

11228 Aurora Avenue
Des Moines, Iowa 50322-7905
United States
www.ghd.com



Our ref: 12575233-LTR-5

January 31, 2025

Mr. Brian L. Rath, P.E.
Environmental Engineer Senior
Solid Waste and Contaminated Sites Section
Land Quality Bureau
Iowa Department of Natural Resources
502 East 9th Street
Des Moines, Iowa 50319-0034

2024 Annual Leachate Report
Louisa Generating Station Coal Combustion Residue East Monofill
Muscatine, Iowa
Permit No. 70-SDP-16-04P

Dear Mr. Rath:

On behalf of MidAmerican Energy Company (MidAmerican), GHD has prepared this Leachate Report to document leachate management activities for the Louisa Generating Station Coal Combustion Residue (CCR) Monofill (East Monofill).

1. Current Operation

The East Monofill is equipped with a leachate collection and transfer system. Leachate from Cell 1, Cell 2, and Cell 3 is pumped by a lift station through buried pipe to the lined Leachate Lagoon.

Construction of Cell 1 was completed in 2018, with the initial CCR placed in the East Monofill on October 15, 2018. Cells 2 and 3 were permitted for use in 2020. CCR placement into Cell 2 and Cell 3 began in March 2020.

1.1 Leachate Head

MidAmerican monitors the leachate depth in the East Monofill by obtaining monthly leachate head measurements at the Cell 1, Cell 2, and Cell 3 leachate sump locations. Table 1 presents monthly leachate head measurements for the Cell 1, Cell 2, and Cell 3 sumps for the reporting months of January 2024 to December 2024. Leachate head was maintained at less than 12 inches above the liner in all cells throughout the reporting period.

1.2 Leachate Volume

Between startup in November 2018 and December 30, 2024, the leachate totalizer recorded removal of 15,326,824 gallons. During the 2024 reporting period (readings collected January 31, 2024, through December 30, 2024), 1,846,331 gallons of leachate removal was recorded at the leachate totalizer.

1.3 Leachate Sampling

Table 2 provides analytical results for the leachate samples collected from 2019 through 2024. The leachate analyte list provided in Table 2 is consistent with the Federal CCR rule groundwater monitoring constituents. The laboratory analytical report for the 2024 sample is provided in Attachment A.

1.4 Overall Operation

Overall, the East Monofill leachate system appears to be functioning properly and preventing the migration of leachate to groundwater.

2. Closing

If you have any questions, please contact Josh Love of MidAmerican at 712-277-6367 or Michael Alowitz at 515-414-3934.

Sincerely,



Michael J. Alowitz, P.E.
Senior Engineer

+1 515 414-3934
michael.alowitz@ghd.com

KA/Is/LTR-5

Encl.

Table 1 Leachate Head and Flow Measurements
Table 2 Leachate Analytical Results (Appendix III and Appendix IV)
Attachment A Laboratory Analytical Report

Copy To: Josh Love, MidAmerican
Jamie Murphy, MidAmerican
Kayla Swope, MidAmerican



Kevin G. Armstrong, C.P.G., P.M.P.
Project Manager

+1 515 414-3935
kevin.armstrong@ghd.com

Tables

Table 1

**Leachate Head and Flow Measurements
MidAmerican Energy Company
East Monofill - Muscatine, Iowa
Permit No. 70-SDP-16-04P**

Date	Cell 1 Leachate Head (inches above liner)	Cell 2 Leachate Head (inches above liner)	Cell 3 Leachate Head (inches above liner)	Lift Station 1 Flow to Leachate Lagoon (gallons)	Leachate from Lagoon Used for Dust Control (gallons)
1/31/2024	3.0	3.0	3.0	268,363	0
2/29/2024	3.0	3.0	3.0	155,613	0
3/28/2024	3.0	3.0	3.0	52,364	0
4/30/2024	3.0	3.1	3.0	425,052	0
5/29/2024	3.0	3.0	3.0	199,642	0
6/27/2024	3.0	3.0	3.0	116,792	43,044
7/31/2024	3.0	3.0	3.0	263,672	265,607
8/29/2024	3.0	3.0	3.0	105,921	336,163
9/30/2024	3.0	3.0	3.0	89,925	312,828
10/31/2024	3.0	3.0	3.0	25,788	173,175
11/26/2024	3.0	3.0	3.0	86,150	58,229
12/30/2024	3.0	3.0	3.0	57,049	40,563

Table 2

Leachate Analytical Results (Appendix III and Appendix IV)
MidAmerican Energy Company
East Monofill - Muscatine, Iowa
Permit No. 70-SDP-16-04P

Analyte	Units	Leachate_19_09 9/12/2019	LMH34_20_09 9/16/2020	LMH34_21_09 9/14/2021	LMH34_22_09 09/28/2022	LMH34_23_09 09/26/2023	LMH34_24_08 8/26/2024
Appendix III							
Boron	mg/L	0.200 U	0.271	0.144	0.286	0.311	0.477
Calcium	mg/L	53.2	324	144	303	345	400
Chloride	mg/L	43.6	1250	465	795	1440	1960
Fluoride	mg/L	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U	1.00 U
pH, lab	s.u.	8.0 J	10.7 J	9.3 J	11.0 J	8.8 J	9.2 J
Sulfate	mg/L	87.4	2360	1060	1910	3430	2920
Total dissolved solids (TDS)	mg/L	354	7360	1920	4700	7940	8100
Appendix IV							
Antimony	mg/L	0.00100 U	0.00100 U	0.00200 U	0.00200 U	0.00200 U	0.00200 U
Arsenic	mg/L	0.00200 U	0.00497	0.00216	0.0107	0.00288	0.00425
Barium	mg/L	0.0915	0.0957	0.0945	0.128	0.0628	0.0619
Beryllium	mg/L	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U
Cadmium	mg/L	0.000100 U	0.000404	0.000201	0.000528	0.000230	0.000268
Chromium	mg/L	0.00500 U	0.377	0.0133	0.0587	0.296	0.138
Cobalt	mg/L	0.000500 U	0.000500 U	0.000500 U	0.00392	0.000570	0.000500 U
Lead	mg/L	0.000500 U	0.000500 U	0.000500 U	0.00353	0.000500 U	0.000500 U
Lithium	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0166	0.0139	0.0269
Mercury	mg/L	0.000200 U	0.000200 U	0.000200 U	0.000200 U	0.000200 U	0.000200 U
Molybdenum	mg/L	0.0287	1.43	0.434	0.798	1.22	1.33
Radium-226 & 228	pCi/L	0.689	1.06	0.867	5.17	1.48	0.576 U
Selenium	mg/L	0.00500 U	0.0914	0.0145	0.0895	0.0686	0.0923
Thallium	mg/L	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U	0.00100 U

Notes:

J - Estimated.

s.u. - Standard Units.

mg/L - Milligrams per liter.

pCi/L - Picocuries per liter.

Attachment A

Laboratory Analytical Report



ANALYTICAL REPORT

PREPARED FOR

Attn: Kevin Armstrong
GHD Services Inc.
11228 Aurora Avenue
Des Moines, Iowa 50322-7905

Generated 9/26/2024 3:32:33 PM

JOB DESCRIPTION

MEC Louisa East Monofill Leachate

JOB NUMBER

310-289113-1

Eurofins Cedar Falls

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing North Central, LLC Project Manager.

Authorization



Generated
9/26/2024 3:32:33 PM

Authorized for release by
Zach Bindert, Senior Project Manager
Zach.Bindert@et.eurofinsus.com
(319)595-2016



Table of Contents

Cover Page	1
Table of Contents	3
Case Narrative	4
Sample Summary	6
Detection Summary	7
Client Sample Results	8
Definitions	10
QC Sample Results	11
QC Association	15
Chronicle	17
Certification Summary	18
Method Summary	19
Chain of Custody	20
Receipt Checklists	22
Tracer Carrier Summary	23

Case Narrative

Client: GHD Services Inc.
Project: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Job ID: 310-289113-1

Eurofins Cedar Falls

Job Narrative 310-289113-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 8/28/2024 9:10 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 2.9°C.

HPLC/IC

Method 9056A_ORGFM_28D: The following sample was diluted due to the nature of the sample matrix: LMH34_24_08 (310-289113-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Metals

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

General Chemistry

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Case Narrative

Client: GHD Services Inc.
Project: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Job ID: 310-289113-2

Eurofins Cedar Falls

Job Narrative 310-289113-2

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers and/or narrative comments are included to explain any exceptions, if applicable.

- Matrix QC may not be reported if insufficient sample is provided or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt

The sample was received on 8/28/2024 9:10 AM. Unless otherwise noted below, the sample arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 2.9°C.

Gas Flow Proportional Counter

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Rad

No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Eurofins Cedar Falls

Sample Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-289113-1	LMH34_24_08	Water	08/26/24 16:45	08/28/24 09:10

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

Detection Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Client Sample ID: LMH34_24_08

Lab Sample ID: 310-289113-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1960		50.0		mg/L	50		9056A	Total/NA
Sulfate	2920		50.0		mg/L	50		9056A	Total/NA
Arsenic	0.00425		0.00200		mg/L	1		6020B	Total/NA
Barium	0.0619		0.00200		mg/L	1		6020B	Total/NA
Boron	0.477		0.400		mg/L	4		6020B	Total/NA
Cadmium	0.000268		0.000200		mg/L	1		6020B	Total/NA
Calcium	400		2.00		mg/L	4		6020B	Total/NA
Chromium	0.138		0.00500		mg/L	1		6020B	Total/NA
Lithium	0.0269		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	1.33		0.00200		mg/L	1		6020B	Total/NA
Selenium	0.0923		0.00500		mg/L	1		6020B	Total/NA
Total Dissolved Solids	8100		500		mg/L	1		SM 2540C	Total/NA
pH	9.2	HF	1.0		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Client Sample ID: LMH34_24_08

Lab Sample ID: 310-289113-1

Date Collected: 08/26/24 16:45

Matrix: Water

Date Received: 08/28/24 09:10

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	1960		50.0		mg/L			08/29/24 09:07	50
Fluoride	<1.00		1.00		mg/L			08/28/24 18:49	5
Sulfate	2920		50.0		mg/L			08/29/24 09:07	50

Method: SW846 6020B - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200		mg/L		08/30/24 09:00	09/03/24 15:25	1
Arsenic	0.00425		0.00200		mg/L		08/30/24 09:00	09/03/24 15:25	1
Barium	0.0619		0.00200		mg/L		08/30/24 09:00	09/03/24 15:25	1
Beryllium	<0.00100		0.00100		mg/L		08/30/24 09:00	09/03/24 15:25	1
Boron	0.477		0.400		mg/L		08/30/24 09:00	09/04/24 15:04	4
Cadmium	0.000268		0.000200		mg/L		08/30/24 09:00	09/03/24 15:25	1
Calcium	400		2.00		mg/L		08/30/24 09:00	09/05/24 14:36	4
Chromium	0.138		0.00500		mg/L		08/30/24 09:00	09/03/24 15:25	1
Cobalt	<0.000500		0.000500		mg/L		08/30/24 09:00	09/03/24 15:25	1
Lead	<0.000500		0.000500		mg/L		08/30/24 09:00	09/03/24 15:25	1
Lithium	0.0269		0.0100		mg/L		08/30/24 09:00	09/03/24 15:25	1
Molybdenum	1.33		0.00200		mg/L		08/30/24 09:00	09/03/24 15:25	1
Selenium	0.0923		0.00500		mg/L		08/30/24 09:00	09/03/24 15:25	1
Thallium	<0.00100		0.00100		mg/L		08/30/24 09:00	09/03/24 15:25	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		09/03/24 14:45	09/04/24 13:05	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	8100		500		mg/L			08/30/24 12:12	1
Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SM 4500 H+ B)	9.2	HF	1.0		SU			08/28/24 11:06	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	<0.341	U	0.179	0.179	1.00	0.341	pCi/L	08/30/24 09:06	09/24/24 17:20	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Barium	97.8		30 - 110					08/30/24 09:06	09/24/24 17:20	1

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-228	<0.576	U	0.380	0.383	1.00	0.576	pCi/L	08/30/24 11:46	09/24/24 12:22	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Barium	97.8		30 - 110					08/30/24 11:46	09/24/24 12:22	1
Y Carrier	78.1		30 - 110					08/30/24 11:46	09/24/24 12:22	1

Eurofins Cedar Falls

Client Sample Results

Client: GHD Services Inc.
 Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Client Sample ID: LMH34_24_08

Lab Sample ID: 310-289113-1

Date Collected: 08/26/24 16:45

Matrix: Water

Date Received: 08/28/24 09:10

Method: TAL-STL Ra226_Ra228 - Combined Radium-226 and Radium-228

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Combined Radium 226 + 228	<0.576	U	0.420	0.423	5.00	0.576	pCi/L		09/26/24 14:13	1

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15

Definitions/Glossary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Qualifiers

HPLC/IC

Qualifier	Qualifier Description
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.

General Chemistry

Qualifier	Qualifier Description
HF	Parameter with a holding time of 15 minutes. Test performed by laboratory at client's request. Sample was analyzed outside of hold time.

Rad

Qualifier	Qualifier Description
U	Result is less than the sample detection limit.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

QC Sample Results

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-431769/3
Matrix: Water
Analysis Batch: 431769

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	<1.00		1.00		mg/L			08/28/24 15:11	1
Fluoride	<0.200		0.200		mg/L			08/28/24 15:11	1
Sulfate	<1.00		1.00		mg/L			08/28/24 15:11	1

Lab Sample ID: LCS 310-431769/4
Matrix: Water
Analysis Batch: 431769

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	10.0	9.687		mg/L		97	90 - 110
Fluoride	2.00	2.028		mg/L		101	90 - 110
Sulfate	10.0	10.20		mg/L		102	90 - 110

Lab Sample ID: 310-289113-1 MS
Matrix: Water
Analysis Batch: 431769

Client Sample ID: LMH34_24_08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Fluoride	<1.00		5.00	4.182		mg/L		84	80 - 120

Lab Sample ID: 310-289113-1 MS
Matrix: Water
Analysis Batch: 431769

Client Sample ID: LMH34_24_08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec Limits
Chloride	1960		250	2063	4	mg/L		43	80 - 120
Sulfate	2920		250	3059	4	mg/L		55	80 - 120

Lab Sample ID: 310-289113-1 MSD
Matrix: Water
Analysis Batch: 431769

Client Sample ID: LMH34_24_08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Fluoride	<1.00		5.00	4.202		mg/L		84	80 - 120	0	15

Lab Sample ID: 310-289113-1 MSD
Matrix: Water
Analysis Batch: 431769

Client Sample ID: LMH34_24_08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
Chloride	1960		250	2068	4	mg/L		44	80 - 120	0	15
Sulfate	2920		250	3069	4	mg/L		59	80 - 120	0	15

QC Sample Results

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-431823/1-A
Matrix: Water
Analysis Batch: 432148

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 431823

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200		mg/L		08/30/24 09:00	09/03/24 13:44	1
Arsenic	<0.00200		0.00200		mg/L		08/30/24 09:00	09/03/24 13:44	1
Barium	<0.00200		0.00200		mg/L		08/30/24 09:00	09/03/24 13:44	1
Beryllium	<0.00100		0.00100		mg/L		08/30/24 09:00	09/03/24 13:44	1
Cadmium	<0.000200		0.000200		mg/L		08/30/24 09:00	09/03/24 13:44	1
Calcium	<0.500		0.500		mg/L		08/30/24 09:00	09/03/24 13:44	1
Chromium	<0.00500		0.00500		mg/L		08/30/24 09:00	09/03/24 13:44	1
Cobalt	<0.000500		0.000500		mg/L		08/30/24 09:00	09/03/24 13:44	1
Lead	<0.000500		0.000500		mg/L		08/30/24 09:00	09/03/24 13:44	1
Lithium	<0.0100		0.0100		mg/L		08/30/24 09:00	09/03/24 13:44	1
Molybdenum	<0.00200		0.00200		mg/L		08/30/24 09:00	09/03/24 13:44	1
Selenium	<0.00500		0.00500		mg/L		08/30/24 09:00	09/03/24 13:44	1
Thallium	<0.00100		0.00100		mg/L		08/30/24 09:00	09/03/24 13:44	1

Lab Sample ID: MB 310-431823/1-A
Matrix: Water
Analysis Batch: 432273

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 431823

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200		mg/L		08/30/24 09:00	09/04/24 14:43	1
Boron	<0.100		0.100		mg/L		08/30/24 09:00	09/04/24 14:43	1

Lab Sample ID: LCS 310-431823/2-A
Matrix: Water
Analysis Batch: 432148

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 431823

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.200	0.2191		mg/L		110	80 - 120
Arsenic	0.200	0.2139		mg/L		107	80 - 120
Barium	0.100	0.1041		mg/L		104	80 - 120
Beryllium	0.100	0.1060		mg/L		106	80 - 120
Cadmium	0.100	0.09576		mg/L		96	80 - 120
Calcium	2.00	2.040		mg/L		102	80 - 120
Chromium	0.100	0.1080		mg/L		108	80 - 120
Cobalt	0.100	0.1098		mg/L		110	80 - 120
Lead	0.200	0.2087		mg/L		104	80 - 120
Lithium	0.200	0.2223		mg/L		111	80 - 120
Molybdenum	0.200	0.2112		mg/L		106	80 - 120
Selenium	0.400	0.3753		mg/L		94	80 - 120
Thallium	0.100	0.09249		mg/L		92	80 - 120

Lab Sample ID: LCS 310-431823/2-A
Matrix: Water
Analysis Batch: 432273

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 431823

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.200	0.2173		mg/L		109	80 - 120
Boron	0.200	0.1645		mg/L		82	80 - 120

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 310-431930/1
Matrix: Water
Analysis Batch: 431930

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	<50.0		50.0		mg/L			08/30/24 12:12	1

Lab Sample ID: LCS 310-431930/2
Matrix: Water
Analysis Batch: 431930

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Total Dissolved Solids	1000	976.0		mg/L		98	88 - 110

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-431638/1
Matrix: Water
Analysis Batch: 431638

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
pH	7.00	7.0		SU		100	98 - 102

Lab Sample ID: 310-289113-1 DU
Matrix: Water
Analysis Batch: 431638

Client Sample ID: LMH34_24_08
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	9.2	HF	9.2		SU		0	20

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-677428/1-A
Matrix: Water
Analysis Batch: 680653

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 677428

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	<0.243	U	0.136	0.136	1.00	0.243	pCi/L	08/30/24 09:06	09/24/24 17:07	1
Carrier	MB %Yield	MB Qualifier	Limits					Prepared	Analyzed	Dil Fac
Barium	98.5		30 - 110					08/30/24 09:06	09/24/24 17:07	1

Lab Sample ID: LCS 160-677428/2-A
Matrix: Water
Analysis Batch: 680653

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 677428

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits
Radium-226	9.58	9.977		1.34	1.00	0.348	pCi/L	104	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Barium	86.0		30 - 110						

Eurofins Cedar Falls

QC Sample Results

Client: GHD Services Inc.
 Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-677559/1-A
Matrix: Water
Analysis Batch: 680776

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 677559

Analyte	MB	MB	Count	Total	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	<0.513	U	0.308	0.309	1.00	0.513	pCi/L	08/30/24 11:46	09/24/24 12:33	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Barium	98.5		30 - 110		08/30/24 11:46	09/24/24 12:33	1			
Y Carrier	78.1		30 - 110		08/30/24 11:46	09/24/24 12:33	1			

Lab Sample ID: LCS 160-677559/2-A
Matrix: Water
Analysis Batch: 680776

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 677559

Analyte	Spike Added	LCS Result	LCS Qual	Total	RL	MDC	Unit	%Rec	%Rec
				Uncert. (2σ+/-)					Limits
Radium-228	8.49	8.581		1.27	1.00	0.588	pCi/L	101	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Barium	86.0		30 - 110						
Y Carrier	80.4		30 - 110						

QC Association Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

HPLC/IC

Analysis Batch: 431769

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	9056A	
310-289113-1	LMH34_24_08	Total/NA	Water	9056A	
MB 310-431769/3	Method Blank	Total/NA	Water	9056A	
LCS 310-431769/4	Lab Control Sample	Total/NA	Water	9056A	
310-289113-1 MS	LMH34_24_08	Total/NA	Water	9056A	
310-289113-1 MS	LMH34_24_08	Total/NA	Water	9056A	
310-289113-1 MSD	LMH34_24_08	Total/NA	Water	9056A	
310-289113-1 MSD	LMH34_24_08	Total/NA	Water	9056A	

Metals

Prep Batch: 431823

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	3005A	
MB 310-431823/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-431823/2-A	Lab Control Sample	Total/NA	Water	3005A	

Prep Batch: 431950

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	7470A	

Analysis Batch: 432148

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	6020B	431823
MB 310-431823/1-A	Method Blank	Total/NA	Water	6020B	431823
LCS 310-431823/2-A	Lab Control Sample	Total/NA	Water	6020B	431823

Analysis Batch: 432225

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	7470A	431950

Analysis Batch: 432273

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	6020B	431823
MB 310-431823/1-A	Method Blank	Total/NA	Water	6020B	431823
LCS 310-431823/2-A	Lab Control Sample	Total/NA	Water	6020B	431823

Analysis Batch: 432365

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	6020B	431823

General Chemistry

Analysis Batch: 431638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	SM 4500 H+ B	
LCS 310-431638/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	
310-289113-1 DU	LMH34_24_08	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 431930

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	SM 2540C	

Eurofins Cedar Falls

QC Association Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

General Chemistry (Continued)

Analysis Batch: 431930 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 310-431930/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-431930/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Rad

Prep Batch: 677428

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	PrecSep-21	
MB 160-677428/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-677428/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

Prep Batch: 677559

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-289113-1	LMH34_24_08	Total/NA	Water	PrecSep_0	
MB 160-677559/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-677559/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: GHD Services Inc.
 Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Client Sample ID: LMH34_24_08

Lab Sample ID: 310-289113-1

Date Collected: 08/26/24 16:45

Matrix: Water

Date Received: 08/28/24 09:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	431769	QTZ5	EET CF	08/28/24 18:49
Total/NA	Analysis	9056A		50	431769	QTZ5	EET CF	08/29/24 09:07
Total/NA	Prep	3005A			431823	QTZ5	EET CF	08/30/24 09:00
Total/NA	Analysis	6020B		1	432148	NFT2	EET CF	09/03/24 15:25
Total/NA	Prep	3005A			431823	QTZ5	EET CF	08/30/24 09:00
Total/NA	Analysis	6020B		4	432365	NFT2	EET CF	09/05/24 14:36
Total/NA	Prep	3005A			431823	QTZ5	EET CF	08/30/24 09:00
Total/NA	Analysis	6020B		4	432273	NFT2	EET CF	09/04/24 15:04
Total/NA	Prep	7470A			431950	DHM5	EET CF	09/03/24 14:45
Total/NA	Analysis	7470A		1	432225	DHM5	EET CF	09/04/24 13:05
Total/NA	Analysis	SM 2540C		1	431930	MDU9	EET CF	08/30/24 12:12
Total/NA	Analysis	SM 4500 H+ B		1	431638	W9YR	EET CF	08/28/24 11:06
Total/NA	Prep	PrecSep-21			677428	MLT	EET SL	08/30/24 09:06
Total/NA	Analysis	9315		1	680777	SWS	EET SL	09/24/24 17:20
Total/NA	Prep	PrecSep_0			677559	MLT	EET SL	08/30/24 11:46
Total/NA	Analysis	9320		1	680653	SWS	EET SL	09/24/24 12:22
Total/NA	Analysis	Ra226_Ra228		1	681159	FLC	EET SL	09/26/24 14:13

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401
 EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Accreditation/Certification Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Laboratory: Eurofins Cedar Falls

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Iowa	State	007	12-01-25

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
6020B	3005A	Water	Lithium

Laboratory: Eurofins St. Louis

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Iowa	State	373	12-01-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
9315	PrecSep-21	Water	Radium-226
9320	PrecSep_0	Water	Radium-228
Ra226_Ra228		Water	Combined Radium 226 + 228

Method Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method	Method Description	Protocol	Laboratory
9056A	Anions, Ion Chromatography	SW846	EET CF
6020B	Metals (ICP/MS)	SW846	EET CF
7470A	Mercury (CVAA)	SW846	EET CF
SM 2540C	Solids, Total Dissolved (TDS)	SM	EET CF
SM 4500 H+ B	pH	SM	EET CF
9315	Radium-226 (GFPC)	SW846	EET SL
9320	Radium-228 (GFPC)	SW846	EET SL
Ra226_Ra228	Combined Radium-226 and Radium-228	TAL-STL	EET SL
3005A	Preparation, Total Metals	SW846	EET CF
7470A	Preparation, Mercury	SW846	EET CF
PrecSep_0	Preparation, Precipitate Separation	None	EET SL
PrecSep-21	Preparation, Precipitate Separation (21-Day In-Growth)	None	EET SL

Protocol References:

None = None

SM = "Standard Methods For The Examination Of Water And Wastewater"

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

TAL-STL = TestAmerica Laboratories, St. Louis, Facility Standard Operating Procedure.

Laboratory References:

EET CF = Eurofins Cedar Falls, 3019 Venture Way, Cedar Falls, IA 50613, TEL (319)277-2401

EET SL = Eurofins St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Environment Testing
America



310-289113 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information			
Client: <u>GHD</u>			
City/State:	<u>Des Moines</u>	STATE: <u>IA</u>	Project:
Receipt Information			
Date/Time Received:	DATE: <u>8/28/24</u>	TIME: <u>0910</u>	Received By: <u>JJ</u>
Delivery Type: <input type="checkbox"/> UPS <input checked="" type="checkbox"/> FedEx <input type="checkbox"/> FedEx Ground <input type="checkbox"/> US Mail <input type="checkbox"/> Spee-Dee <input type="checkbox"/> Lab Courier <input type="checkbox"/> Lab Field Services <input type="checkbox"/> Client Drop-off <input type="checkbox"/> Other: _____			
Condition of Cooler/Containers			
Sample(s) received in Cooler?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler ID: _____	
Multiple Coolers?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Cooler # ____ of ____	
Cooler Custody Seals Present?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	If yes: Cooler custody seals intact? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
Sample Custody Seals Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Sample custody seals intact? <input type="checkbox"/> Yes <input type="checkbox"/> No	
Trip Blank Present?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	If yes: Which VOA samples are in cooler? ↓	
Temperature Record			
Coolant:	<input checked="" type="checkbox"/> Wet ice <input type="checkbox"/> Blue ice <input type="checkbox"/> Dry ice <input type="checkbox"/> Other: _____ <input type="checkbox"/> NONE		
Thermometer ID: <u>2</u>	Correction Factor (°C): <u>0</u>		
• Temp Blank Temperature – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature			
Uncorrected Temp (°C): <u>29</u>	Corrected Temp (°C): <u>29</u>		
• Sample Container Temperature			
Container(s) used:	<u>CONTAINER 1</u>	<u>CONTAINER 2</u>	
Uncorrected Temp (°C):			
Corrected Temp (°C):			
Exceptions Noted			
1) If temperature exceeds criteria, was sample(s) received same day of sampling? <input type="checkbox"/> Yes <input type="checkbox"/> No a) If yes: Is there evidence that the chilling process began? <input type="checkbox"/> Yes <input type="checkbox"/> No			
2) If temperature is <0°C, are there obvious signs that the integrity of sample containers is compromised? (e.g., bulging septa, broken/cracked bottles, frozen solid?) <input type="checkbox"/> Yes <input type="checkbox"/> No			
NOTE: If yes, contact PM before proceeding. If no, proceed with login			
Additional Comments			

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-289113-1

SDG Number:

Login Number: 289113

List Number: 1

Creator: Homolar, Dana J

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <math><6\text{mm}</math> (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Tracer/Carrier Summary

Client: GHD Services Inc.
Project/Site: MEC Louisa East Monofill Leachate

Job ID: 310-289113-1

Method: 9315 - Radium-226 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba (30-110)							
310-289113-1	LMH34_24_08	97.8							
LCS 160-677428/2-A	Lab Control Sample	86.0							
MB 160-677428/1-A	Method Blank	98.5							

Tracer/Carrier Legend

Ba = Barium

Method: 9320 - Radium-228 (GFPC)

Matrix: Water

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Ba (30-110)	Y (30-110)						
310-289113-1	LMH34_24_08	97.8	78.1						
LCS 160-677559/2-A	Lab Control Sample	86.0	80.4						
MB 160-677559/1-A	Method Blank	98.5	78.1						

Tracer/Carrier Legend

Ba = Barium

Y = Y Carrier