

Bottom Ash Data

2023 Week 39

The following analytical report represents bottom ash composite results for week 39 of 2023 (September 24, 2023 to September 30, 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 : VA23C3839</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 : 05-Oct-2023 12:10</p> <p>Date Analysis Commenced : 06-Oct-2023</p> <p>Issue Date : 13-Oct-2023 14:20</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>
Ilmaz Badbezanchi	Supervisor - Metals Prep & Mercury	Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Organics, Burnaby, British Columbia
Jon Fisher	Production Manager, Environmental	Metals, Waterloo, Ontario
Kinny Wu	Lab Analyst	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.

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/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2339-A-1	BA2339-A-2	BA2339-A-3	BA2339-A-4	BA2339-A-5
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-001	VA23C3839-002	VA23C3839-003	VA23C3839-004	VA23C3839-005
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	----	E144/VA	0.25	%	24.9	26.4	27.0	26.0	27.0
pH (1:2 soil:water)	----	E108/VA	0.10	pH units	10.4	10.3	10.4	10.4	10.4
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	30600	30400	38800	32100	29200
Antimony	7440-36-0	E440/VA	0.10	mg/kg	116	112	139	157	132
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	22.4	20.3	25.3	20.9	25.9
Barium	7440-39-3	E440/VA	0.50	mg/kg	396	528	407	330	269
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.34	0.32	0.34	0.33	0.31
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	7.72	6.93	10.5	7.48	9.20
Boron	7440-42-8	E440/VA	5.0	mg/kg	173	280	235	318	244
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	9.87	9.47	10.6	10.9	11.5
Calcium	7440-70-2	E440/VA	50	mg/kg	132000	130000	131000	130000	132000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	188	154	139	130	131
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	254	47.1	118	289	91.2
Copper	7440-50-8	E440/VA	0.50	mg/kg	1290	1110	2440	2600	2100
Iron	7439-89-6	E440/VA	50	mg/kg	44500	46300	36600	55200	40200
Lead	7439-92-1	E440/VA	0.50	mg/kg	573	2810	348	357	442
Lithium	7439-93-2	E440/VA	2.0	mg/kg	27.7	25.6	29.4	33.6	27.1
Magnesium	7439-95-4	E440/VA	20	mg/kg	10000	10400	10100	9660	9840
Manganese	7439-96-5	E440/VA	1.0	mg/kg	915	741	2310	768	681
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.350	0.203	0.188	0.319	0.303
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	22.1	23.3	21.6	32.7	24.0
Nickel	7440-02-0	E440/VA	0.50	mg/kg	187	147	119	196	153
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9980	10700	10600	11600	10600
Potassium	7440-09-7	E440/VA	100	mg/kg	5220	5160	6010	5560	5170
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.42	0.36	0.56	0.44	0.37
Silver	7440-22-4	E440/VA	0.10	mg/kg	4.54	3.00	5.05	3.83	4.02
Sodium	7440-23-5	E440/VA	50	mg/kg	14400	15500	16400	16000	14500
Strontium	7440-24-6	E440/VA	0.50	mg/kg	266	261	259	258	253



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2339-A-1	BA2339-A-2	BA2339-A-3	BA2339-A-4	BA2339-A-5
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-001	VA23C3839-002	VA23C3839-003	VA23C3839-004	VA23C3839-005
					Result	Result	Result	Result	Result
Metals									
Sulfur	7704-34-9	E440/VA	1000	mg/kg	13200	11000	12800	11800	12300
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	96.0	195	104	130	112
Titanium	7440-32-6	E440/VA	1.0	mg/kg	244	298	427	197	184
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	81.1	66.4	64.7	58.4	73.1
Uranium	7440-61-1	E440/VA	0.050	mg/kg	3.02	2.75	2.98	2.79	3.08
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	37.5	33.8	36.0	35.1	35.4
Zinc	7440-66-6	E440/VA	2.0	mg/kg	4040	3900	5570	3780	3470
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.3	1.4	2.1	2.6	3.2
Speciated Metals									
Chromium, hexavalent [Cr VI]	18540-29-9	E532/WT	0.10	mg/kg	1.78 ^{DLM}	----	----	----	----
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.1	11.1	11.3	11.2	11.1
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	5.70	5.80	6.30	5.84	5.47
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.87	2.87	2.87	2.87	2.87
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.29	6.28	6.40	6.20	6.08
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	2.47	2.60	2.52	2.66	2.43
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.465	0.124	0.176	0.170	0.413
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2100	2120	2120	2110	2070
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	1.01	0.955	0.853	1.02	1.64
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.37	1.31	1.29	1.42	1.14
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	110	111	109	112	108
Mercury, TCLP	7439-97-6	E512/VA	0.0010	mg/L	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010



Analytical Results

Sub-Matrix: Soil/Solid
 (Matrix: Soil/Solid)

					Client sample ID	BA2339-A-1	BA2339-A-2	BA2339-A-3	BA2339-A-4	BA2339-A-5
					Client sampling date / time	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-001	VA23C3839-002	VA23C3839-003	VA23C3839-004	VA23C3839-005	
					Result	Result	Result	Result	Result	
TCLP Metals										
Nickel, TCLP	7440-02-0	E444/VA	0.25	mg/L	0.44	0.54	0.42	0.53	0.68	
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	
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	23.8	21.8	34.7	37.8	34.8	
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)

					BA2339-A-6	BA2339-A-7	BA2339-A-8	BA2339-A-9	BA2339-A-10
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-006	VA23C3839-007	VA23C3839-008	VA23C3839-009	VA23C3839-010
					Result	Result	Result	Result	Result
Physical Tests									
Moisture	---	E144/VA	0.25	%	27.1	27.4	27.3	26.7	26.1
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.6	10.4	10.3	10.6	10.4
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	31200	32200	31500	33600	26500
Antimony	7440-36-0	E440/VA	0.10	mg/kg	124	114	126	113	93.2
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	21.5	19.1	23.9	21.4	19.3
Barium	7440-39-3	E440/VA	0.50	mg/kg	412	345	316	388	453
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.32	0.37	0.40	0.30	0.25
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	7.10	7.57	15.9	6.87	8.80
Boron	7440-42-8	E440/VA	5.0	mg/kg	239	163	184	304	127
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	13.1	8.73	11.7	8.74	7.86
Calcium	7440-70-2	E440/VA	50	mg/kg	123000	124000	135000	125000	117000
Chromium	7440-47-3	E440/VA	0.50	mg/kg	132	141	176	120	728
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	275	75.9	101	66.8	28.7
Copper	7440-50-8	E440/VA	0.50	mg/kg	2360	2330	1890	2380	1250
Iron	7439-89-6	E440/VA	50	mg/kg	53000	42200	31400	50100	49300
Lead	7439-92-1	E440/VA	0.50	mg/kg	356	865	493	317	492
Lithium	7439-93-2	E440/VA	2.0	mg/kg	26.3	26.7	25.9	22.1	19.9
Magnesium	7439-95-4	E440/VA	20	mg/kg	9670	10000	10200	9380	9490
Manganese	7439-96-5	E440/VA	1.0	mg/kg	612	680	666	603	585
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.139	0.176	0.197	0.138	0.162
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	24.4	20.3	22.5	29.6	29.3
Nickel	7440-02-0	E440/VA	0.50	mg/kg	114	170	121	120	517
Phosphorus	7723-14-0	E440/VA	50	mg/kg	11300	9150	10000	10200	10600
Potassium	7440-09-7	E440/VA	100	mg/kg	5820	5060	5960	5840	4700
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.33	0.28	0.43	0.34	0.29
Silver	7440-22-4	E440/VA	0.10	mg/kg	3.91	3.30	4.01	2.83	2.60
Sodium	7440-23-5	E440/VA	50	mg/kg	15800	14700	15400	15800	14200
Strontium	7440-24-6	E440/VA	0.50	mg/kg	270	262	252	242	226
Sulfur	7704-34-9	E440/VA	1000	mg/kg	11200	10400	13700	11800	8900



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID	BA2339-A-6	BA2339-A-7	BA2339-A-8	BA2339-A-9	BA2339-A-10
(Matrix: Soil/Solid)					Client sampling date / time	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-006	VA23C3839-007	VA23C3839-008	VA23C3839-009	VA23C3839-010	
					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	85.4	91.0	146	90.2	91.7	
Titanium	7440-32-6	E440/VA	1.0	mg/kg	183	164	270	240	244	
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	47.8	44.0	75.2	51.4	48.0	
Uranium	7440-61-1	E440/VA	0.050	mg/kg	5.05	2.78	3.05	2.70	2.14	
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	43.1	35.2	38.6	33.0	33.4	
Zinc	7440-66-6	E440/VA	2.0	mg/kg	3440	3090	3380	2730	2690	
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.9	2.6	2.2	3.1	1.5	
TCLP Metals										
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.4	11.0	11.1	11.3	11.1	
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	6.42	5.25	5.48	5.86	5.47	
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.87	2.87	2.87	2.87	2.87	
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.39	6.32	6.41	6.29	6.28	
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	2.72	2.60	2.64	2.59	2.78	
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.129	0.123	0.122	0.137	0.140	
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2160	2130	2180	2120	2120	
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	0.888	0.873	1.20	0.786	1.40	
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.01	1.13	0.548	0.991	1.40	
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	1.04	<0.25	
Magnesium, TCLP	7439-95-4	E444/VA	2.5	mg/L	115	112	116	113	114	
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	0.43	0.59	0.63	0.47	0.52	
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 (Matrix: Soil/Solid)					Client sample ID	BA2339-A-6	BA2339-A-7	BA2339-A-8	BA2339-A-9	BA2339-A-10
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00	27-Sep-2023 09:00
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-006	VA23C3839-007	VA23C3839-008	VA23C3839-009	VA23C3839-010	
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	23.4	23.6	22.3	27.7	35.1	
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)					BA2339-A-11	BA2339-A-12	----	----	----
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-011	VA23C3839-012	-----	-----	-----
					Result	Result	----	----	----
Physical Tests									
Moisture	---	E144/VA	0.25	%	26.0	26.3	----	----	----
pH (1:2 soil:water)	---	E108/VA	0.10	pH units	10.4	10.4	----	----	----
Metals									
Aluminum	7429-90-5	E440/VA	50	mg/kg	35000	31400	----	----	----
Antimony	7440-36-0	E440/VA	0.10	mg/kg	116	97.0	----	----	----
Arsenic	7440-38-2	E440/VA	0.10	mg/kg	24.7	17.6	----	----	----
Barium	7440-39-3	E440/VA	0.50	mg/kg	444	341	----	----	----
Beryllium	7440-41-7	E440/VA	0.10	mg/kg	0.29	0.32	----	----	----
Bismuth	7440-69-9	E440/VA	0.20	mg/kg	10.3	11.6	----	----	----
Boron	7440-42-8	E440/VA	5.0	mg/kg	160	209	----	----	----
Cadmium	7440-43-9	E440/VA	0.020	mg/kg	8.34	7.42	----	----	----
Calcium	7440-70-2	E440/VA	50	mg/kg	128000	118000	----	----	----
Chromium	7440-47-3	E440/VA	0.50	mg/kg	136	544	----	----	----
Cobalt	7440-48-4	E440/VA	0.10	mg/kg	54.2	77.7	----	----	----
Copper	7440-50-8	E440/VA	0.50	mg/kg	1160	1110	----	----	----
Iron	7439-89-6	E440/VA	50	mg/kg	55500	72100	----	----	----
Lead	7439-92-1	E440/VA	0.50	mg/kg	2490	1420	----	----	----
Lithium	7439-93-2	E440/VA	2.0	mg/kg	21.3	21.0	----	----	----
Magnesium	7439-95-4	E440/VA	20	mg/kg	8680	8980	----	----	----
Manganese	7439-96-5	E440/VA	1.0	mg/kg	602	1140	----	----	----
Mercury	7439-97-6	E510/VA	0.0500	mg/kg	0.635	0.239	----	----	----
Molybdenum	7439-98-7	E440/VA	0.10	mg/kg	21.8	64.9	----	----	----
Nickel	7440-02-0	E440/VA	0.50	mg/kg	122	296	----	----	----
Phosphorus	7723-14-0	E440/VA	50	mg/kg	9990	9160	----	----	----
Potassium	7440-09-7	E440/VA	100	mg/kg	5460	5270	----	----	----
Selenium	7782-49-2	E440/VA	0.20	mg/kg	0.33	0.30	----	----	----
Silver	7440-22-4	E440/VA	0.10	mg/kg	2.91	2.85	----	----	----
Sodium	7440-23-5	E440/VA	50	mg/kg	15400	14200	----	----	----
Strontium	7440-24-6	E440/VA	0.50	mg/kg	263	225	----	----	----
Sulfur	7704-34-9	E440/VA	1000	mg/kg	10600	10600	----	----	----



Analytical Results

Sub-Matrix: Soil/Solid					Client sample ID				
(Matrix: Soil/Solid)					BA2339-A-11	BA2339-A-12	----	----	----
Client sampling date / time					27-Sep-2023 09:00	27-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-011	VA23C3839-012	-----	-----	-----
					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	90.1	83.6	---	---	---
Titanium	7440-32-6	E440/VA	1.0	mg/kg	308	225	---	---	---
Tungsten	7440-33-7	E440/VA	0.50	mg/kg	76.7	44.9	---	---	---
Uranium	7440-61-1	E440/VA	0.050	mg/kg	2.42	2.47	---	---	---
Vanadium	7440-62-2	E440/VA	0.20	mg/kg	31.8	38.6	---	---	---
Zinc	7440-66-6	E440/VA	2.0	mg/kg	2820	4410	---	---	---
Zirconium	7440-67-7	E440/VA	1.0	mg/kg	2.1	2.5	---	---	---
TCLP Metals									
pH, TCLP 1st preliminary	----	EPP444/VA	0.010	pH units	11.2	11.2	---	---	---
pH, TCLP 2nd preliminary	----	EPP444/VA	0.010	pH units	5.57	6.17	---	---	---
pH, TCLP extraction fluid initial	----	EPP444/VA	0.010	pH units	2.87	2.87	---	---	---
pH, TCLP final	----	EPP444/VA	0.010	pH units	6.10	6.25	---	---	---
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	2.56	2.41	---	---	---
Cadmium, TCLP	7440-43-9	E444/VA	0.050	mg/L	0.148	0.139	---	---	---
Calcium, TCLP	7440-70-2	E444/VA	10	mg/L	2060	2090	---	---	---
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	0.946	0.780	---	---	---
Copper, TCLP	7440-50-8	E444/VA	0.050	mg/L	1.16	1.12	---	---	---
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	111	111	---	---	---
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	0.52	0.56	---	---	---
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		BA2339-A-11	BA2339-A-12	----	----	----
(Matrix: Soil/Solid)					Client sampling date / time		27-Sep-2023 09:00	27-Sep-2023 09:00	----	----	----
Analyte	CAS Number	Method/Lab	LOR	Unit	VA23C3839-011	VA23C3839-012	-----	-----	-----	-----	-----
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	32.0	28.3	---	---	---	---	---
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 : VA23C3839</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 : 05-Oct-2023 12:10</p> <p>Issue Date : 13-Oct-2023 14:04</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
- Duplicate outliers occur - please see following pages for full details.
- Matrix Spike 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	Anonymous	Anonymous	Manganese	7439-96-5	E440	30.8 % DUP-H	30%	Duplicate RPD does not meet the DQO for this test.
Speciated Metals	VA23C3839-001	BA2339-A-1	Chromium, hexavalent [Cr VI]	18540-29-9	E532	118 % DUP-H	35%	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.

Matrix Spike (MS) Recoveries

TCLP Metals	VA23C3839-001	BA2339-A-1	Barium, TCLP	7440-39-3	E444	41.9 % K	50.0-140%	Recovery less than lower data quality objective
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Result Qualifiers

Qualifier	Description
K	Matrix Spike recovery outside ALS DQO due to sample matrix effects.



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 BA2339-A-1	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-10	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-11	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-12	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-2	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-3	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-4	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-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 BA2339-A-5	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-6	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-7	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-8	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Mercury in Soil/Solid by CVAAS										
LDPE bag BA2339-A-9	E510	27-Sep-2023	11-Oct-2023	28 days	14 days	✔	12-Oct-2023	28 days	15 days	✔
Metals : Metals in Soil/Solid by CRC ICMS										
LDPE bag BA2339-A-1	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔
Metals : Metals in Soil/Solid by CRC ICMS										
LDPE bag BA2339-A-10	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔
Metals : Metals in Soil/Solid by CRC ICMS										
LDPE bag BA2339-A-11	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔
Metals : Metals in Soil/Solid by CRC ICMS										
LDPE bag BA2339-A-12	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔



Matrix: Soil/Solid

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis				
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval	
				Rec	Actual			Rec	Actual		
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-2	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-3	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-4	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-5	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-6	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-7	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-8	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Metals : Metals in Soil/Solid by CRC ICPMS											
LDPE bag BA2339-A-9	E440	27-Sep-2023	11-Oct-2023	180 days	14 days	✔	12-Oct-2023	180 days	15 days	✔	
Physical Tests : Moisture Content by Gravimetry											
LDPE bag BA2339-A-1	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-10	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-11	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-12	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-2	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-3	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-4	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-5	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-6	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-7	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	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	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-8	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : Moisture Content by Gravimetry										
LDPE bag BA2339-A-9	E144	27-Sep-2023	----	----	----		12-Oct-2023	----	15 days	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-1	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-10	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-11	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-12	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-2	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-3	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-4	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 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	
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-5	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-6	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-7	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-8	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Physical Tests : pH by Meter (1:2 Soil:Water Extraction)										
LDPE bag BA2339-A-9	E108	27-Sep-2023	11-Oct-2023	30 days	14 days	✔	11-Oct-2023	30 days	15 days	✔
Speciated Metals : Hexavalent Chromium (Cr VI) by IC										
Glass soil jar/Teflon lined cap BA2339-A-1	E532	27-Sep-2023	10-Oct-2023	30 days	14 days	✔	11-Oct-2023	6 days	1 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2339-A-1	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2339-A-10	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔
TCLP Metals : Mercury by CVAAS (TCLP)										
Glass vial - total (lab preserved) BA2339-A-11	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 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		
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-12	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-2	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-3	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-4	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-5	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-6	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-7	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-8	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 days	14 days	✔	
TCLP Metals : Mercury by CVAAS (TCLP)											
Glass vial - total (lab preserved) BA2339-A-9	E512	06-Oct-2023	11-Oct-2023	38 days	14 days	✔	11-Oct-2023	38 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-1	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-10	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-11	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-12	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-2	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-3	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-4	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-5	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-6	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 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		
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-7	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-8	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : Metals by CRC ICPMS (TCLP)											
HDPE - total (lab preserved) BA2339-A-9	E444	06-Oct-2023	11-Oct-2023	190 days	14 days	✔	12-Oct-2023	190 days	15 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-1	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-10	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-11	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-12	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-2	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)											
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-3	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✔	



Matrix: **Soil/Solid**

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

Analyte Group Container / Client Sample ID(s)	Method	Sampling Date	Extraction / Preparation				Analysis			
			Preparation Date	Holding Times		Eval	Analysis Date	Holding Times		Eval
				Rec	Actual			Rec	Actual	
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-4	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-5	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-6	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-7	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-8	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 days	✓
TCLP Metals : TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)										
Lab Split - Non-Volatile Leach: 28 day HT (e.g. Hg, CrVI, PFAS) BA2339-A-9	EPP444	27-Sep-2023	06-Oct-2023	----	----		----	28 days	10 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)							
Hexavalent Chromium (Cr VI) by IC	E532	1177487	2	14	14.2	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1177751	1	20	5.0	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1177752	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	1180817	1	17	5.8	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1177753	1	20	5.0	5.0	✔
Laboratory Control Samples (LCS)							
Hexavalent Chromium (Cr VI) by IC	E532	1177487	4	14	28.5	10.0	✔
Mercury in Soil/Solid by CVAAS	E510	1177751	2	20	10.0	10.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1177752	2	20	10.0	10.0	✔
Moisture Content by Gravimetry	E144	1180817	1	17	5.8	5.0	✔
pH by Meter (1:2 Soil:Water Extraction)	E108	1177753	1	20	5.0	5.0	✔
Method Blanks (MB)							
Hexavalent Chromium (Cr VI) by IC	E532	1177487	2	14	14.2	5.0	✔
Mercury by CVAAS (TCLP)	E512	1177950	1	12	8.3	5.0	✔
Mercury in Soil/Solid by CVAAS	E510	1177751	1	20	5.0	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1177952	1	12	8.3	5.0	✔
Metals in Soil/Solid by CRC ICPMS	E440	1177752	1	20	5.0	5.0	✔
Moisture Content by Gravimetry	E144	1180817	1	17	5.8	5.0	✔
Matrix Spikes (MS)							
Mercury by CVAAS (TCLP)	E512	1177950	1	12	8.3	5.0	✔
Metals by CRC ICPMS (TCLP)	E444	1177952	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.
Hexavalent Chromium (Cr VI) by IC	E532 ALS Environmental - Waterloo	Soil/Solid	APHA 3500-CR C	Instrumental analysis is performed by ion chromatography with UV detection.

Preparation Methods	Method / Lab	Matrix	Method Reference	Method Descriptions
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<i>Preparation Methods</i>	<i>Method / Lab</i>	<i>Matrix</i>	<i>Method Reference</i>	<i>Method Descriptions</i>
Leach 1:2 Soil:Water for pH/EC	EP108 ALS Environmental - Vancouver	Soil/Solid	BC WLAP METHOD: PH, ELECTROMETRIC, SOIL	The procedure involves mixing the dried (at <60°C) and sieved (No. 10 / 2mm) sample with deionized/distilled water at a 1:2 ratio of sediment to water.
Digestion for Metals and Mercury	EP440 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.
Preparation of Hexavalent Chromium (Cr VI) for IC	EP532 ALS Environmental - Waterloo	Soil/Solid	EPA 3060A	Field moist samples are digested with a sodium hydroxide/sodium carbonate solution as described in EPA 3060A.
TCLP Leachate Preparation (Metals, Inorganics, and SVOCs)	EPP444 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

<p>Work Order : VA23C3839</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 12</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 : 05-Oct-2023 12:10</p> <p>Date Analysis Commenced : 06-Oct-2023</p> <p>Issue Date : 13-Oct-2023 13:58</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 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>
Ilmaz Badbezanchi	Supervisor - Metals Prep & Mercury	Vancouver Metals, Burnaby, British Columbia
Janice Leung	Supervisor - Organics Instrumentation	Vancouver Organics, Burnaby, British Columbia
Jon Fisher	Production Manager, Environmental	Waterloo Metals, Waterloo, Ontario
Kinny Wu	Lab Analyst	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: 1177753)											
VA23C3741-017	Anonymous	pH (1:2 soil:water)	----	E108	0.10	pH units	6.70	6.97	4.0%	5%	----
Physical Tests (QC Lot: 1180817)											
VA23C2803-001	Anonymous	Moisture	----	E144	0.25	%	25.2	24.6	2.51%	20%	----
Metals (QC Lot: 1177751)											
VA23C3741-017	Anonymous	Mercury	7439-97-6	E510	0.0050	mg/kg	0.0201	0.0168	0.0033	Diff <2x LOR	----
Metals (QC Lot: 1177752)											
VA23C3741-017	Anonymous	Aluminum	7429-90-5	E440	50	mg/kg	18200	18600	2.35%	40%	----
		Antimony	7440-36-0	E440	0.10	mg/kg	0.26	0.30	0.05	Diff <2x LOR	----
		Arsenic	7440-38-2	E440	0.10	mg/kg	5.81	6.15	5.62%	30%	----
		Barium	7440-39-3	E440	0.50	mg/kg	211	289	30.9%	40%	----
		Beryllium	7440-41-7	E440	0.10	mg/kg	0.49	0.49	0.004	Diff <2x LOR	----
		Bismuth	7440-69-9	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Boron	7440-42-8	E440	5.0	mg/kg	9.4	11.2	1.7	Diff <2x LOR	----
		Cadmium	7440-43-9	E440	0.020	mg/kg	0.259	0.270	3.85%	30%	----
		Calcium	7440-70-2	E440	50	mg/kg	6600	5960	10.2%	30%	----
		Chromium	7440-47-3	E440	0.50	mg/kg	39.6	40.9	3.09%	30%	----
		Cobalt	7440-48-4	E440	0.10	mg/kg	17.0	17.7	4.09%	30%	----
		Copper	7440-50-8	E440	0.50	mg/kg	15.1	15.7	4.23%	30%	----
		Iron	7439-89-6	E440	50	mg/kg	33300	33800	1.60%	30%	----
		Lead	7439-92-1	E440	0.50	mg/kg	8.12	8.03	1.18%	40%	----
		Lithium	7439-93-2	E440	2.0	mg/kg	5.2	5.1	0.10	Diff <2x LOR	----
		Magnesium	7439-95-4	E440	20	mg/kg	7540	7830	3.78%	30%	----
		Manganese	7439-96-5	E440	1.0	mg/kg	942	1290	30.8%	30%	DUP-H
		Molybdenum	7439-98-7	E440	0.10	mg/kg	1.20	1.14	5.57%	40%	----
		Nickel	7440-02-0	E440	0.50	mg/kg	47.1	48.7	3.21%	30%	----
		Phosphorus	7723-14-0	E440	50	mg/kg	1300	1040	21.9%	30%	----
		Potassium	7440-09-7	E440	100	mg/kg	2120	2320	8.82%	40%	----
		Selenium	7782-49-2	E440	0.20	mg/kg	<0.20	<0.20	0	Diff <2x LOR	----
		Silver	7440-22-4	E440	0.10	mg/kg	<0.10	0.13	0.03	Diff <2x LOR	----
		Sodium	7440-23-5	E440	50	mg/kg	470	374	22.8%	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: 1177752) - continued											
VA23C3741-017	Anonymous	Strontium	7440-24-6	E440	0.50	mg/kg	49.1	43.4	12.4%	40%	----
		Sulfur	7704-34-9	E440	1000	mg/kg	<1000	<1000	0	Diff <2x LOR	----
		Thallium	7440-28-0	E440	0.050	mg/kg	0.075	0.109	0.034	Diff <2x LOR	----
		Tin	7440-31-5	E440	2.0	mg/kg	<2.0	<2.0	0	Diff <2x LOR	----
		Titanium	7440-32-6	E440	1.0	mg/kg	1580	1420	9.98%	40%	----
		Tungsten	7440-33-7	E440	0.50	mg/kg	<0.50	<0.50	0	Diff <2x LOR	----
		Uranium	7440-61-1	E440	0.050	mg/kg	0.432	0.569	27.4%	30%	----
		Vanadium	7440-62-2	E440	0.20	mg/kg	63.0	63.8	1.26%	30%	----
		Zinc	7440-66-6	E440	2.0	mg/kg	150	149	0.895%	30%	----
		Zirconium	7440-67-7	E440	1.0	mg/kg	11.9	11.6	2.55%	30%	----
Speciated Metals (QC Lot: 1177487)											
WT2332552-001	Anonymous	Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.10	mg/kg	<0.10 µg/g	<0.10	0	Diff <2x LOR	----
Speciated Metals (QC Lot: 1179195)											
VA23C3839-001	BA2339-A-1	Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.12	mg/kg	1.78	0.46	118%	35%	DUP-H

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: 1180817)						
Moisture	---	E144	0.25	%	<0.25	---
Metals (QCLot: 1177751)						
Mercury	7439-97-6	E510	0.005	mg/kg	<0.0050	---
Metals (QCLot: 1177752)						
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: 117752) - 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	----
Speciated Metals (QCLot: 1177487)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
Speciated Metals (QCLot: 1179195)						
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	<0.10	----
TCLP Metals (QCLot: 1177950)						
Mercury, TCLP	7439-97-6	E512	0.001	mg/L	<0.0010	----
TCLP Metals (QCLot: 1177952)						
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: 1177753)									
pH (1:2 soil:water)	----	E108	----	pH units	6 pH units	101	95.0	105	----
Physical Tests (QCLot: 1180817)									
Moisture	----	E144	0.25	%	50 %	99.1	90.0	110	----
Metals (QCLot: 1177751)									
Mercury	7439-97-6	E510	0.005	mg/kg	0.1 mg/kg	98.5	80.0	120	----
Metals (QCLot: 1177752)									
Aluminum	7429-90-5	E440	50	mg/kg	200 mg/kg	94.9	80.0	120	----
Antimony	7440-36-0	E440	0.1	mg/kg	100 mg/kg	95.9	80.0	120	----
Arsenic	7440-38-2	E440	0.1	mg/kg	100 mg/kg	98.0	80.0	120	----
Barium	7440-39-3	E440	0.5	mg/kg	25 mg/kg	96.1	80.0	120	----
Beryllium	7440-41-7	E440	0.1	mg/kg	10 mg/kg	93.1	80.0	120	----
Bismuth	7440-69-9	E440	0.2	mg/kg	100 mg/kg	89.1	80.0	120	----
Boron	7440-42-8	E440	5	mg/kg	100 mg/kg	95.2	80.0	120	----
Cadmium	7440-43-9	E440	0.02	mg/kg	10 mg/kg	95.1	80.0	120	----
Calcium	7440-70-2	E440	50	mg/kg	5000 mg/kg	92.8	80.0	120	----
Chromium	7440-47-3	E440	0.5	mg/kg	25 mg/kg	93.2	80.0	120	----
Cobalt	7440-48-4	E440	0.1	mg/kg	25 mg/kg	91.1	80.0	120	----
Copper	7440-50-8	E440	0.5	mg/kg	25 mg/kg	92.0	80.0	120	----
Iron	7439-89-6	E440	50	mg/kg	100 mg/kg	99.2	80.0	120	----
Lead	7439-92-1	E440	0.5	mg/kg	50 mg/kg	92.3	80.0	120	----
Lithium	7439-93-2	E440	2	mg/kg	25 mg/kg	90.9	80.0	120	----
Magnesium	7439-95-4	E440	20	mg/kg	5000 mg/kg	96.0	80.0	120	----
Manganese	7439-96-5	E440	1	mg/kg	25 mg/kg	92.5	80.0	120	----
Molybdenum	7439-98-7	E440	0.1	mg/kg	25 mg/kg	93.9	80.0	120	----
Nickel	7440-02-0	E440	0.5	mg/kg	50 mg/kg	90.1	80.0	120	----
Phosphorus	7723-14-0	E440	50	mg/kg	1000 mg/kg	101	80.0	120	----
Potassium	7440-09-7	E440	100	mg/kg	5000 mg/kg	91.0	80.0	120	----
Selenium	7782-49-2	E440	0.2	mg/kg	100 mg/kg	96.0	80.0	120	----
Silver	7440-22-4	E440	0.1	mg/kg	10 mg/kg	85.8	80.0	120	----
Sodium	7440-23-5	E440	50	mg/kg	5000 mg/kg	92.7	80.0	120	----
Strontium	7440-24-6	E440	0.5	mg/kg	25 mg/kg	91.0	80.0	120	----
Sulfur	7704-34-9	E440	1000	mg/kg	5000 mg/kg	93.3	80.0	120	----



Sub-Matrix: Soil/Solid					Laboratory Control Sample (LCS) Report				
					Spike	Recovery (%)	Recovery Limits (%)		Qualifier
Analyte	CAS Number	Method	LOR	Unit	Concentration	LCS	Low	High	
Metals (QCLot: 1177752) - continued									
Thallium	7440-28-0	E440	0.05	mg/kg	100 mg/kg	90.6	80.0	120	----
Tin	7440-31-5	E440	2	mg/kg	50 mg/kg	93.5	80.0	120	----
Titanium	7440-32-6	E440	1	mg/kg	25 mg/kg	88.7	80.0	120	----
Tungsten	7440-33-7	E440	0.5	mg/kg	10 mg/kg	95.0	80.0	120	----
Uranium	7440-61-1	E440	0.05	mg/kg	0.5 mg/kg	97.0	80.0	120	----
Vanadium	7440-62-2	E440	0.2	mg/kg	50 mg/kg	94.6	80.0	120	----
Zinc	7440-66-6	E440	2	mg/kg	50 mg/kg	93.7	80.0	120	----
Zirconium	7440-67-7	E440	1	mg/kg	10 mg/kg	97.4	80.0	120	----
Speciated Metals (QCLot: 1177487)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	86.5	80.0	120	----
Speciated Metals (QCLot: 1179195)									
Chromium, hexavalent [Cr VI]	18540-29-9	E532	0.1	mg/kg	0.8 mg/kg	93.0	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: 1177950)										
VA23C3839-001	BA2339-A-1	Mercury, TCLP	7439-97-6	E512	0.0010 mg/L	0.001 mg/L	105	50.0	140	----
TCLP Metals (QCLot: 1177952)										
VA23C3839-001	BA2339-A-1	Antimony, TCLP	7440-36-0	E444	5.02 mg/L	5 mg/L	100	50.0	140	----
		Arsenic, TCLP	7440-38-2	E444	5.2 mg/L	5 mg/L	103	50.0	140	----
		Barium, TCLP	7440-39-3	E444	5.2 mg/L	12.5 mg/L	41.9	50.0	140	K
		Beryllium, TCLP	7440-41-7	E444	0.246 mg/L	0.25 mg/L	98.6	50.0	140	----
		Boron, TCLP	7440-42-8	E444	10.5 mg/L	10 mg/L	105	50.0	140	----
		Cadmium, TCLP	7440-43-9	E444	ND mg/L	0.25 mg/L	ND	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	1.20 mg/L	1.25 mg/L	96.1	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	2.33 mg/L	2.5 mg/L	93.4	50.0	140	----
		Iron, TCLP	7439-89-6	E444	240 mg/L	250 mg/L	96.0	50.0	140	----
		Lead, TCLP	7439-92-1	E444	6.94 mg/L	10 mg/L	69.4	50.0	140	----
		Magnesium, TCLP	7439-95-4	E444	273 mg/L	250 mg/L	109	50.0	140	----
		Nickel, TCLP	7440-02-0	E444	2.40 mg/L	2.5 mg/L	96.0	50.0	140	----
		Selenium, TCLP	7782-49-2	E444	5.42 mg/L	5 mg/L	108	50.0	140	----
		Silver, TCLP	7440-22-4	E444	0.084 mg/L	0.1 mg/L	83.6	50.0	140	----
		Thallium, TCLP	7440-28-0	E444	4.7 mg/L	5 mg/L	94.2	50.0	140	----
		Uranium, TCLP	7440-61-1	E444	4.82 mg/L	5 mg/L	96.4	50.0	150	----
		Vanadium, TCLP	7440-62-2	E444	0.75 mg/L	0.75 mg/L	99.8	50.0	140	----
		Zinc, TCLP	7440-66-6	E444	ND mg/L	10 mg/L	ND	50.0	140	----
		Zirconium, TCLP	7440-67-7	E444	0.7 mg/L	1 mg/L	70.3	50.0	150	----

Qualifiers

Qualifier	Description
K	Matrix Spike recovery outside ALS DQO due to sample matrix effects.



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: 1177751)									
	SCP SS-2	Mercury	7439-97-6	E510	0.059 mg/kg	99.3	70.0	130	----
Metals (QCLot: 1177752)									
	SCP SS-2	Aluminum	7429-90-5	E440	9817 mg/kg	99.0	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	92.5	70.0	130	----
	SCP SS-2	Barium	7440-39-3	E440	105 mg/kg	92.0	70.0	130	----
	SCP SS-2	Beryllium	7440-41-7	E440	0.349 mg/kg	102	70.0	130	----
	SCP SS-2	Boron	7440-42-8	E440	8.5 mg/kg	110	40.0	160	----
	SCP SS-2	Cadmium	7440-43-9	E440	0.91 mg/kg	90.6	70.0	130	----
	SCP SS-2	Calcium	7440-70-2	E440	31082 mg/kg	93.5	70.0	130	----
	SCP SS-2	Chromium	7440-47-3	E440	101 mg/kg	104	70.0	130	----
	SCP SS-2	Cobalt	7440-48-4	E440	6.9 mg/kg	92.4	70.0	130	----
	SCP SS-2	Copper	7440-50-8	E440	123 mg/kg	92.8	70.0	130	----
	SCP SS-2	Iron	7439-89-6	E440	23558 mg/kg	93.9	70.0	130	----
	SCP SS-2	Lead	7439-92-1	E440	267 mg/kg	86.5	70.0	130	----
	SCP SS-2	Lithium	7439-93-2	E440	9.5 mg/kg	91.6	70.0	130	----
	SCP SS-2	Magnesium	7439-95-4	E440	5509 mg/kg	98.7	70.0	130	----
	SCP SS-2	Manganese	7439-96-5	E440	269 mg/kg	100	70.0	130	----
	SCP SS-2	Molybdenum	7439-98-7	E440	1.03 mg/kg	88.2	70.0	130	----
	SCP SS-2	Nickel	7440-02-0	E440	26.7 mg/kg	92.2	70.0	130	----
	SCP SS-2	Phosphorus	7723-14-0	E440	752 mg/kg	93.4	70.0	130	----
	SCP SS-2	Potassium	7440-09-7	E440	1587 mg/kg	102	70.0	130	----
	SCP SS-2	Sodium	7440-23-5	E440	797 mg/kg	92.1	70.0	130	----
	SCP SS-2	Strontium	7440-24-6	E440	86.1 mg/kg	88.3	70.0	130	----
	SCP SS-2	Thallium	7440-28-0	E440	0.0786 mg/kg	88.4	40.0	160	----
	SCP SS-2	Tin	7440-31-5	E440	10.6 mg/kg	89.1	70.0	130	----
	SCP SS-2	Titanium	7440-32-6	E440	839 mg/kg	108	70.0	130	----



Sub-Matrix:

Laboratory sample ID	Reference Material ID	Analyte	CAS Number	Method	Reference Material (RM) Report				
					RM Target Concentration	Recovery (%) RM	Recovery Limits (%)		Qualifier
							Low	High	
Metals (QCLot: 1177752) - continued									
	SCP SS-2	Uranium	7440-61-1	E440	0.52 mg/kg	97.6	70.0	130	----
	SCP SS-2	Vanadium	7440-62-2	E440	32.7 mg/kg	99.2	70.0	130	----
	SCP SS-2	Zinc	7440-66-6	E440	297 mg/kg	91.5	70.0	130	----
	SCP SS-2	Zirconium	7440-67-7	E440	5.73 mg/kg	90.0	70.0	130	----
Speciated Metals (QCLot: 1177487)									
	RM	Chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	84.7	70.0	130	----
Speciated Metals (QCLot: 1179195)									
	RM	Chromium, hexavalent [Cr VI]	18540-29-9	E532	172 mg/kg	89.9	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
Address:	5150 Riverbend Drive	Email 1:	nvictor@covanta.com		<input type="radio"/> Priority (2-4 Business Days) - 50% Surcharge - Contact ALS to Confirm TAT
	Burnaby BC	Email 2:	ofetherstonhaugh@covanta.com		<input type="radio"/> Emergency (1-2 Bus. Days) - 100% Surcharge - Contact ALS to Confirm TAT
Phone:	604-521-1025	Fax:	dskrpynyk@covanta.com		<input type="radio"/> Same Day or Weekend Emergency - Contact ALS to Confirm TAT
	<input type="checkbox"/> Yes <input type="checkbox"/> No		brent.kirkpatrick@metrovancover.org		Analysis Request
			Sarah.Wellman@metrovancover.org		

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

Sample #	Sample Identification (This description will appear on the report)	Date (dd-mmm-yy)	Time (hh:mm)	Sample Type	Analysis Request				Number of Containers
					MET-TCLP-VA (all metals, Hg)	MOISTURE	Chrome 6	MET-CSR+FULL-VA (all metals)	
BA2339-A-1		27-Sep-23	9:00	Soil	X	X	X	X	1
BA2339-A-2		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-3		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-4		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-5		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-6		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-7		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-8		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-9		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-10		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-11		27-Sep-23	9:00	Soil	X	X		X	1
BA2339-A-12		27-Sep-23	9:00	Soil	X	X		X	1

Environmental Division
 Vancouver
 Work Order Reference
VA23C3839

Telephone : +1 604 253 4188

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

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

SHIPMENT RELEASE (client use)			SHIPMENT RECEPTION (lab use only)			SHIPMENT VERIFICATION (lab use only)				
Released by:	Date (dd-mmm-yy)	Time (hh-mm)	Received by:	Date:	Time:	Temperature:	Verified by:	Date:	Time:	Observations: Yes / No ? If Yes add SIF
	5 Oct 23	0830		5 Oct 23	1210pm	21 °C				