63	6.45	6.64	6.05	
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	2.48	1.96	2.15	2.03	2.15	
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.284	0.111	0.108	0.093	0.134	
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2060	1990	1920	1910	2020	
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	1.58	0.754	2.34	0.859	1.59	
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.81	1.15	1.28	0.932	0.817	
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	126	114	109	112	122	
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	0.56	0.32	0.35	0.44	0.63	
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					Client sample ID	BA2338-A-6	BA2338-A-7	BA2338-A-8	BA2338-A-9	BA2338-A-10
(Matrix: Soil/Solid)					Client sampling date / time	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00	20-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-006	VA23C2833-007	VA23C2833-008	VA23C2833-009	VA23C2833-010	
TCLP Metals					Result	Result	Result	Result	Result	
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	31.8	12.0	16.4	12.4	33.0	
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					Client sample ID				
(Matrix: Soil/Solid)					BA2338-A-11	BA2338-A-12	----	----	----
Client sampling date / time					20-Sep-2023 09:00	20-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-011	VA23C2833-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	25.8	25.5	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.5	10.6	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	43600	45400	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	123	145	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	21.5	22.0	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	534	456	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.38	0.36	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	9.97	22.6	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	276	174	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	10.7	12.2	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	176000	185000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	164	142	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	104	341	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	2260	4230	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	60500	40400	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	2100	527	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	30.3	43.2	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	13500	13600	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	1820	956	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.0890	0.102	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	33.5	46.6	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	174	164	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	10800	12400	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	7010	7840	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.36	0.39	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	5.53	4.07	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	19700	21400	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	358	385	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	13400	14900	----	----	----



Analytical Results

Sub-Matrix: Soil					Client sample ID		BA2338-A-11	BA2338-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		20-Sep-2023 09:00	20-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-011	VA23C2833-012	-----	-----	-----	-----	-----
					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	186	173	----	----	----	----	----
Titanium	7440-32-6	E440/VA	1.0	mg/kg	252	283	----	----	----	----	----
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	4.22	4.50	----	----	----	----	----
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.80	4.09	----	----	----	----	----
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	44.3	41.6	----	----	----	----	----
Zinc	7440-66-6	E440/VA	2.0	mg/kg	6350	5990	----	----	----	----	----
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	3.8	4.0	----	----	----	----	----
TCLP Metals											
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.5	11.6	----	----	----	----	----
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.56	6.63	----	----	----	----	----
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.86	2.86	----	----	----	----	----
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.75	6.21	----	----	----	----	----
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	2.35	2.37	----	----	----	----	----
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.087	0.219	----	----	----	----	----
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	1980	2050	----	----	----	----	----
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	0.693	1.44	----	----	----	----	----
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	0.986	1.39	----	----	----	----	----
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	109	124	----	----	----	----	----
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	0.33	0.50	----	----	----	----	----
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					Client sample ID		BA2338-A-11	BA2338-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		20-Sep-2023 09:00	20-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C2833-011	VA23C2833-012	-----	-----	-----	-----	-----
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	8.95	48.6	---	---	---	---	---
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 : VA23C2833</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 : VANCO0000051998</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 : 26-Sep-2023 13:17</p> <p>Issue Date : 06-Oct-2023 16:53</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	VA23C2833-001	BA2338-A-1	Antimony	7440-36-0	E440	32.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Arsenic	7440-38-2	E440	37.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Cadmium	7440-43-9	E440	46.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Cobalt	7440-48-4	E440	45.0 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Copper	7440-50-8	E440	144 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Molybdenum	7439-98-7	E440	43.6 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Nickel	7440-02-0	E440	53.3 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Silver	7440-22-4	E440	105 % DUP-H	40%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Tungsten	7440-33-7	E440	32.2 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Metals	VA23C2833-001	BA2338-A-1	Zinc	7440-66-6	E440	55.4 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.

Result Qualifiers

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



Analysis Holding Time Compliance

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

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

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

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

Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-1	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-10	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-11	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-12	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-2	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-3	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-4	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-5	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-6	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-7	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-8	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Mercury in Soil/Solid by CVAAS											
LDPE bag BA2338-A-9	E510	20-Sep-2023	04-Oct-2023	28 days	14 days	✔	05-Oct-2023	28 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2338-A-1	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2338-A-10	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2338-A-11	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICMS											
LDPE bag BA2338-A-12	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-2	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-3	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-4	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-5	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-6	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-7	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-8	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2338-A-9	E440	20-Sep-2023	04-Oct-2023	180 days	14 days	✔	05-Oct-2023	180 days	16 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2338-A-1	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days		



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-10	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-11	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-12	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-2	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-3	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-4	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-5	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-6	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2338-A-7	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days	



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2338-A-8	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days		
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2338-A-9	E144	20-Sep-2023	----	----	----		02-Oct-2023	----	12 days		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-1	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-10	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-11	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-12	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-2	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-3	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-4	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-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		
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-5	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-6	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-7	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-8	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)											
LDPE bag BA2338-A-9	E108	20-Sep-2023	04-Oct-2023	30 days	14 days	✔	04-Oct-2023	30 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2338-A-1	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2338-A-10	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2338-A-11	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2338-A-12	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 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	
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-2	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-3	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-4	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-5	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-6	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-7	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-8	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2338-A-9	E512	27-Sep-2023	29-Sep-2023	35 days	9 days	✔	29-Sep-2023	35 days	9 days	✔
TCLP Metals : Metals by CRC ICPMS (TCLP)										
HDPE - total (lab preserved) BA2338-A-1	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-10	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-11	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-12	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-2	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-3	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-4	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-5	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-6	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 days	9 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-7	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✔	29-Sep-2023	187 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-8	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✓	29-Sep-2023	187 days	9 days	✓	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2338-A-9	E444	27-Sep-2023	29-Sep-2023	187 days	9 days	✓	29-Sep-2023	187 days	9 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-1	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-10	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-11	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-12	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-2	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-3	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-4	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✓	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-5	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-6	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-7	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-8	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 days	✔
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2338-A-9	EPP444	20-Sep-2023	27-Sep-2023	----	----		----	28 days	7 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	1164000	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1164001	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	1164003	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1164002	1	12	8.3	5.0	✔
Laboratory Control Samples (LCS)							
Mercury in Soil/Solid by CVAAS	E510	1164000	2	12	16.6	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1164001	2	12	16.6	10.0	✔
Moisture Content by Gravimetry	E144	1164003	1	19	5.2	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1164002	1	12	8.3	5.0	✔
Method Blanks (MB)							
Mercury by CVAAS (TCLP)	E512	1160288	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1164000	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1160289	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1164001	1	12	8.3	5.0	✔
Moisture Content by Gravimetry	E144	1164003	1	19	5.2	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1160288	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1160289	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, 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.



<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	: VA23C2833	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	: 26-Sep-2023 13:17
PO	: VANCO0000051998	Date Analysis Commenced	: 27-Sep-2023
C-O-C number	: ----	Issue Date	: 06-Oct-2023 16:53
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
Kim Jensen	Department Manager - Metals	Vancouver Metals, Burnaby, British Columbia
Rebecca Sit	Supervisor - Organics Extractions	Vancouver Organics, Burnaby, British Columbia
Sam Silveira	Lab Assistant	Vancouver Metals, Burnaby, British Columbia
Tony Nguyen	Analyst	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: 1164002)											
VA23C2833-001	BA2338-A-1	pH (1:2 soil:water)	----	E108	0.10	pH units	10.4	10.5	1.1%	5%	----
Physical Tests (QC Lot: 1164003)											
VA23C2833-001	BA2338-A-1	Moisture	----	E144	0.25	%	25.2	25.5	1.42%	20%	----
Metals (QC Lot: 1164000)											
VA23C2833-001	BA2338-A-1	Mercury	7439-97-6	E510	0.0500	mg/kg	<0.0500	0.0533	0.0033	Diff <2x LOR	----
Metals (QC Lot: 1164001)											
VA23C2833-001	BA2338-A-1	Aluminum	7429-90-5	E440	50	mg/kg	38800	37000	4.85%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	161	116	32.8%	30%	DUP-H
		Arsenic	7440-38-2	E440	0.10	mg/kg	31.6	21.8	37.0%	30%	DUP-H
		Barium	7440-39-3	E440	0.50	mg/kg	703	553	23.9%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.40	0.36	0.04	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	9.91	12.1	20.1%	30%	----
		Boron	7440-42-8	E440	5.0	mg/kg	290	269	7.60%	30%	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	9.82	15.7	46.0%	30%	DUP-H
		Calcium	7440-70-2	E440	50	mg/kg	179000	177000	0.871%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	179	153	15.8%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	61.8	97.7	45.0%	30%	DUP-H
		Copper	7440-50-8	E440	0.50	mg/kg	2690	16400	144%	30%	DUP-H
		Iron	7439-89-6	E440	50	mg/kg	66000	56600	15.3%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	670	509	27.4%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	32.3	32.4	0.274%	30%	----
		Magnesium	7439-95-4	E440	20	mg/kg	13900	13100	5.65%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	926	904	2.43%	30%	----
		Molybdenum	7439-98-7	E440	0.10	mg/kg	50.9	32.7	43.6%	40%	DUP-H
		Nickel	7440-02-0	E440	0.50	mg/kg	178	307	53.3%	30%	DUP-H
		Phosphorus	7723-14-0	E440	50	mg/kg	10400	10200	1.74%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	7080	6760	4.56%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	0.36	0.46	0.10	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	16.4	5.08	105%	40%	DUP-H
		Sodium	7440-23-5	E440	50	mg/kg	20800	19700	5.32%	40%	----



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: 1164001) - continued											
VA23C2833-001	BA2338-A-1	Strontium	7440-24-6	E440	0.50	mg/kg	334	373	11.2%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	12900	12500	2.89%	30%	----
		Thallium	7440-28-0	E440	0.050	mg/kg	<0.050	<0.050	0	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	104	122	15.6%	40%	----
		Titanium	7440-32-6	E440	1.0	mg/kg	267	184	36.8%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	4.56	3.30	32.2%	30%	DUP-H
		Uranium	7440-61-1	E440	0.050	mg/kg	3.81	3.70	3.08%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	46.3	41.9	9.92%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	4430	7820	55.4%	30%	DUP-H
		Zirconium	7440-67-7	E440	1.0	mg/kg	3.1	4.2	1.1	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: 1164003)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 1164000)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 1164001)						
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	---



Sub-Matrix: Soil/Solid

Analyte	CAS Number	Method	LOR	Unit	Result	Qualifier
Metals (QCLot: 1164001) - continued						
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	----
TCLP Metals (QCLot: 1160288)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1160289)						
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	----



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: 1164002)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	99.5	95.0	105	----
Physical Tests (QCLot: 1164003)									
Moisture	----	E144	0.25	%	50 %	99.4	90.0	110	----
Metals (QCLot: 1164000)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	104	80.0	120	----
Metals (QCLot: 1164001)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	102	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	102	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	105	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	98.6	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	102	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	104	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	103	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	106	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	103	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	105	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	104	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	100	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	116	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	108	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	104	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	107	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	105	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	96.8	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	103	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	104	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	105	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	93.4	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	104	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	103	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	95.7	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: 1164001) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	105	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	103	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	101	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	102	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	108	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	103	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	98.5	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: 1160288)										
VA23C2833-001	BA2338-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	99.5	50.0	140	----
TCLP Metals (QCLot: 1160289)										
VA23C2833-001	BA2338-A-1	Antimony, TCLP	7440-36-0	E444	5.37 mg/L	5 mg/L	107	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.1 mg/L	5 mg/L	103	50.0	140	----
		Barium, TCLP	7440-39-3	E444	13.1 mg/L	12.5 mg/L	105	50.0	140	----
		Beryllium, TCLP	7440-41-7	E444	0.252 mg/L	0.25 mg/L	101	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.1 mg/L	10 mg/L	101	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	0.252 mg/L	0.25 mg/L	101	50.0	140	----
		Calcium, TCLP	7440-70-2	E444	ND mg/L	250 mg/L	ND	50.0	140	----
		Chromium, TCLP	7440-47-3	E444	1.23 mg/L	1.25 mg/L	98.1	50.0	140	----
		Cobalt, TCLP	7440-48-4	E444	ND mg/L	0.25 mg/L	ND	50.0	140	----
		Copper, TCLP	7440-50-8	E444	2.32 mg/L	2.5 mg/L	93.0	50.0	140	----
		Iron, TCLP	7439-89-6	E444	244 mg/L	250 mg/L	97.6	50.0	140	----
		Lead, TCLP	7439-92-1	E444	9.90 mg/L	10 mg/L	99.0	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	254 mg/L	250 mg/L	101	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.41 mg/L	2.5 mg/L	96.4	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.04 mg/L	5 mg/L	101	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.084 mg/L	0.1 mg/L	84.5	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.9 mg/L	5 mg/L	98.4	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.90 mg/L	5 mg/L	97.9	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	100	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.8 mg/L	1 mg/L	81.2	50.0	150	----



Reference Material (RM) Report

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

Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1164000)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	97.9	70.0	130	----
Metals (QCLot: 1164001)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	107	70.0	130	----
	SCP SS-2	Antimony	7440-36-0	E440	3.99 mg/kg	101	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	105	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	109	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	137	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	114	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	110	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	117	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	101	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	103	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	101	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	102	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	115	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	108	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	108	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	101	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	103	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	98.9	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	114	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	103	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	97.7	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	116	70.0	130	----

Page : 11 of 11
 Work Order : VA23C2833
 Client : Covanta Burnaby Renewable Energy, ULC
 Project : Weekly Bottom Ash - Suite



Sub-Matrix:

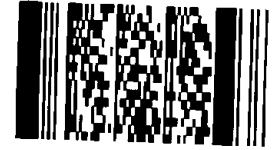
Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1164001) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	105	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	106	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	96.0	70.0	130	----



Chain of Custody / Analytical Request Form
 Canada Toll Free: 1 800 668 9878
 www.alsglobal.com

COO

Environmental Division
 Vancouver
 Work Order Reference
VA23C2833



Telephone : +1 604 263 4166

Report To			Report Format / Distribution			Service Requested (Rush for routine analyses)		
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	
Address:	5150 Riverbend Drive Burnaby BC		Email 1:	nvictor@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge		
Phone:	604-521-1025	Fax:	Email 2:	ofetherstonhaugh@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS		
	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Email 3:	dskrypnik@covanta.com		Analysis Requested		
				brent.kirkpatrick@metrovancover.org				
				Sarah.Wellman@metrovancover.org				

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

Lab Work Order # (lab use only)			ALS Contact:			Sampler:														
02833																				

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			
BA2338-A-1		20-Sep-23	9:00	Soil	X	X		X													1	
BA2338-A-2		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-3		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-4		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-5		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-6		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-7		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-8		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-9		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-10		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-11		20-Sep-23	9:00	Soil	X	X		X														1
BA2338-A-12		20-Sep-23	9:00	Soil	X	X		X														1

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)				SHIPMENT VERIFICATION (lab use only)			
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations:
	26 sep 23	0900	JL	26-9-23	1317	20,20 °C				Yes / No ? If Yes add SIF