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

Our ref: 12575233-LTR-2

January 31, 2024

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

2023 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 2023 to December 2023. 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 29, 2023, the leachate totalizer recorded removal of 13,480,493 gallons. During the 2023 reporting period (readings collected January 31, 2023, through December 29, 2023), 1,173,227 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 2023. The leachate analyte list provided in Table 2 is consistent with the Federal CCR rule groundwater monitoring constituents. The laboratory analytical report for the 2023 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

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michael.alowitz@ghd.com

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

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kevin.armstrong@ghd.com

KA/mg/LTR-2

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

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)
1/31/2023	3.0	3.0	3.0	109,667	0
2/28/2023	3.0	3.0	3.0	196,874	0
3/30/2023	3.0	3.0	3.0	199,112	0
4/30/2023	3.0	3.0	3.0	111,026	213,666
5/31/2023	3.0	3.0	3.0	86,578	308,876
6/29/2023	3.0	3.0	3.1	36,265	361,526
7/31/2023	3.0	3.0	3.0	80,354	342,741
8/31/2023	3.0	3.0	3.0	133,343	204,192
9/29/2023	3.0	3.0	3.0	30,708	215,584
10/31/2023	3.0	3.0	3.0	89,342	100,964
11/29/2023	3.0	3.0	3.0	39,186	14,347
12/29/2023	3.0	3.0	3.0	60,772	0

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
Appendix III						
Boron	mg/L	0.200 U	0.271	0.144	0.286	0.311
Calcium	mg/L	53.2	324	144	303	345
Chloride	mg/L	43.6	1250	465	795	1440
Fluoride	mg/L	0.500 U	0.500 U	0.500 U	0.500 U	1.00 U
pH, lab	s.u.	8.0 J	10.7 J	9.3 J	11.0 J	8.8 J
Sulfate	mg/L	87.4	2360	1060	1910	3430
Total dissolved solids (TDS)	mg/L	354	7360	1920	4700	7940
Appendix IV						
Antimony	mg/L	0.00100 U	0.00100 U	0.00200 U	0.00200 U	0.00200 U
Arsenic	mg/L	0.00200 U	0.00497	0.00216	0.0107	0.00288
Barium	mg/L	0.0915	0.0957	0.0945	0.128	0.0628
Beryllium	mg/L	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
Chromium	mg/L	0.00500 U	0.377	0.0133	0.0587	0.296
Cobalt	mg/L	0.000500 U	0.000500 U	0.000500 U	0.00392	0.000570
Lead	mg/L	0.000500 U	0.000500 U	0.000500 U	0.00353	0.000500 U
Lithium	mg/L	0.0100 U	0.0100 U	0.0100 U	0.0166	0.0139
Mercury	mg/L	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
Radium-226 & 228	pCi/L	0.689	1.06	0.867	5.17	1.48
Selenium	mg/L	0.00500 U	0.0914	0.0145	0.0895	0.0686
Thallium	mg/L	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

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

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

Generated 10/26/2023 2:54:51 PM

JOB DESCRIPTION

MEC Louisa Generating Station CCR

JOB NUMBER

310-265705-1

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls IA 50613

See page two for job notes and contact information.

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

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Authorized for release by
Meredith Liechti, Service Center Manager
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(319)277-2401

Table of Contents

Job ID: 310-265705-1

Laboratory: Eurofins Cedar Falls

Narrative

Job Narrative
310-265705-1

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 are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

Matrix QC may not be reported if insufficient sample 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 9/27/2023 9:20 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 3.3°C

HPLC/IC
Method 9056A_ORGFM_28D: The following sample was diluted due to the nature of the sample matrix: LMH34_23_09 (310-265705-1). 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.

Narrative

Job Narrative
310-265705-2

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 are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

Matrix QC may not be reported if insufficient sample 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 9/27/2023 9:20 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 3.3°C

Gas Flow Proportional Counter
Method 9315_Ra226: Radium-226 batch 630504
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time

Job ID: 310-265705-1 (Continued)

Laboratory: Eurofins Cedar Falls (Continued)

applied as the Activity Reference Date.
LMH34_23_09 (310-265705-1), (LCS 160-630504/2-A), (MB 160-630504/1-A), (160-51681-A-2-A) and (160-51681-B-2-A DU)

Method 9320_Ra228: Radium-228 batch 630505
Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative. Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.
LMH34_23_09 (310-265705-1), (LCS 160-630505/2-A), (MB 160-630505/1-A), (160-51681-A-2-B) and (160-51681-B-2-B DU)

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.

Sample Summary

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
310-265705-1	LMH34_23_09	Water	09/26/23 07:50	09/27/23 09:20

Detection Summary

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Client Sample ID: LMH34_23_09
Lab Sample ID: 310-265705-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloride	1440		100		mg/L	100		9056A	Total/NA
Sulfate	3430		100		mg/L	100		9056A	Total/NA
Arsenic	0.00288		0.00200		mg/L	1		6020B	Total/NA
Barium	0.0628		0.00200		mg/L	1		6020B	Total/NA
Boron	0.311		0.100		mg/L	1		6020B	Total/NA
Cadmium	0.000230		0.000200		mg/L	1		6020B	Total/NA
Calcium	345		0.500		mg/L	1		6020B	Total/NA
Chromium	0.296		0.00500		mg/L	1		6020B	Total/NA
Cobalt	0.000570		0.000500		mg/L	1		6020B	Total/NA
Lithium	0.0139		0.0100		mg/L	1		6020B	Total/NA
Molybdenum	1.22		0.00200		mg/L	1		6020B	Total/NA
Selenium	0.0686		0.00500		mg/L	1		6020B	Total/NA
Total Dissolved Solids	7940		250		mg/L	1		SM 2540C	Total/NA
pH	8.8	HF	1.0		SU	1		SM 4500 H+ B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: LMH34_23_09
Lab Sample ID: 310-265705-1

Date Collected: 09/26/23 07:50
Matrix: Water
Date Received: 09/27/23 09:20

Method: SW846 9056A - Anions, Ion Chromatography

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**1440**		100		mg/L			10/03/23 14:03	100
Sulfate	**3430**		100		mg/L			10/03/23 14:03	100
Fluoride	<1.00		1.00		mg/L			10/02/23 21:37	5

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

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200		mg/L		10/02/23 09:30	10/11/23 19:19	1
Arsenic	**0.00288**		0.00200		mg/L		10/02/23 09:30	10/11/23 19:19	1
Barium	**0.0628**		0.00200		mg/L		10/02/23 09:30	10/11/23 19:19	1
Beryllium	<0.00100		0.00100		mg/L		10/02/23 09:30	10/11/23 19:19	1
Boron	**0.311**		0.100		mg/L		10/02/23 09:30	10/11/23 19:19	1
Cadmium	**0.000230**		0.000200		mg/L		10/02/23 09:30	10/11/23 19:19	1
Calcium	**345**		0.500		mg/L		10/02/23 09:30	10/11/23 19:19	1
Chromium	**0.296**		0.00500		mg/L		10/02/23 09:30	10/11/23 19:19	1
Cobalt	**0.000570**		0.000500		mg/L		10/02/23 09:30	10/11/23 19:19	1
Lead	<0.000500		0.000500		mg/L		10/02/23 09:30	10/11/23 19:19	1
Lithium	**0.0139**		0.0100		mg/L		10/02/23 09:30	10/11/23 19:19	1
Molybdenum	**1.22**		0.00200		mg/L		10/02/23 09:30	10/11/23 19:19	1
Selenium	**0.0686**		0.00500		mg/L		10/02/23 09:30	10/11/23 19:19	1
Thallium	<0.00100		0.00100		mg/L		10/02/23 09:30	10/11/23 19:19	1

Method: SW846 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		10/04/23 10:42	10/05/23 10:55	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids (SM 2540C)	**7940**		250		mg/L			09/28/23 14:35	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
pH (SM 4500 H+ B)	**8.8**	**HF**	1.0		SU			09/27/23 12:20	1

Method: SW846 9315 - Radium-226 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.00898	U	0.106	0.106	1.00	0.224	pCi/L	10/03/23 09:51	10/25/23 09:10	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.1*		*30 - 110*	*10/03/23 09:51*	*10/25/23 09:10*	*1*

Method: SW846 9320 - Radium-228 (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	**1.47**		0.547	0.564	1.00	0.674	pCi/L	10/03/23 09:54	10/23/23 12:08	1

Carrier	*%Yield*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*94.1*		*30 - 110*	*10/03/23 09:54*	*10/23/23 12:08*	*1*
Y Carrier	*86.0*		*30 - 110*	*10/03/23 09:54*	*10/23/23 12:08*	*1*

Client Sample Results

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Client Sample ID: LMH34_23_09
Lab Sample ID: 310-265705-1
Date Collected: 09/26/23 07:50
Matrix: Water
Date Received: 09/27/23 09:20

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	1.48		0.557	0.574	5.00	0.674	pCi/L		10/26/23 11:25	1

Definitions/Glossary

Client: GHD Services Inc. Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Qualifiers

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.
¤	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

Method: 9056A - Anions, Ion Chromatography

Lab Sample ID: MB 310-401445/3
Matrix: Water
Analysis Batch: 401445

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			10/02/23 15:23	1
Sulfate	<1.00		1.00		mg/L			10/02/23 15:23	1
Fluoride	<0.200		0.200		mg/L			10/02/23 15:23	1

Lab Sample ID: LCS 310-401445/35
Matrix: Water
Analysis Batch: 401445

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	9.889		mg/L		99	90 - 110
Sulfate	10.0	10.15		mg/L		102	90 - 110
Fluoride	2.00	2.044		mg/L		102	90 - 110

Method: 6020B - Metals (ICP/MS)

Lab Sample ID: MB 310-401133/1-A
Matrix: Water
Analysis Batch: 402305

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 401133

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	<0.00200		0.00200		mg/L		10/02/23 09:30	10/11/23 17:23	1
Arsenic	<0.00200		0.00200		mg/L		10/02/23 09:30	10/11/23 17:23	1
Barium	<0.00200		0.00200		mg/L		10/02/23 09:30	10/11/23 17:23	1
Beryllium	<0.00100		0.00100		mg/L		10/02/23 09:30	10/11/23 17:23	1
Boron	<0.100		0.100		mg/L		10/02/23 09:30	10/11/23 17:23	1
Cadmium	<0.000200		0.000200		mg/L		10/02/23 09:30	10/11/23 17:23	1
Calcium	<0.500		0.500		mg/L		10/02/23 09:30	10/11/23 17:23	1
Chromium	<0.00500		0.00500		mg/L		10/02/23 09:30	10/11/23 17:23	1
Cobalt	<0.000500		0.000500		mg/L		10/02/23 09:30	10/11/23 17:23	1
Lead	<0.000500		0.000500		mg/L		10/02/23 09:30	10/11/23 17:23	1
Lithium	<0.0100		0.0100		mg/L		10/02/23 09:30	10/11/23 17:23	1
Molybdenum	<0.00200		0.00200		mg/L		10/02/23 09:30	10/11/23 17:23	1
Selenium	<0.00500		0.00500		mg/L		10/02/23 09:30	10/11/23 17:23	1
Thallium	<0.00100		0.00100		mg/L		10/02/23 09:30	10/11/23 17:23	1

Lab Sample ID: LCS 310-401133/2-A
Matrix: Water
Analysis Batch: 402305

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 401133

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Antimony	0.200	0.2040		mg/L		102	80 - 120
Arsenic	0.200	0.1927		mg/L		96	80 - 120
Barium	0.100	0.09490		mg/L		95	80 - 120
Beryllium	0.100	0.09185		mg/L		92	80 - 120
Boron	0.200	0.1790		mg/L		90	80 - 120
Cadmium	0.100	0.09014		mg/L		90	80 - 120
Calcium	2.00	1.918		mg/L		96	80 - 120
Chromium	0.100	0.1016		mg/L		102	80 - 120
Cobalt	0.100	0.1022		mg/L		102	80 - 120

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

Lab Sample ID: LCS 310-401133/2-A
Matrix: Water
Analysis Batch: 402305

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 401133

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Lead	0.200	0.1894		mg/L		95	80 - 120
Lithium	0.200	0.1775		mg/L		89	80 - 120
Molybdenum	0.200	0.1746		mg/L		87	80 - 120
Selenium	0.400	0.3659		mg/L		91	80 - 120
Thallium	0.200	0.1756		mg/L		88	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 310-401458/1-A
Matrix: Water
Analysis Batch: 401648

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 401458

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	<0.000200		0.000200		mg/L		10/04/23 10:42	10/05/23 10:31	1

Lab Sample ID: LCS 310-401458/2-A
Matrix: Water
Analysis Batch: 401648

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 401458

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
Mercury	0.00167	0.001666		mg/L		100	80 - 120

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

Lab Sample ID: MB 310-400945/1
Matrix: Water
Analysis Batch: 400945

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			09/28/23 14:35	1

Lab Sample ID: LCS 310-400945/2
Matrix: Water
Analysis Batch: 400945

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	1018		mg/L		102	90 - 110

Method: SM 4500 H+ B - pH

Lab Sample ID: LCS 310-400808/1
Matrix: Water
Analysis Batch: 400808

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

Method: 9315 - Radium-226 (GFPC)

Lab Sample ID: MB 160-630504/1-A
Matrix: Water
Analysis Batch: 633327

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 630504

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	-0.03281	U	0.0715	0.0716	1.00	0.178	pCi/L	10/03/23 09:51	10/25/23 09:00	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*30 - 110*	*10/03/23 09:51*	*10/25/23 09:00*	*1*

Lab Sample ID: LCS 160-630504/2-A
Matrix: Water
Analysis Batch: 633327

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 630504

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-226			11.3	9.949		1.15	1.00	0.174	pCi/L	88	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.6*		*30 - 110*

Method: 9320 - Radium-228 (GFPC)

Lab Sample ID: MB 160-630505/1-A
Matrix: Water
Analysis Batch: 632929

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 630505

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	RL	MDC	Unit	Prepared	Analyzed	Dil Fac
Radium-228	0.3289	U	0.534	0.535	1.00	0.913	pCi/L	10/03/23 09:54	10/23/23 16:49	1

Carrier	*MB %Yield*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
Ba Carrier	*89.5*		*30 - 110*	*10/03/23 09:54*	*10/23/23 16:49*	*1*
Y Carrier	*86.0*		*30 - 110*	*10/03/23 09:54*	*10/23/23 16:49*	*1*

Lab Sample ID: LCS 160-630505/2-A
Matrix: Water
Analysis Batch: 632929

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 630505

Analyte			Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	RL	MDC	Unit	%Rec	%Rec Limits		
Radium-228			7.78	9.425		1.57	1.00	0.969	pCi/L	121	75 - 125		

Carrier	*LCS %Yield*	*LCS Qualifier*	*Limits*
Ba Carrier	*94.6*		*30 - 110*
Y Carrier	*83.4*		*30 - 110*

HPLC/IC

Analysis Batch: 401445

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	9056A	
310-265705-1	LMH34_23_09	Total/NA	Water	9056A	
MB 310-401445/3	Method Blank	Total/NA	Water	9056A	
LCS 310-401445/35	Lab Control Sample	Total/NA	Water	9056A	

Metals

Prep Batch: 401133

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	3005A	
MB 310-401133/1-A	Method Blank	Total/NA	Water	3005A	
LCS 310-401133/2-A	Lab Control Sample	Total/NA	Water	3005A	

Prep Batch: 401458

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	7470A	
MB 310-401458/1-A	Method Blank	Total/NA	Water	7470A	
LCS 310-401458/2-A	Lab Control Sample	Total/NA	Water	7470A	

Analysis Batch: 401648

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	7470A	401458
MB 310-401458/1-A	Method Blank	Total/NA	Water	7470A	401458
LCS 310-401458/2-A	Lab Control Sample	Total/NA	Water	7470A	401458

Analysis Batch: 402305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	6020B	401133
MB 310-401133/1-A	Method Blank	Total/NA	Water	6020B	401133
LCS 310-401133/2-A	Lab Control Sample	Total/NA	Water	6020B	401133

General Chemistry

Analysis Batch: 400808

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	SM 4500 H+ B	
LCS 310-400808/1	Lab Control Sample	Total/NA	Water	SM 4500 H+ B	

Analysis Batch: 400945

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	SM 2540C	
MB 310-400945/1	Method Blank	Total/NA	Water	SM 2540C	
LCS 310-400945/2	Lab Control Sample	Total/NA	Water	SM 2540C	

Rad

Prep Batch: 630504

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	PrecSep-21	
MB 160-630504/1-A	Method Blank	Total/NA	Water	PrecSep-21	
LCS 160-630504/2-A	Lab Control Sample	Total/NA	Water	PrecSep-21	

QC Association Summary

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Rad

Prep Batch: 630505

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
310-265705-1	LMH34_23_09	Total/NA	Water	PrecSep_0	
MB 160-630505/1-A	Method Blank	Total/NA	Water	PrecSep_0	
LCS 160-630505/2-A	Lab Control Sample	Total/NA	Water	PrecSep_0	

Lab Chronicle

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Client Sample ID: LMH34_23_09
Lab Sample ID: 310-265705-1

Date Collected: 09/26/23 07:50
Matrix: Water
Date Received: 09/27/23 09:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Analyst	Lab	Prepared or Analyzed
Total/NA	Analysis	9056A		5	401445	QTZ5	EET CF	10/02/23 21:37
Total/NA	Analysis	9056A		100	401445	QTZ5	EET CF	10/03/23 14:03
Total/NA	Prep	3005A			401133	KCK5	EET CF	10/02/23 09:30
Total/NA	Analysis	6020B		1	402305	A6US	EET CF	10/11/23 19:19
Total/NA	Prep	7470A			401458	NFT2	EET CF	10/04/23 10:42
Total/NA	Analysis	7470A		1	401648	NFT2	EET CF	10/05/23 10:55
Total/NA	Analysis	SM 2540C		1	400945	ENB7	EET CF	09/28/23 14:35
Total/NA	Analysis	SM 4500 H+ B		1	400808	W9YR	EET CF	09/27/23 12:20
Total/NA	Prep	PrecSep-21			630504	KAC	EET SL	10/03/23 09:51
Total/NA	Analysis	9315		1	633416	FLC	EET SL	10/25/23 09:10
Total/NA	Prep	PrecSep_0			630505	KAC	EET SL	10/03/23 09:54
Total/NA	Analysis	9320		1	632945	FLC	EET SL	10/23/23 12:08
Total/NA	Analysis	Ra226_Ra228		1	633692	EMH	EET SL	10/26/23 11:25

Laboratory References:

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

Accreditation/Certification Summary

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

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	12-01-23

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

Method Summary

Client: GHD Services Inc.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

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
3005A	Preparation, Total Metals	SW846	EET CF
7470A	Preparation, Mercury	SW846	EET CF

Protocol References:

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.

Laboratory References:

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

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310-265705 Chain of Custody

Cooler/Sample Receipt and Temperature Log Form

Client Information

Client: GHD

City/State: CITY | STATE | Project:

Receipt Information

Date/Time Received: DATE 9-27-23 | TIME 0920 | Received By: MY

Delivery Type: ☐ UPS ☒ FedEx ☐ FedEx Ground ☐ US Mail ☐ Spee-Dee ☐ Lab Courier ☐ Lab Field Services ☐ Client Drop-off ☐ Other:_____

Condition of Cooler/Containers

Sample(s) received in Cooler?	☒ Yes	☐ No	*If yes:* Cooler ID.
Multiple Coolers?	☐ Yes	☒ No	*If yes:* Cooler # _____ of _____
Cooler Custody Seals Present? No	☒ Yes	☐ No	*If yes:* Cooler custody seals intact? ☒ Yes ☐ No
Sample Custody Seals Present? No	☐ Yes	☒ No	*If yes:* Sample custody seals intact? ☐ Yes ☐ No
Trip Blank Present?	☐ Yes	☒ No	*If yes:* Which VOA samples are in cooler? ↓

Temperature Record

Coolant: ☒ Wet ice ☐ Blue ice ☐ Dry ice ☐ Other:_____ ☐ NONE

Thermometer ID: T | Correction Factor (°C): 0

• **Temp Blank Temperature** – If no temp blank, or temp blank temperature above criteria, proceed to Sample Container Temperature

Uncorrected Temp (°C): 3.3 | Corrected Temp (°C): 3.3

• **Sample Container Temperature**

	CONTAINER 1	CONTAINER 2
Container(s) used:		
Uncorrected Temp (°C):		
Corrected Temp (°C):		

Exceptions Noted

1) If temperature exceeds criteria, was sample(s) received same day of sampling? ☐ Yes ☐ No
   a) *If yes:* Is there evidence that the chilling process began? ☐ Yes ☐ 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?) ☐ Yes ☐ No

NOTE: If yes, contact PM before proceeding If no, proceed with login

Additional Comments

Eurofins Cedar Falls
3019 Venture Way
Cedar Falls, IA 50613
Phone (319) 277-2401 Phone (319) 277-2425

Chain of Custody Record

DSM 214

eurofins | Environment Testing

Client Information	Sampler: Brooke Wasson	Lab PM: Liechti, Meredith	Carrier Tracking No(s):	COC No:
Client Contact: Kevin Armstrong	Phone: 563-568-7524	E-Mail: meredith.liechti@et.eurofinsus.com	State of Origin: Iowa	Page: Page 1 of 1
Company: GHD Services Inc.	PWSID:			Job #:

Address: 11228 Aurora Avenue	Due Date Requested:	
City: Des Moines	TAT Requested (days): Standard	
State, Zip: IA, 50322-7905	Compliance Project: Δ Yes Δ No	
Phone: 515-414-3935	PO #: 340-004027	
Email: Kevin.Armstrong@ghd com	WO #: 12575233-001	
Project Name: Louisa East Monofill Leachate	Project #: 31007299	
Site: MEC Louisa East CCR Monofill	SSOW#: 12575233-001	

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA, M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2O3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Y - Trizma, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	9315_Ra226 - Standard Target List	9320_Ra228 - Standard Target List	9056A_ORGFM_28D - Chloride, Fluoride, Sulfate	6020B, 7470A - CCR Metals List	2540C_Calcd, SM4500_H+	Total Number of containers	Special Instructions/Note:
			Preservation Code:				D	D	N	D	N		
LMH34_23_09	09/26/23	0750	G	W	N		X	X	X	X	X		All Appendix III and Appendix IV constituents

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ [illegible] ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Deliverable Requested I, II, III, IV, Other (specify)

Special Instructions/QC Requirements. Database Facility Code. 11114676-GD-MidAmeri

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

	Relinquished by	Date/Time:	Company	Received by	Date/Time:	Company
1	Brooke Wasson					
2						
3					09/27/23 0920	

Custody Seals Intact: Δ Yes Δ No | Custody Seal No

Cooler Temperature(s) °C and Other Remarks:

Ver 01/16/2019

Login Sample Receipt Checklist

Client: GHD Services Inc.

Job Number: 310-265705-1

Login Number: 265705
List Number: 1
Creator: Homolar, Dana J

List Source: Eurofins Cedar Falls

Question	Answer	Comment
Radioactivity wasn't checked or is </= 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 <6mm (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.
Job ID: 310-265705-1
Project/Site: MEC Louisa Generating Station CCR

Method: 9315 - Radium-226 (GFPC)

Matrix: Water **Prep Type: Total/NA**

		Percent Yield (Acceptance Limits)
Lab Sample ID	Client Sample ID	Ba (30-110)
310-265705-1	LMH34_23_09	94.1
LCS 160-630504/2-A	Lab Control Sample	94.6
MB 160-630504/1-A	Method Blank	89.5

Tracer/Carrier Legend

Ba = Ba Carrier

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)
310-265705-1	LMH34_23_09	94.1	86.0
LCS 160-630505/2-A	Lab Control Sample	94.6	83.4
MB 160-630505/1-A	Method Blank	89.5	86.0

Tracer/Carrier Legend

Ba = Ba Carrier

Y = Y Carrier