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

**Our ref:** 12575233-LTR-4

**February 02, 2024**

**Mr. Brian Rath**
**Environmental Engineer Senior**
**Solid Waste and Contaminated Sites Section**
**MidAmerican Energy Company**
**502 E. 9th Street**
**Des Moines, Iowa 50319**

**2023 IDNR Template Tables**
**Louisa Generating Station East Monofill**
**Muscatine, Iowa**
**Permit 70-SDP-16-04P**

Dear Brian,

As recently discussed, GHD has prepared Table 7 and Table 9 using the general format provided in the Iowa Department of Natural Resources' (IDNR's) *Annual Water Quality Report Template for Non-Municipal Landfills*. Table 7 and Table 9, provided in Attachment 1, are modified as approved in your January 31, 2024 email to Kevin Armstrong of GHD and Josh Love of MidAmerican Energy Company. Additionally, in Attachment 2, the 2023 groundwater monitoring results are compared to the Maximum Contaminant Level (MCL) or Health Advisory Lifetime (HAL) as described in 567 Iowa Administrative Code Chapter 103, paragraph 103.1(4)d.

Attachment 3 provides a crosswalk table to reference the items provided in the Annual Groundwater Monitoring and Corrective Action Report prepared under the Federal CCR rule with the IDNR's *Annual Water Quality Report Template for Non-Municipal Landfills*.

If you have any questions regarding these tables, please contact Kevin Amstrong.

Sincerely,

**Kevin Armstrong**
Science Leader

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

**Michael J. Alowitz, P.E.**
Senior Engineer

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

KA/mg/LTR-4

Encl.

Copy to: Jamie Murphy, MidAmerican Energy Company
Josh Love, MidAmerican Energy Company

# Attachments

# Attachment 1

## IDNR Template Table 7 and Table 9

**Summary of Ongoing and Newly Identified Control Limit Exceedances**
**2023 Annual Water Quality Report**
**Louisa Generating Station - East Monofill**
**Permit No. 70-SDP-16-04P**

| Well | Constituent | Units | Most recent result | Background Standard | Groundwater Protection Standard 40 CFR §257.95(h) |
|---|---|---|---|---|---|
| MW-230 | Barium | mg/L | 0.0497 | 0.0396 | 2.0 |
| MW-231 | Calcium | mg/L | 80.2 / 78.9 | 64.58 | None |
| | Barium | mg/L | 0.0671 / 0.0686 | 0.0396 | 2.0 |
| MW-232 | Sulfate | mg/L | 17.2 | 15.3 | None |
| MW-233 | Sulfate | mg/L | 48.4 | 15.3 | None |
| | Barium | mg/L | 0.0461 | 0.0396 | 2.0 |
| MW-234 | pH, lab | s.u. | 8.2 J | 7.70 - 8.05 | None |
| | Sulfate | mg/L | 27.8 | 15.3 | None |

Comments:
None.

**Table 9**

**Historic Control Limit & GWPS Exceedances**
**2023 Annual Water Quality Report**
**Louisa Generating Station - East Monofill**
**Permit No. 70-SDP-16-04P**

| Key: gray =CL; black =GWPS | | March | June | September | December | March | May | September | November | March | September | March | September |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Well** | **Constituent** | **2020** | **2020** | **2020** | **2020** | **2021** | **2021** | **2021** | **2021** | **2022** | **2022** | **2023** | **2023** |
| MW-213A (Background) | pH, lab | | *na* | | *na* | | | | *ns* | | | | |
| MW-221A (Background) | pH, lab | | *na* | | *na* | | | | *ns* | | | | |
| MW-230 | Calcium | | *na* | | | | | | *ns* | | | | |
| | pH, lab | | *na* | | *na* | | | | *ns* | | | | |
| | Sulfate | | | | | | | | *ns* | | | | |
| | Total Dissolved Solids (TDS) | | *na* | | | | | | *ns* | | | | |
| | Barium | *na* | *na* | *na* | *na* | | | | *ns* | | | | |
| MW-231 | Calcium | | | | | | | | *ns* | | | | |
| | pH, lab | | *na* | | *na* | | | | *ns* | | | | |
| | Sulfate | | | | | | | | *ns* | | | | |
| | Total Dissolved Solids (TDS) | | *na* | | *na* | | | | *ns* | | | | |
| | Barium | *na* | *na* | *na* | *na* | | | | *ns* | | | | |
| | Radium-226 & 228 | *na* | *na* | *na* | *na* | | | | *ns* | | | | |
| MW-232 | Calcium | | | | | | | | *na* | | | | |
| | Chloride | | *na* | | *na* | | | | *na* | | | | |
| | pH, lab | | *na* | | *na* | | | | *na* | | | | |
| | Sulfate | | *na* | | | | | | | | | | |
| | Barium | *na* | *na* | *na* | *na* | | | | | | | | |
| | Radium-226 & 228 | *na* | *na* | *na* | *na* | | | | *na* | | | | |
| MW-233 | Calcium | | | | | | | | *na* | | | | |
| | Chloride | | *na* | | *na* | | | | *na* | | | | |
| | pH, lab | | *na* | | *na* | | | | *na* | | | | |
| | Sulfate | | *na* | | *na* | | | | | | | | |
| | Total Dissolved Solids (TDS) | | *na* | | *na* | | | | *na* | | | | |
| | Barium | *na* | *na* | *na* | *na* | | | | *na* | | | | |
| | Radium-226 & 228 | *na* | *na* | *na* | *na* | | | | *na* | | | | |
| MW-234 | pH, lab | | *na* | | *na* | | | | *ns* | | | | |
| | Sulfate | | *na* | | *na* | | | | *ns* | | | | |
| | Radium-226 & 228 | *na* | *na* | *na* | *na* | | | | *ns* | | | | |

Comments:
Groundwater Protection Standard (GWPS) established under 40 CFR §257.95(h).
*ns* - No sample collected during this sampling event.
*na* - Constituent not analyzed.

# Attachment 2

## MCL/HAL Comparison Table

**2023 Monitoring Data**
**Louisa Generating Station - East Monofill**
**Muscatine, Iowa**

| Sample Location: | | | | | MW-213A | MW-213A | MW-213A | MW-213A | MW-221A | MW-221A | MW-221A | MW-221A | MW-230 | MW-230 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Sample ID: | | | | | MW-213A_23_03 | MW-213A_23_03 Re1 | MW-213A_23_03 Re2 | MW-213A_23_09 | MW-221A_23_03 | MW-221A_23_03 Re1 | MW-221A_23_03 Re2 | MW-221A_23_09 | MW-230_23_03 | MW-230_23_09 |
| Sample Date: | | MCL [a] | HAL [b] | SDWR [c] | 03/06/2023 | 03/06/2023 | 03/06/2023 | 09/25/2023 | 03/06/2023 | 03/06/2023 | 03/06/2023 | 09/25/2023 | 03/07/2023 | 09/26/2023 |
| **Parameters** | **Units** | | | | | | | | | | | | | |
| **Appendix III** | | | | | | | | | | | | | | |
| Boron | mg/L | -- | 6 | -- | R | 0.100 U | 0.100 U | 0.100 U | R | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U |
| Calcium | mg/L | -- | -- | -- | 40.9 | -- | -- | 40.0 | 43.2 | -- | -- | 37.2 | 75.0 | 64.0 |
| Chloride | mg/L | -- | -- | 250 | 5.00 U | -- | -- | 5.93 | 5.00 U | -- | -- | 5.00 U | 5.00 U | 5.00 U |
| Fluoride | mg/L | 4.0 | -- | 2.0 | 0.500 U | -- | -- | 1.00 U | 0.500 U | -- | -- | 1.00 U | 0.500 U | 1.00 U |
| pH, lab | s.u. | -- | -- | 6.5 - 8.5 | 8.0 J | -- | -- | 7.8 J | 8.1 J | -- | -- | 8.0 J | 7.8 J | 7.7 J |
| Sulfate | mg/L | -- | -- | 250 | 5.47 | -- | -- | 7.71 | 10.3 | -- | -- | 9.48 | 12.6 | 16.5 |
| Total dissolved solids (TDS) | mg/L | -- | -- | 500 | 138 | -- | -- | 132 | 128 | -- | -- | 114 | 242 | 298 |
| **Appendix IV** | | | | | | | | | | | | | | |
| Antimony | mg/L | 0.006 | 0.006 | -- | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | 0.00200 U |
| Arsenic | mg/L | 0.01 | -- | -- | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | 0.00200 U |
| Barium | mg/L | 2.0 | -- | -- | 0.0320 | -- | -- | 0.0310 | 0.0309 | -- | -- | 0.0285 | 0.0573 | 0.0497 |
| Beryllium | mg/L | 0.004 | -- | -- | 0.00400 U | -- | -- | 0.00100 U | 0.00100 U | -- | -- | 0.00100 U | 0.00100 U | 0.00100 U |
| Cadmium | mg/L | 0.005 | 0.005 | -- | 0.000100 U | -- | -- | 0.000200 U | 0.000100 U | -- | -- | 0.000200 U | 0.000100 U | 0.000200 U |
| Chromium | mg/L | 0.1 | -- | -- | 0.00500 U | -- | -- | 0.00500 U | 0.00500 U | -- | -- | 0.00500 U | 0.00500 U | 0.00500 U |
| Cobalt | mg/L | -- | -- | -- | 0.000568 | -- | -- | 0.000500 U | 0.000500 U | -- | -- | 0.000500 U | 0.000500 U | 0.000500 U |
| Lead | mg/L | 0.015 [d] | -- | -- | 0.000580 | -- | -- | 0.000500 U | 0.000500 U | -- | -- | 0.000500 U | 0.000500 U | 0.000500 U |
| Lithium | mg/L | -- | -- | -- | 0.0100 U | -- | -- | 0.0100 U | 0.0100 U | -- | -- | 0.0100 U | 0.0100 U | 0.0100 U |
| Mercury | mg/L | 0.002 | 0.002 | -- | 0.000200 U | -- | -- | 0.000200 U | 0.000200 U | -- | -- | 0.000200 U | 0.000200 U | 0.000200 U |
| Molybdenum | mg/L | -- | 0.04 | -- | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | -- | -- | 0.00200 U | 0.00200 U | 0.00200 U |
| Radium-226 & 228 | pCi/L | 5 | -- | -- | 0.214 U | -- | -- | 0.163 U | 0.298 U | -- | -- | 0.418 U | 0.225 U | 0.561 |
| Selenium | mg/L | 0.05 | 0.05 | -- | 0.00500 U | -- | -- | 0.00500 U | 0.00500 U | -- | -- | 0.00500 U | 0.00500 U | 0.00500 U |
| Thallium | mg/L | 0.002 | -- | -- | 0.00100 U | -- | -- | 0.00100 U | 0.00100 U | -- | -- | 0.00100 U | 0.00100 U | 0.00100 U |

**2023 Monitoring Data**
**Louisa Generating Station - East Monofill**
**Muscatine, Iowa**

| **Sample Location:** | | **MW-231** | **MW-231** | **MW-231** | **MW-231** | **MW-232** | **MW-232** | **MW-233** | **MW-233** | **MW-234** | **MW-234** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID:** | | **MW-231_23_03** | **FD-1_23_03** | **MW-231_23_09** | **FD-1_23_09** | **MW-232_23_03** | **MW-232_23_09** | **MW-233_23_03** | **MW-233_23_09** | **MW-234_23_03** | **MW-234_23_09** |
| **Sample Date:** | | **03/07/2023** | **03/07/2023 (Duplicate)** | **09/26/2023** | **09/26/2023 (Duplicate)** | **03/07/2023** | **09/26/2023** | **03/07/2023** | **09/25/2023** | **03/07/2023** | **09/25/2023** |
| **Parameters** | **Units** | | | | | | | | | | |
| **Appendix III** | | | | | | | | | | | |
| Boron | mg/L | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U | 0.100 U |
| Calcium | mg/L | 71.3 | 72.0 | 80.2 | 78.9 | 50.5 | 67.0 | 66.3 | 55.7 | 40.5 | 38.7 |
| Chloride | mg/L | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 5.00 U | 11.9 | 5.00 U | 5.00 U | 5.00 U |
| Fluoride | mg/L | 0.500 U | 0.500 U | 1.00 U | 1.00 U | 0.500 U | 1.00 U | 0.500 U | 1.00 U | 0.500 U | 1.00 U |
| pH, lab | s.u. | 7.8 J | 7.9 J | 7.6 J | 7.6 J | 8.1 J | 7.6 J | 7.9 J | 8.0 J | 8.3 J | 8.2 J |
| Sulfate | mg/L | 8.26 | 8.33 | 7.87 | 7.74 | 15.6 | 17.2 | 51.5 | 48.4 | 18.1 | 27.8 |
| Total dissolved solids (TDS) | mg/L | 254 | 246 | 336 | 264 | 186 | 246 | 274 | 240 | 148 | 158 |
| **Appendix IV** | | | | | | | | | | | |
| Antimony | mg/L | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U |
| Arsenic | mg/L | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U |
| Barium | mg/L | 0.0576 | 0.0576 | 0.0686 | 0.0671 | 0.0345 | 0.0542 | 0.0510 | 0.0461 | 0.0260 | 0.0264 |
| Beryllium | mg/L | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U |
| Cadmium | mg/L | 0.000100 U | 0.000100 U | 0.000200 U | 0.000200 U | 0.000100 U | 0.000200 U | 0.000100 U | 0.000200 U | 0.000100 U | 0.000200 U |
| Chromium | mg/L | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U |
| Cobalt | mg/L | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U |
| Lead | mg/L | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000500 U | 0.000675 |
| Lithium | mg/L | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U | 0.0100 U |
| Mercury | mg/L | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U | 0.000200 U |
| Molybdenum | mg/L | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U | 0.00200 U |
| Radium-226 & 228 | pCi/L | -0.0761 U | 0.559 | 0.142 U | -0.0218 U | 0.147 U | 0.243 U | 0.444 | 0.262 U | 0.219 U | 0.346 U |
| Selenium | mg/L | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U | 0.00500 U |
| Thallium | mg/L | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U | 0.00100 U |

Notes:
[a] Maximum contaminant level (MCL) establised under 40 CFR 257.95(h)(1).
[b] Drink Water Health Advisories - Life-time established in the 2018 Edition of the Drinking Water Standards and Health Advisories (EPA 822-F-18-001).
[c] Secondary Drinking Water Regulation.
[d] Action level for lead (treatment technique).
**1.00** Value exceeds the MCL, or HAL where MCL not established.
J - Estimated concentration.
U - Not detected at the associated reporting limit.
J- - Estimated concentration, result may be biased low
J+ - Estimated concentration, result may be biased high.

# Attachment 3

## IDNR Template to AGWMCAR Cross Reference Table

**IDNR Template to AGWMCAR Cross Reference Table**

**Louisa Generating Station - East Monofill**
**Permit No. 70-SDP-16-04P**

| Annual Water Quality Report Template for Non-Municipal Landfills | | Annual Groundwater Monitoring and Corrective Action Report | | Notes |
|---|---|---|---|---|
| Table 1 | Monitoring Program Summary | Table 2.1 | Groundwater Monitoring Well Network | Lists all wells in monitoring network. |
| | | Table 2.6 | Summary of Groundwater Monitoring Events | Lists total number of samples from monitoring programs since March 2018. |
| | | Table 4.5 | Comparison of Monitoring Results to Intra-well Prediction Limits for Constituents in Groundwater | Compares current reporting period's groundwater data to the prediction limit value (control limit). |
| | | Section 1 | Introduction | States the current monitoring program. |
| | | Section 2.1 | Groundwater Monitoring Network | Describes the aquifer characteristics. |
| | | Section 6.3 | Recommendations | Provides recommended changes, if any, to the monitoring network. |
| Table 2 | Monitoring Program Implementation Schedule | Table 2.6 | Summary of Groundwater Monitoring Events | Provides summary of all sampling events since March 2018. |
| Table 3 | Monitoring Well Maintenance and Performance Revaluation Schedule | Section 2.2 | Monitoring Well Inspection | States the frequency of total depth measurements (annually). |
| Table 4 | Monitoring Well Maintenance and Performance Summary | Table 2.2 | Well Construction Details | Provides well coordinates and elevations for TOC, original total depth, ground surface, top of screen, and bottom of screen. |
| | | Table 2.3 | Monitoring Well Screen Occlusion Evaluation | Provides TOC elevation, original total depth below TOC, screen length, annual total depth measurements, and percent of screen occluded. |
| | | Table 3.1 | Groundwater Elevation Summary | Provides all groundwater elevation data, past elevations through elevations during the current reporting period. |
| Table 5 | Background Summary | Table 4.4 | Revised Baseline Monitoring Inter-well and Intra-well Prediction Limits for Constituents in Groundwater | Summary of inter-well evaluation from pooled background well data. Provides the prediction limit value (background level). |
| Table 6 | Summary of Well/Detected Constituent Pairs With No Immediately Preceding Control Limit Exceedances | Table 4.5 | Comparison of Monitoring Results to Intra-well Prediction Limits for Constituents in Groundwater | Compares current reporting period's groundwater data to the prediction limit value (control limit). |
| Table 7 | Summary of Ongoing and Newly Identified Control Limit Exceedances | -- | | Table 7 is provided to IDNR. |
| Table 8 | Analytical Data Summary | Table 4.1 | Revised Baseline Period Groundwater Monitoring Data | Provides all groundwater analytical data from the baseline period at the CCR Monofill. |
| | | Table 4.2 | Monitoring Data | Provides all groundwater analytical data for the current reporting period at the CCR Monofill. |
| Table 9 | Historic Control Limit & GWPS Exceedances | -- | | Table 9 is provided to IDNR. |
| Table 10 | Groundwater Quality Assessment Plan Trend Analysis | Section 4 | Groundwater Monitoring | Section 4 discusses trends in groundwater data, during baseline monitoring and current reporting period. |
| Table 11 | Leachate Management Summary | Annual Leachate Report | | The Annual Leachate Report documents the leachate management activities for the current reporting period. Provides analytical data, leachate head, and leachate volume measurements. |
| Table 12 | Gas Monitoring Summary | NA | | Not applicable since the CCR Monofill holds CCR and does not generate gas. |