
Metropolitan Water Reclamation District of Greater Chicago

# MONITORING AND RESEARCH DEPARTMENT

***REPORT NO. 22-10***

## *TUNNEL AND RESERVOIR PLAN MCCOOK RESERVOIR ANNUAL GROUNDWATER MONITORING REPORT FOR 2021*

***April 2022***

Protecting Our Water Environment

Metropolitan Water Reclamation District of Greater Chicago

CECIL LUE-HING RESEARCH AND DEVELOPMENT COMPLEX
6001 WEST PERSHING ROAD CICERO, ILLINOIS 60804-4112

**Edward W. Podczerwinski, P.E.**
Director of Monitoring and Research



April 29, 2022

Mr. Michael Summers, P.G.
Groundwater Section Manager
Bureau of Water/Public Water Supplies
Illinois Environmental Protection Agency
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Dear Mr. Summers:

Subject: Transmittal of the Report "Tunnel and Reservoir Plan McCook Reservoir Annual Groundwater Monitoring Report for 2021"

Please find attached the report entitled "Tunnel and Reservoir Plan McCook Reservoir Annual Groundwater Monitoring Report for 2021." The report was prepared for transmittal to the Illinois Environmental Protection Agency in accordance with the Chicagoland Underflow Plan McCook Reservoir Groundwater Monitoring and Analysis Plan.

If you have any questions or would like additional information, please contact Mr. Benjamin Morgan at (708) 588-3743 or MorganB@mwrd.org.

Very truly yours,

Albert Cox

Albert E. Cox, Ph.D.
Environmental Monitoring and Research Manager
Monitoring and Research Department

AC:BM:lf
Attachment
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# TUNNEL AND RESERVOIR PLAN McCOOK RESERVOIR ANNUAL GROUNDWATER MONITORING REPORT FOR 2021

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**April 2022**

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| | |
|---|---|
| °C | degrees Celsius |
| Ag | silver |
| As | arsenic |
| B | boron |
| Ba | barium |
| Be | beryllium |
| CCD | Chicago City Datum |
| Cd | cadmium |
| CFU | colony forming units |
| $Cl^-$ | chloride |
| CN | copernicium |
| Co | cobalt |
| COD | chemical oxygen demand |
| Cr | chromium |
| CSF | combined sewer flow |
| Cu | copper |
| District | Metropolitan Water Reclamation District of Greater Chicago |
| EC | electrical conductivity |
| F | fluorine |
| Fe | iron |
| Hg | mercury |
| IAC | Illinois Administrative Code |
| IEPA | Illinois Environmental Protection Agency |
| MAP | Groundwater Monitoring and Analysis Plan |
| Mn | manganese |
| $NH_3^-$-N | ammonia nitrogen |
| Ni | nickel |
| $NO_3$-N | nitrate nitrogen |
| P | phosphorus |
| Pb | lead |
| Ra | radium |
| Reservoir | Chicagoland Underflow Plan McCook Reservoir |
| Sb | antimony |
| Se | selenium |
| $SO_4^{2-}$ | sulfate |
| TARP | Tunnel and Reservoir Plan |
| TDS | total dissolved solids |
| TDS | total dissolved solids |
| Tl | thallium |
| TL | tolerance limit |
| TOC | total organic carbon |
| USACE | United States Army Corps of Engineers |
| Zn | zinc |

## ACKNOWLEDGMENTS

The McCook Reservoir groundwater monitoring is conducted by the Monitoring and Research Department of the Metropolitan Water Reclamation District of Greater Chicago (District) under the Groundwater Monitoring and Analysis Plan prepared by the United States Army Corps of Engineers. Organic analyses were performed by Environmental Monitoring Technologies, Inc., inorganic analyses by the District's Analytical Laboratories Division, and fecal coliform analyses by the District's Analytical Bacteriology Laboratory. Special thanks to Mr. James Rivera and Ms. Barbara Covic for collecting samples and to Ms. Laura Franklin for typing and formatting this report.

## DISCLAIMER

Mention of proprietary equipment and chemicals in this report does not constitute endorsement by the Metropolitan Water Reclamation District of Greater Chicago.

# TUNNEL AND RESERVOIR PLAN McCOOK RESERVOIR ANNUAL GROUNDWATER MONITORING REPORT FOR 2021

## McCook Reservoir Site Description

The Chicagoland Underflow Plan McCook Reservoir (Reservoir), located within Lyons Township in western Cook County, is part of the Tunnel and Reservoir Plan (TARP). The Reservoir was designed to reduce flooding in the Chicago area by providing storage of combined sewer flow (CSF) during storms. The Reservoir construction has been divided into two phases. Phase I of the Reservoir is complete and has been in operation since January 2018. Phase II of the Reservoir is still under construction and is anticipated to begin operation in 2029. When the capacity of the sewer systems is exceeded, the CSF is conveyed to the Reservoir by the TARP tunnels for storage until it can be treated at the Stickney Water Reclamation Plant.

The groundwater protection system surrounding the Reservoir is designed to prevent exfiltration of CSF from the Reservoir to the surrounding groundwater during high-stage conditions and control seepage of groundwater into the Reservoir during low-stage conditions. The groundwater protection system consists of a double-row grout curtain that completely surrounds Phases I and II of the Reservoir to a depth of -320 ft Chicago City Datum (CCD). The grouted area has achieved permeabilities of less than 1 lugeon.

## Groundwater Monitoring Program

A Groundwater Monitoring and Analysis Plan (MAP) (United States Army Corps of Engineers [USACE], 2014), including seven groundwater monitoring wells around the perimeter of the Reservoir (Figure 1), was developed by the USACE in coordination with the District and approved by the Illinois Environmental Protection Agency (IEPA) to monitor groundwater conditions and the performance of the groundwater protection system.

The objectives of the monitoring program as specified in the MAP are:

- To characterize local background groundwater quality by measuring Field, Routine, Organic, and Inorganic parameters prior to Reservoir operation.
- To assess potential exfiltration of CSF effluent into groundwater by measuring Field and Routine parameters while the Reservoir is in high-stage operation.
- To determine potential migration of groundwater contaminants into the Reservoir system from the surrounding area by measuring Field, Routine, Organic, and Inorganic parameters while the Reservoir is in low-stage operation.
- To evaluate long-term changes in groundwater quality associated with Reservoir operations.

FIGURE 1: McCOOK RESERVOIR SITE AND MONITORING WELL LOCATIONS

To evaluate changes in groundwater quality, monitoring wells are installed 100 feet outside the grout curtain. However, due to physical constraints near the Reservoir where it would be impossible to install or access wells, some are located greater than 100 feet from the grout curtain. In the summer of 2016, a USACE investigation discovered that wells G-04 and G-05 exhibited signs of a compromised annular seal. These wells were re-drilled during fall 2017 and became operational for monitoring in November 2017.

**Background Monitoring.** Background monitoring began in the first quarter of 2016. Groundwater samples collected during the background monitoring program were analyzed for concentrations of organic and inorganic parameters and groundwater quality indicators based on Illinois Class I Potable Resource Groundwater standards constituents in 35 Illinois Administrative Code (IAC) 620.410 (Class I) and Illinois General Use Water Quality standards constituents in 35 IAC 302 B. Background monitoring results were used to determine upper tolerance limits (TLs) in each well for all measured groundwater quality parameters to enable future assessment of groundwater protection system efficacy. The TL for all parameters were established in 2019 using all background data and the statistical approaches recommended in the MAP. The details are documented in the Appendix of the 2018 McCook annual report.

**High-Stage/Fill Event Monitoring.** High-stage monitoring is initiated when water elevation in the Reservoir exceeds -265 ft CCD. The initial high-stage/fill event threshold of -280 ft CCD was increased to -265 ft CCD in January 2018 to reflect the Reservoir operating conditions. During high-stage monitoring, samples are collected every 14 days until the Reservoir water elevation falls below -265 ft CCD. The intent of the high-stage program is to monitor time-series data when the Reservoir is under large positive (outward) gradients that have the potential to exfiltrate CSF water. For the current Phase I of the Reservoir operation during high-stage monitoring events, only wells G-01, G-02, G-03, G-04, and G-05 must be monitored. The measurements and analyses include four Field and nine Routine Parameters as specified in Table 2 of the MAP.

**Low-Stage Semiannual Monitoring.** Low-stage monitoring is implemented on a semiannual basis to collect water quality data when the Reservoir is acting as a regional groundwater sink. Low-stage sampling requires that water elevation in the Reservoir is at or below the "wet bottom" elevation (-265 ft CCD). Low-stage samples can only be collected after low-stage operation has been maintained for at least four days to ensure that monitoring results are characteristic of the regional groundwater and do not reflect re-infiltration of groundwater constituents that exfiltrated during the high-stage operation. The first low-stage semiannual sampling occurs during the second quarter of each year (April-June), analyzing all eighty-one (81) Field, Routine, Organic, and Inorganic Parameters as specified in Tables 2, 3, and 4 of the MAP. The second low-stage semiannual sampling occurs during the fourth quarter of each year (October-December), analyzing only the Field and Routine Parameters. The two low-stage semiannual samplings require collecting samples from all seven wells.

This is the 2021 report under the groundwater monitoring program for the Reservoir. It presents field activities and analytical results for groundwater monitoring of Reservoir operations from January 1, 2021 – December 31, 2021.

## Monitoring Activities for 2021

During 2021, there were 30 high-stage events at the Reservoir. One event lasted for over five weeks and required three samplings, but only one sampling could be conducted due to a staffing shortage as staff needed to be allocated to the high-priority concurrent TARP tunnel fill event sampling. Two events lasted for three weeks, requiring two samplings each. Two additional events lasted over two weeks, requiring two samplings each, but only one sampling could be conducted before new high-stage events began. One additional event lasted three weeks, requiring two samplings, but the second sampling was not done because priority was given to sampling for the second semiannual monitoring. The remaining 24 high-stage events lasted for less than two weeks, requiring one sampling each, but for six of these events, the duration was too short to allow for sampling before the next new high-stage event began. The last event of 2021 (Event 30) started on December 27, but could not be sampled due to a staffing shortage. Thus, a total of 24 high-stage samplings were conducted throughout 2021. Due to pump malfunctioning in wells G-01 and G-02, only 15 and 20 samplings, respectively, could be conducted at these wells. The Reservoir operated at high stage for a total of 256 days in 2021. Water samples were collected and immediately analyzed in the field for pH and electrical conductivity, and water temperature and depth were recorded. Samples were packed in ice and transported to District laboratories for analysis of the nine Routine parameters.

The first low-stage semiannual monitoring sampling began during the third quarter of 2021 on August 19 and 20, 2021, after the Reservoir had been at low stage for over four days. Five of the seven wells were sampled before the Reservoir entered a high-stage operation. The sampling of the remaining two wells and well duplicate for the first low-stage semiannual monitoring was continued on September 8, 2021, after the Reservoir had again been at low stage for over four days. Water sample pH, electrical conductivity, temperature, and elevation were recorded in the field. Aliquots of each sample were packed in ice and transferred to Environmental Monitoring and Technologies, Inc. for analysis of Organic constituents in accordance with requirements specified in the MAP. Additional aliquots of each sample were packed in ice and taken to the District's laboratories for analysis of Routine and Inorganic parameters.

The second semiannual sampling was conducted on November 18 and 19, 2021, following low-stage operation at the Reservoir for over four days. Five of the seven wells were sampled. Wells G-01 and G-02 could not be sampled due to pump malfunctioning. Field parameters for each water sample were measured. Water samples were packed in ice and brought to the District's laboratories for analysis of Routine parameters.

## Analytical Results for 2021

**High-Stage/Fill Event Monitoring.** All analytical results for all high-stage samples collected from wells G-01, G-02, G-03, G-04, and G-05 and the duplicate samples are reported in Tables 1 through 5, respectively. Analytical results that exceed Class I standards are shown in bold text in each table. Analytical results were compared to upper TLs based on the background monitoring data.

TABLE 1: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-01 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC | Temp. | Elevation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | CFU/100 mL | °C | ft CCD |
| **Class I Standard**[1] | | **6.5–9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 5.3–8.1 | 586 | 3,845 | 2.7 | 40 | 1,280 | 730 | 0.13 | 2.8 | 1,607 | <1 | 15.7 | -106 |
| 1 | 01/07/21 | 6.9 | 198 | **1,558** | 6.0 | 41 | **449** | 326 | 0.24 | 3.4 | 836 | <1 | 13.2 | -118 |
| 2/3 | 01/20/21 | 6.8 | 189 | **1,610** | NRR[4] | 27 | **447** | 316 | 0.21 | 3.6 | 832 | <1 | 13.4 | -117 |
| 4 | 01/28/21 | 6.9 | 152 | **1,542** | <5.0 | 34 | **431** | 303 | 0.32 | 3.7 | 860 | <2 | 13.2 | -119 |
| 5 | 02/10/21 | 6.8 | 193 | **1,406** | <5.0 | 20 | **602** | 385 | 0.25 | 3.7 | 868 | <1 | 13.2 | -119 |
| 6.1 | 02/23/21 | 6.8 | 192 | **1,574** | <5.0 | 30 | **459** | 320 | 0.25 | 3.5 | 858 | <1 | 13.4 | -119 |
| 6.1DUP | 02/23/21 | 6.8 | 192 | **1,582** | <5.0 | <20 | **458** | 319 | 0.28 | 3.5 | 863 | <1 | 13.4 | -119 |
| 6.2 | 03/09/21 | 6.8 | 196 | **1,534** | <5.0 | 30 | **449** | 303 | 0.29 | 3.8 | 826 | <1 | 13.6 | -117 |
| 7 | 03/18/21 | 6.9 | 185 | **1,694** | <5.0 | 23 | **455** | 314 | 0.31 | 3.8 | 861 | <1 | 13.2 | -117 |
| 8 | 04/08/21 | 6.9 | 195 | **1,542** | <5.0 | 32 | **461** | 324 | 0.22 | 3.5 | 839 | <1 | 13.7 | -112 |
| 9 | 04/15/21 | 6.8 | 166 | **1,464** | <5.0 | 24 | **430** | 304 | 0.22 | 3.5 | 870 | <1 | 13.8 | -117 |
| 10 | 04/29/21 | 6.9 | 175 | **1,658** | <5.0 | 23 | **439** | 321 | 0.16 | 3.2 | 868 | <1 | 13.7 | -119 |
| 10DUP | 04/29/21 | 6.9 | 175 | **1,632** | <5.0 | 27 | **441** | 323 | 0.16 | 3.1 | 905 | <1 | 13.7 | -119 |
| 11/12/13 | 05/11/21 | 6.8 | 187 | **1,634** | <5.0 | 23 | **415** | 308 | 0.26 | 3.6 | 797 | <1 | 13.7 | -119 |
| 14 | 05/25/21 | 6.8 | 190 | **1,620** | <5.0 | 23 | **422** | 314 | 0.18 | 3.6 | 899 | <1 | 13.9 | -119 |
| 15.1 | 06/22/21 | 6.8 | 167 | **1,664** | <5.0 | <20 | **411** | 319 | 0.16 | 3.3 | 883 | <1 | 14.1 | -119 |
| 15.2 | 07/12/21 | 6.9 | 156 | **1,664** | <5.0 | 23 | **411** | 331 | 0.28 | 3.8 | 881 | <1 | 13.7 | -116 |
| 22/23 | 08/31/21[5] | 6.9 | 168 | **1,552** | <5.0 | 36 | **423** | 334 | 0.18 | 3.4 | 898 | <1 | 14.0 | -117 |

[1]Illinois Administrative Code (IAC) Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]For pH, upper and lower tolerance limits are shown.
[4]No reportable result because chemical preservation did not meet method requirements.
[5]No sampling at the well from September to end of the year due to pump failure.

TABLE 2: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-02 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | | | |
| **Class I Standard**[1] | | **6.5−9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 5.7−8.1 | 182 | 1,214 | 4.3 | 31 | 383 | 207 | 0.68 | 2.2 | 791 | <1 | 17.3 | -69 |
| 1 | 01/07/21 | 6.9 | 116 | 896 | <5.0 | 29 | 187 | 149 | 0.23 | 1.8 | 626 | <1 | 13.1 | -82 |
| 1DUP | 01/07/21 | 6.9 | 116 | 884 | <5.0 | 32 | 191 | 153 | 0.21 | 1.8 | 617 | <1 | 13.1 | -82 |
| 2/3 | 01/20/21 | 6.8 | 112 | 944 | <5.0 | 21 | 188 | 162 | 0.21 | 1.9 | 639 | <1 | 13.5 | -82 |
| 4 | 01/28/21 | 6.9 | 128 | 902 | <5.0 | 30 | 180 | 157 | <0.15 | 1.8 | 629 | <1 | 13.6 | -87 |
| 5 | 02/10/21 | 6.9 | 116 | 852 | 5.9 | <20 | **208** | 180 | 0.27 | 1.9 | 634 | <1 | 13.6 | -82 |
| 6.1 | 02/23/21 | 6.8 | 114 | 918 | <5.0 | <20 | 184 | 155 | 0.18 | 1.8 | 631 | <1 | 13.5 | -83 |
| 6.2 | 03/09/21 | 6.8 | 117 | 894 | <5.0 | 27 | 193 | 152 | 0.34 | 1.8 | 626 | <1 | 13.7 | -81 |
| 6.2DUP | 03/09/21 | 6.8 | 117 | 882 | <5.0 | 34 | 195 | 153 | 0.37 | 2.0 | 647 | <1 | 13.7 | -81 |
| 7 | 03/18/21 | 6.9 | 112 | 810 | <5.0 | 16 | 182 | 156 | 0.19 | 1.9 | 612 | <1 | 13.6 | -83 |
| 8 | 04/08/21 | 6.8 | 114 | 910 | <5.0 | 28 | 188 | 162 | 0.16 | 1.8 | 597 | <1 | 13.9 | -82 |
| 9 | 04/15/21 | 6.9 | 108 | 844 | <5.0 | <20 | 183 | 163 | <0.15 | 1.9 | 632 | <1 | 13.9 | -83 |
| 10 | 04/29/21 | 7.0 | 116 | 980 | <5.0 | 23 | 181 | 149 | <0.15 | 1.9 | 645 | <1 | 13.8 | -86 |
| 11/12/13 | 05/11/21 | 6.8 | 121 | 1,008 | <5.0 | 22 | 170 | 138 | 0.23 | 1.8 | 617 | <1 | 13.6 | -85 |
| 11/12/13DUP | 05/11/21 | 6.8 | 121 | 1,028 | <5.0 | 29 | 174 | 141 | 0.20 | 1.8 | 627 | <1 | 13.6 | -85 |
| 14 | 05/25/21 | 6.9 | 122 | 934 | <5.0 | 25 | 175 | 150 | 0.18 | 1.9 | 651 | <1 | 14.6 | -83 |
| 15.1 | 06/22/21 | 6.9 | 108 | 924 | <5.0 | <20 | 179 | 142 | 0.28 | 1.8 | 621 | <1 | 14.8 | -84 |
| 15.2 | 07/12/21 | 6.9 | 104 | 968 | <5.0 | <20 | 186 | 150 | 0.29 | 1.8 | 628 | <1 | 14.1 | -82 |
| 16 | 07/21/21 | 6.8 | 104 | 958 | <5.0 | 24 | 176 | 145 | <0.15 | 1.6 | 604 | <1 | 13.9 | -81 |
| 17 | 07/27/21 | 6.8 | 114 | 922 | <5.0 | 21 | 176 | 153 | <0.15 | 1.8 | 626 | <1 | 14.9 | -82 |
| 17DUP | 07/27/21 | 6.8 | 114 | 932 | <5.0 | 22 | 179 | 155 | <0.15 | 1.8 | 624 | <1 | 14.9 | -82 |
| 18/19/20 | 08/04/21 | **5.9** | 111 | 998 | <5.0 | <20 | 171 | 150 | 0.23 | 1.7 | 604 | <1 | 14.5 | -85 |
| 22/23 | 08/31/21 | 6.9 | 111 | 872 | <5.0 | <20 | 175 | 151 | 0.20 | 1.6 | 641 | <1 | 14.8 | -84 |
| 24 | 09/24/21 | 6.8 | 117 | 970 | <5.0 | 20 | 173 | 149 | NRR[5] | 1.7 | 973 | <1 | 14.8 | -84 |
| 25 | 10/06/21[4] | 7.0 | 95 | 1,024 | <5.0 | 20 | 172 | 153 | 0.17 | 1.7 | 632 | <1 | 14.5 | -84 |

[1]Illinois Administrative Code (IAC) Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]For pH, upper and lower tolerance limits are shown.
[4]No sampling at the well from the rest of October to end of the year due to pump failure.
[5]No reportable result due to possible sample contamination.

TABLE 3: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-03 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | | | |
| **Class I Standard**[1] | | **6.5–9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 5.7–8.4 | 312 | 1,826 | 19.3 | 93 | 618 | 167 | 0.24 | 32.0 | 570 | <1 | 18.3 | -95 |
| 1 | 01/07/21 | 7.0 | 179 | **1,240** | 15.6 | 69 | **400** | 141 | <0.15 | 24.0 | 489 | <1 | 13.9 | -112 |
| 2/3 | 01/20/21 | 6.8 | 179 | **1,382** | 17.7 | 64 | **435** | 148 | <0.15 | 25.2 | 545 | <1 | 13.6 | -112 |
| 2/3DUP | 01/20/21 | 6.8 | 179 | **1,382** | 18.3 | 66 | **435** | 148 | <0.15 | 25.2 | 542 | <1 | 13.6 | -112 |
| 4 | 01/28/21 | 7.0 | 173 | 1,176 | 13.7 | 60 | **374** | 127 | 0.20 | 23.1 | 479 | <1 | 13.7 | -112 |
| 5 | 02/17/21 | 6.9 | 172 | **1,266** | 17.1 | 62 | **412** | 142 | <0.15 | 24.1 | 506 | <1 | 14.1 | -112 |
| 6.1 | 02/23/21 | 6.9 | 174 | **1,302** | 17.1 | 65 | **425** | 143 | <0.15 | 24.7 | 518 | <1 | 14.0 | -110 |
| 6.2 | 03/09/21 | 7.0 | 170 | 1,194 | 15.0 | 60 | **401** | 139 | <0.15 | 23.6 | 480 | <1 | 13.9 | -110 |
| 7 | 03/18/21 | 7.0 | 171 | 1,176 | 15.3 | 59 | **384** | 133 | <0.15 | 23.6 | 473 | <1 | 14.0 | -111 |
| 7DUP | 03/18/21 | 7.0 | 171 | 1,184 | 13.7 | 64 | **384** | 133 | <0.15 | 23.8 | 482 | <1 | 14.0 | -111 |
| 8 | 04/08/21 | 7.0 | 147 | 1,128 | 14.3 | 52 | **383** | 134 | <0.15 | 22.2 | 453 | <1 | 14.3 | -109 |
| 9 | 04/15/21 | 7.0 | 146 | 1,142 | 15.0 | 59 | **393** | 137 | <0.15 | 23.0 | 487 | <1 | 14.2 | -110 |
| 10 | 04/29/21 | 7.1 | 150 | **1,262** | 15.8 | 65 | **384** | 130 | <0.15 | 24.2 | 510 | <1 | 14.2 | -109 |
| 11/12/13 | 05/11/21 | 6.9 | 166 | **1,494** | 16.0 | 62 | **405** | 136 | <0.15 | 25.6 | 502 | <1 | 13.9 | -111 |
| 14 | 05/25/21 | 7.0 | 162 | **1,202** | 13.6 | 58 | **365** | 128 | <0.15 | 22.8 | 514 | <1 | 14.3 | -110 |
| 14DUP | 05/25/21 | 7.0 | 162 | **1,254** | 13.3 | 63 | **365** | 128 | <0.15 | 23.0 | 506 | <1 | 14.3 | -110 |
| 15.1 | 06/22/21 | 7.0 | 140 | **1,220** | 15.1 | 42 | **358** | 127 | <0.15 | 19.5 | 493 | <1 | 14.3 | -109 |
| 15.2 | 07/12/21 | 7.0 | 149 | **1,360** | 15.3 | 60 | **409** | 141 | <0.15 | 23.9 | 523 | <1 | 14.2 | -104 |
| 16 | 07/21/21 | 6.9 | 161 | **1,320** | 14.1 | 62 | **379** | 137 | <0.15 | 22.8 | 516 | <1 | 14.2 | -109 |
| 16DUP | 07/21/21 | 6.9 | 161 | **1,318** | 13.4 | 64 | **378** | 137 | <0.15 | 22.8 | 513 | <1 | 14.2 | -109 |
| 17 | 07/27/21 | 7.0 | 163 | **1,232** | 11.7 | 56 | **381** | 143 | <0.15 | 23.6 | 494 | <1 | 14.5 | -110 |
| 18/19/20 | 08/04/21 | **5.9** | 154 | **1,392** | 13.6 | 56 | **385** | 133 | <0.15 | 25.0 | 493 | <1 | 14.3 | -110 |
| 22/23 | 08/31/21 | 7.0 | 144 | 1,112 | 12.4 | 51 | **362** | 133 | <0.15 | 19.4 | 497 | <1 | 14.7 | -110 |
| 24 | 09/24/21 | 6.8 | 179 | **1,292** | 13.8 | 60 | **386** | 136 | <0.15 | 24.6 | 511 | <1 | 14.3 | -110 |
| 25 | 10/06/21 | 7.0 | 148 | **1,328** | 14.8 | 64 | **397** | 137 | <0.15 | 24.3 | 560 | <1 | 14.1 | -110 |
| 26 | 10/14/21 | 7.0 | 136 | **1,276** | 15.0 | 61 | **398** | 138 | <0.15 | 23.4 | 502 | <1 | 13.8 | -109 |
| 27 | 10/27/21 | 7.0 | 180 | **1,348** | 16.5 | 63 | **431** | 143 | <0.15 | 24.7 | 521 | <1 | 13.7 | -98 |

TABLE 3 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-03 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | | | |
| **Class I Standard**[1] | | **6.5−9.0** | **NS** | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 5.7−8.4 | 312 | 1,826 | 19.3 | 93 | 618 | 167 | 0.24 | 32.0 | 570 | <1 | 18.3 | -95 |
| 27DUP | 10/27/21 | 7.0 | 180 | **1,378** | 16.7 | 65 | **411** | 141 | <0.15 | 24.7 | 518 | <1 | 13.7 | -98 |
| 28 | 11/30/21 | 7.0 | 182 | **1,294** | 15.5 | 56 | **404** | 139 | <0.15 | 22.4 | 522 | <1 | 13.9 | -112 |
| 29 | 12/14/21 | 7.0 | 194 | **1,322** | 17.0 | 54 | **409** | 142 | <0.15 | 25.2 | 579 | <1 | 14 | -111 |
| 29DUP | 12/14/21 | 7.0 | 194 | **1,326** | 17.1 | 54 | **410** | 143 | <0.15 | 25.2 | 580 | <1 | 14 | -111 |

[1]Illinois Administrative Code (IAC) Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]For pH, upper and lower tolerance limits are shown.

TABLE 4: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-04 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS mg/L | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | mg/L | | | | | | | | | |
| **Class I Standard**[1] | | **6.5−9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 6.3−9.2 | 179 | 1,100 | 8.1 | 30 | 213 | 584 | 0.11 | 19.0 | 746 | <1 | 17.0 | -34 |
| 1 | 01/06/21 | 6.8 | 118 | **1,276** | 5.5 | 24 | 150 | 335 | <0.15 | 9.6 | 657 | <1 | 14.5 | -35 |
| 2/3 | 01/21/21 | 6.8 | 134 | **1,266** | NRR[4] | 22 | 152 | 339 | <0.15 | 10.1 | 737 | <1 | 14.7 | -33 |
| 4 | 01/27/21 | 6.9 | 110 | 1,144 | 5.3 | 23 | 153 | 345 | 0.18 | 10.2 | 772 | <1 | 14.3 | -35 |
| 4DUP | 01/27/21 | 6.9 | 110 | 1,140 | 5.2 | 24 | 153 | 343 | <0.15 | 10.1 | 767 | <1 | 14.3 | -35 |
| 5 | 02/09/21 | 6.9 | 138 | 966 | 5.8 | <20 | 177 | 328 | 0.19 | 10.1 | 728 | <1 | 14.3 | -34 |
| 6.1 | 02/24/21 | 6.8 | 139 | 1,148 | 5.5 | 21 | 150 | 332 | <0.15 | 10.0 | 712 | <1 | 14.5 | -36 |
| 6.2 | 03/11/21 | 7.0 | 131 | 1,178 | 6.1 | 26 | 154 | 333 | <0.15 | 10.2 | 696 | <1 | 14.6 | -34 |
| 7 | 03/19/21 | 6.7 | 134 | 1,130 | 5.9 | 21 | 151 | 339 | <0.15 | 10.8 | 711 | <1 | 14.6 | -34 |
| 8 | 04/06/21 | 6.9 | 134 | 1,122 | 5.4 | <20 | 152 | 337 | <0.15 | 10.2 | 693 | <1 | 15.4 | -35 |
| 9 | 04/16/21 | 6.9 | 136 | 1,162 | 5.3 | 22 | 160 | 340 | <0.15 | 10.3 | 726 | <1 | 14.6 | -32 |
| 10 | 04/27/21 | 6.9 | 104 | 1,118 | 5.2 | 20 | 150 | 328 | 0.27 | 10.5 | 740 | <1 | 15.3 | -33 |
| 11/12/13 | 05/10/21 | 6.8 | 109 | **1,244** | 5.2 | <20 | 144 | 312 | <0.15 | 10.2 | 698 | <1 | 14.8 | -32 |
| 14 | 05/21/21 | 6.7 | 147 | **1,244** | <5.0 | <20 | 151 | 322 | <0.15 | 10.2 | 753 | <1 | 15.2 | -34 |
| 15.1 | 06/23/21 | 6.8 | 122 | 1,126 | 5.2 | 25 | 138 | 298 | <0.15 | 10.0 | 685 | <1 | 15.0 | -34 |
| 15.1DUP | 06/23/21 | 6.8 | 122 | 1,174 | 5.4 | <20 | 138 | 299 | <0.15 | 10.1 | 690 | <1 | 15.0 | -34 |
| 15.2 | 07/13/21 | 6.8 | 123 | 1,092 | <5.0 | <20 | 150 | 320 | <0.15 | 10.2 | 684 | <1 | 15.8 | -30 |
| 16 | 07/22/21 | 6.8 | 126 | **1,238** | <5.0 | 30 | 157 | 325 | <0.15 | 10.1 | 707 | <1 | 15.5 | -32 |
| 17 | 07/28/21 | **6.4** | 119 | 1,156 | <5.0 | <20 | 164 | 330 | <0.15 | 10.0 | 714 | <1 | 16.0 | -34 |
| 18/19/20 | 08/03/21 | **5.9** | 122 | 1,188 | <5.0 | <20 | 152 | 308 | <0.15 | 9.9 | 694 | <1 | 15.4 | -32 |
| 18/19/20DUP | 08/03/21 | **5.9** | 122 | **1,226** | <5.0 | <20 | 154 | 312 | <0.15 | 10.2 | 687 | <1 | 15.4 | -32 |
| 22/23 | 08/27/21 | 6.8 | 109 | 1,066 | <5.0 | <20 | 155 | 318 | <0.15 | 9.8 | 716 | <1 | 15.6 | -31 |
| 24 | 09/23/21 | 6.7 | 138 | 1,192 | <5.0 | <20 | 158 | 313 | <0.15 | 10.3 | 704 | <1 | 14.8 | -32 |
| 24DUP | 09/23/21 | 6.7 | 138 | **1,206** | <5.0 | <20 | 159 | 315 | <0.15 | 10.0 | 673 | <1 | 14.8 | -32 |
| 25 | 10/08/21 | 6.9 | 133 | 1,116 | <5.0 | <20 | 151 | 314 | <0.15 | 9.3 | 658 | <1 | 15.3 | -32 |
| 26 | 10/14/21 | 6.9 | 103 | 1,088 | <5.0 | 23 | 152 | 313 | <0.15 | 9.4 | 689 | <1 | 14.8 | -32 |
| 27 | 10/27/21 | 6.7 | 144 | 1,196 | 5.1 | 24 | 163 | 321 | 0.16 | 10.2 | 712 | <1 | 14.7 | -25 |

TABLE 4 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-04 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS mg/L | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | mg/L | | | | | | | | | |
| **Class I Standard**[1] | | **6.5–9.0** | **NS** | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 6.3–9.2 | 179 | 1,100 | 8.1 | 30 | 213 | 584 | 0.11 | 19.0 | 746 | <1 | 17.0 | -34 |
| 28 | 11/30/21 | 6.9 | 138 | 1,062 | <5.0 | 29 | 156 | 315 | <0.15 | 9.6 | 721 | <1 | 14.4 | -33 |
| 29 | 12/14/21 | 6.9 | 143 | 1,122 | 5.0 | 24 | 157 | 309 | <0.15 | 9.9 | 759 | <1 | 14.3 | -35 |

[1]Illinois Administrative Code (IAC) Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]For pH, upper and lower tolerance limits are shown.
[4]No reportable result because chemical preservation did not meet method requirements.

TABLE 5: ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-05 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC | Temp. | Elevation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | CFU/100 mL | °C | ft CCD |
| **Class I Standard**[1] | | **6.5−9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 6.3−9.4 | 219 | 1,200 | 29.8 | 102 | 159 | 499 | 0.32 | 6.6 | 738 | <1 | 15.3 | -38 |
| 1 | 01/06/21 | 6.8 | 124 | **1,284** | <5.0 | 23 | 141 | **421** | 0.16 | 6.1 | 767 | <1 | 13.9 | -37 |
| 2/3 | 01/21/21 | 6.8 | 133 | **1,226** | NRR[4] | <20 | 147 | **419** | 0.32 | 6.4 | 798 | <1 | 13.8 | -36 |
| 4 | 01/28/21 | 6.9 | 143 | 1,178 | <5.0 | 22 | 144 | **421** | 0.22 | 6.3 | 835 | <1 | 13.7 | -38 |
| 5 | 02/09/21 | 6.7 | 140 | **1,250** | <5.0 | <20 | 173 | **445** | 0.21 | 6.1 | 798 | <1 | 14.0 | -36 |
| 5DUP | 02/09/21 | 6.7 | 140 | **1,224** | <5.0 | <20 | 172 | **455** | 0.17 | 6.0 | 807 | <1 | 14.0 | -36 |
| 6.1 | 02/24/21 | 6.8 | 141 | **1,216** | <5.0 | <20 | 148 | **423** | 0.16 | 6.0 | 807 | <1 | 15.2 | -34 |
| 6.2 | 03/11/21 | 6.9 | 131 | **1,292** | <5.0 | <20 | 154 | **449** | <0.15 | 6.3 | 781 | <1 | 14.7 | -37 |
| 7 | 03/19/21 | 6.6 | 136 | **1,202** | <5.0 | 19 | 150 | **436** | <0.15 | 6.2 | 798 | <1 | 14.3 | -37 |
| 8 | 04/06/21 | 6.9 | 137 | **1,224** | <5.0 | <20 | 154 | **437** | <0.15 | 6.1 | 812 | <1 | 14.5 | -35 |
| 9 | 04/16/21 | 6.8 | 139 | **1,236** | <5.0 | <20 | 154 | **436** | <0.15 | 6.0 | 835 | <1 | 15.3 | -42 |
| 9DUP | 04/16/21 | 6.8 | 139 | **1,238** | <5.0 | <20 | 154 | **438** | <0.15 | 6.0 | 815 | <1 | 15.3 | -42 |
| 10 | 04/27/21 | 6.9 | 109 | **1,222** | <5.0 | <20 | 148 | **422** | <0.15 | 6.4 | 840 | <1 | 14.5 | -35 |
| 11/12/13 | 05/10/21 | 6.8 | 133 | **1,334** | <5.0 | <20 | 140 | **404** | <0.15 | 6.0 | 778 | <1 | 14.4 | -36 |
| 14 | 05/21/21 | 6.8 | 151 | **1,314** | <5.0 | <20 | 147 | **422** | 0.20 | 6.2 | 849 | <1 | 15.8 | -36 |
| 15.1 | 06/23/21 | 6.8 | 130 | **1,274** | <5.0 | <20 | 134 | 399 | <0.15 | 6.2 | 800 | <1 | 15.3 | -35 |
| 15.2 | 07/13/21 | 6.8 | 122 | **1,232** | <5.0 | <20 | 149 | **437** | <0.15 | 6.4 | 804 | <1 | 14.4 | -32 |
| 15.2DUP | 07/13/21 | 6.8 | 122 | **1,204** | <5.0 | <20 | 143 | **408** | 0.17 | 6.4 | 804 | <1 | 14.4 | -32 |
| 16 | 07/22/21 | 6.8 | 124 | **1,278** | <5.0 | <20 | 148 | **422** | <0.15 | 6.2 | 807 | <1 | 14.7 | -37 |
| 17 | 07/28/21 | **6.3** | 116 | **1,258** | <5.0 | <20 | 152 | **435** | <0.15 | 6.1 | 809 | <1 | 14.7 | -36 |
| 18/19/20 | 08/03/21 | **5.8** | 119 | **1,378** | <5.0 | <20 | 143 | **407** | <0.15 | 6.1 | 782 | <1 | 14.2 | -35 |
| 22/23 | 08/27/21 | 6.5 | 110 | 1,168 | <5.0 | <20 | 148 | **424** | <0.15 | 5.7 | 813 | <1 | 14.6 | -35 |
| 22/23DUP | 08/27/21 | 6.5 | 110 | **1,200** | <5.0 | <20 | 142 | **407** | <0.15 | 5.8 | 830 | <1 | 14.6 | -35 |
| 24 | 09/23/21 | 6.7 | 135 | **1,224** | <5.0 | <20 | 145 | **410** | <0.15 | 5.7 | 752 | <1 | 14.2 | -32 |
| 25 | 10/08/21 | 6.8 | 145 | **1,234** | <5.0 | 21 | 145 | **408** | <0.15 | 5.8 | 750 | <1 | 14.2 | -33 |
| 25DUP | 10/08/21 | 6.8 | 145 | **1,234** | <5.0 | <20 | 145 | **407** | <0.15 | 5.8 | 744 | <1 | 14.2 | -33 |

TABLE 5 (Continued): ANALYSIS OF GROUNDWATER SAMPLED FROM MONITORING WELL G-05 AT THE McCOOK RESERVOIR SITE DURING HIGH-STAGE OPERATION IN 2021

| Fill Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | mg/L | | | | | | | | | | |
| **Class I Standard**[1] | | **6.5−9.0** | **NS** | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| Upper TL[3] | | 6.3−9.4 | 219 | 1,200 | 29.8 | 102 | 159 | 499 | 0.32 | 6.6 | 738 | <1 | 15.3 | -38 |
| 26 | 10/14/21 | 6.9 | 97 | **1,204** | <5.0 | <20 | 146 | **414** | <0.15 | 5.7 | 784 | <1 | 14.1 | -34 |
| 27 | 10/27/21 | 6.7 | 122 | **1,288** | <5.0 | 21 | 149 | **419** | <0.15 | 5.9 | 788 | <1 | 14.1 | -31 |
| 28 | 11/30/21 | 6.9 | 139 | **1,234** | <5.0 | <20 | 152 | **425** | <0.15 | 5.8 | 821 | <1 | 14.1 | -35 |
| 28DUP | 11/30/21 | 6.9 | 139 | 1,150 | <5.0 | <20 | 152 | **427** | <0.15 | 5.8 | 833 | <1 | 14.1 | -35 |
| 29 | 12/14/21 | 6.9 | 143 | **1,232** | <5.0 | <20 | 148 | **408** | <0.15 | 5.7 | 862 | <1 | 14.2 | -36 |

[1]Illinois Administrative Code (IAC) Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]For pH, upper and lower tolerance limits are shown.
[4]No reportable result because chemical preservation did not meet method requirements.

Groundwater pH was below the Class I standard in one sample each from wells G-02 and G-03, and two samples each from wells G-04 and G-05. However, pH was below the lower TL in only one sample each from wells G-04 and G-05. Total dissolved solids (TDS) exceeded the Class I standard in all samples from well G-01, 18 samples from well G-03, seven samples from well G-04, and 23 samples from well G-05. The TDS in those samples from wells G-04 and G-05 also exceeded the upper TLs. Chloride concentrations exceeded Class I standards in all samples from wells G-01 and G-03, and in one sample from well G-02. However, it did not exceed the upper TLs for these wells. Sulfate exceeded the Class I standard in 23 samples from well G-05, but never exceeded the upper TL for this well.

There were a few exceedances of upper TLs for parameters that do not have established limits under Class I standards. Total organic carbon (TOC) exceeded the upper TL in one sample each from wells G-01 and G-02. The TOC was undetected in 13 samples from well G-01 and 19 samples from well G-02, but the laboratory reporting limit for these samples was higher than the upper TLs at these wells. Chemical oxygen demand (COD) exceeded the upper TL in one sample from well G-01 and two samples from well G-02. Total phosphorus (P) exceeded the upper TL in all samples from well G-01 and four samples from well G-04. Total P was undetected in all remaining samples from well G-04, but the laboratory reporting limit was greater than the upper TL at this well. Ammonia exceeded the upper TL in all samples from well G-01. Hardness exceeded the upper TL in one sample each from wells G-02 and G-03, three samples from well G-04, and all samples from well G-05. Groundwater temperature exceeded the upper TL in three samples from well G-05. Groundwater elevation exceeded the upper TL during 13 events in well G-04 and 23 events in well G-05. Fecal coliform bacteria were not detected in any high-stage samples, for one sample from well G-01 the laboratory reporting limit was higher than the upper TL.

**Low-Stage Semiannual Monitoring.** All results for Field and Routine parameters for low-stage semiannual sampling and TLs for these parameters are reported in Table 6. The results for Inorganic and Radioactive parameters are reported in Table 7, and all associated upper TLs for parameters in Table 7 are listed in Table 8. The results for Organic parameters are reported in Table 9, and all associated upper TLs for parameters in Table 9 are listed in Table 10. Analytical results that exceed the Class I standards are shown in bold text in Tables 6, 7 and 9. Analytical results were compared to upper TLs based on the background monitoring data.

There were a few exceedances of Class I standards and upper TLs by Routine and Field parameters (Table 6). Groundwater pH was below the Class I standard in the first semiannual sample from well G-07, but it was not lower than the lower TL for this well. The TDS exceeded the Class I standard in the first semiannual sample from wells G-01 and G-05, in the second semiannual sample from well G-04, and in both semiannual samples from well G-03, but it exceeded the upper TLs only for samples from wells G-04 and G-05. The chloride concentration exceeded the Class I standard in the first semiannual sample from well G-01 and in both semiannual samples from wells G-03 and G-07, but it never exceeded the upper TLs for these wells. Sulfate concentrations exceeded the Class I standard in both semiannual samples from well G-05, but it never exceeded the upper TL for this well.

There were a few exceedances of upper TLs among parameters without established Class I standards. The COD exceeded the upper TL in the first semiannual sample from well G-04.

TABLE 6: ANALYSIS OF ROUTINE PARAMETERS IN GROUNDWATER SAMPLED FROM EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE DURING TWO LOW-STAGE SEMIANNUAL SAMPLINGS IN 2021

| Well | Sampling Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | mg/L | | | | | | | | | | |
| **Class I Standard**[1] | | | **6.5–9.0** | **NS**[2] | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| G-01[3] | | Upper TL[4] | 5.3–8.1 | 586 | 3,845 | 2.7 | 40 | 1,280 | 730 | 0.13 | 2.8 | 1,607 | <1 | 15.7 | -106 |
| | 1 | 09/08/21 | 6.9 | 168 | **1,668** | <5.0 | <20 | **438** | 335 | 0.16 | 3.6 | 886 | <1 | 14.2 | -117 |
| G-02[3] | | Upper TL | 5.7–8.1 | 182 | 1,214 | 4.3 | 31 | 383 | 207 | 0.68 | 2.2 | 791 | <1 | 17.3 | -69 |
| | 1 | 08/19/21 | 6.7 | 119 | 942 | <5.0 | <20 | 180 | 161 | 0.27 | 1.6 | 601 | <1 | 14.8 | -84 |
| G-03 | | Upper TL | 5.7–8.4 | 312 | 1,826 | 19.3 | 93 | 618 | 167 | 0.24 | 32.0 | 570 | <1 | 18.3 | -95 |
| | 1 | 09/08/21 | 7.0 | 153 | **1,258** | 13.7 | 66 | **400** | 133 | <0.150 | 24.3 | 506 | <1 | 14.4 | -110 |
| | 1DUP | 09/08/21 | 7.0 | 153 | **1,254** | 14.3 | 57 | **404** | 135 | <0.150 | 24.5 | 507 | <1 | 14.4 | -110 |
| | 2 | 11/19/21 | 7.0 | 179 | **1,212** | 13.9 | 54 | **406** | 138 | <0.150 | 21.9 | 509 | <1 | 13.8 | -111 |
| G-04 | | Upper TL | 6.3–9.2 | 179 | 1,100 | 8.1 | 30 | 213 | 584 | 0.11 | 19.0 | 746 | <1 | 17.0 | -34 |
| | 1 | 08/20/21 | 7.0 | 111 | 1,108 | <5.0 | 35 | 155 | 325 | <0.150 | 9.7 | 680 | <1 | 15.3 | -31 |
| | 2 | 11/18/21 | 6.9 | 140 | **1,308** | <5.0 | 30 | 162 | 323 | <0.150 | 9.7 | 710 | <1 | 14.1 | -32 |
| | 2DUP | 11/18/21 | 6.9 | 140 | 1,088 | <5.0 | 24 | 163 | 324 | <0.150 | 9.6 | 714 | <1 | 14.1 | -32 |
| G-05 | | Upper TL | 6.3–9.4 | 219 | 1,200 | 29.8 | 102 | 159 | 499 | 0.32 | 6.6 | 738 | <1 | 15.3 | -38 |
| | 1 | 08/20/21 | 7.0 | 109 | **1,202** | <5.0 | <20 | 146 | **427** | <0.150 | 5.9 | 776 | <1 | 14.5 | -34 |
| | 2 | 11/18/21 | 6.9 | 138 | 1,046 | <5.0 | <20 | 153 | **429** | <0.150 | 5.7 | 810 | <1 | 14.2 | -34 |
| G-06 | | Upper TL | 6.0–7.9 | 176 | 1,324 | 3.8 | 17 | 147 | 392 | 0.081 | 3.7 | 804 | <1 | 16.2 | -13 |
| | 1 | 08/20/21 | 6.9 | 88 | 968 | <5.0 | <20 | 125 | 268 | <0.150 | 2.8 | 680 | <1 | 13.1 | -18 |
| | 2 | 11/18/21 | 6.9 | 115 | 1,074 | <5.0 | <20 | 111 | 335 | <0.150 | 2.9 | 729 | <1 | 12.8 | -18 |

TABLE 6 (Continued): ANALYSIS OF ROUTINE PARAMETERS IN GROUNDWATER SAMPLED FROM EACH MONITORING WELL AT THE MCCOOK RESERVOIR SITE DURING TWO LOW-STAGE SEMIANNUAL SAMPLINGS IN 2021

| Well | Sampling Event | Sample Date | pH | EC mS/m | TDS | TOC | COD | $Cl^-$ | $SO_4^{2-}$ | Total P | $NH_3$-N | Hardness | FC CFU/100 mL | Temp. °C | Elevation ft CCD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | mg/L | | | | | | | |
| **Class I Standard**[1] | | | **6.5−9.0** | **NS** | **1,200** | **NS** | **NS** | **200** | **400** | **NS** | **NS** | **NS** | **NS** | **NS** | **NS** |
| G-07 | | Upper TL | 5.8−7.8 | 536 | 2,856 | 12.2 | 62 | 558 | 610 | 4.3 | 192 [5] | 1,430 | <1 | 20.3 | -3 |
| | 1 | 08/19/21 | **6.2** | 167 | 1,054 | <5.0 | 30 | **262** | 255 | 0.89 | 100 | 499 | <1 | 13.7 | -2 |
| | 2 | 11/19/21 | 7.0 | 168 | 1,094 | 6.2 | 28 | **247** | 230 | 0.83 | 89 | 479 | <1 | 13.5 | -8 |

[1]Illinois Administrative Code Title (IAC) 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]No standard established by 35 IAC Part 620.410.
[3]No sampling at the well for the second semiannual sampling event due to pump failure.
[4]For pH, upper and lower tolerance limits are shown.
[5]McCook Reservoir site was previously unpaved biosolids lagoons. Elevated $NH_3$-N may reflect infiltration or drilling through old biosolids lagoon sediments.

TABLE 7: ANALYSIS OF INORGANIC AND RADIOACTIVE PARAMETERS IN GROUNDWATER SAMPLED FROM EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE DURING THE FIRST LOW-STAGE SEMIANNUAL SAMPLING IN AUGUST AND SEPTEMBER 2021

| Parameter | Units | Class I Standard[1] | G-01 | G-02 | G-03 | G-03DUP[2] | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|---|---|
| Ag | mg/L | 0.05 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| As | " | 0.01 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | 0.003 |
| B | " | 2.0 | 0.508 | 0.352 | 0.791 | 0.774 | 1.87 | 1.88 | **4.38** | 0.219 |
| Ba | " | 2.0 | 0.049 | 0.053 | 0.083 | 0.081 | 0.033 | 0.045 | 0.020 | 0.036 |
| Be | " | 0.004 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Cd | " | 0.005 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Co | " | 1.0 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Cr | " | 0.1 | 0.004 | 0.056 | 0.005 | 0.006 | <0.004 | <0.004 | <0.004 | <0.004 |
| Cu | " | 0.65 | <0.002 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| CN | " | 0.2 | <0.005 | <0.005 | 0.005 | 0.005 | <0.005 | <0.005 | <0.005 | <0.005 |
| F | " | 4.0 | 0.363 | 0.292 | 0.443 | 0.445 | 0.420 | 0.370 | 0.349 | 0.263 |
| Fe | " | 5.0 | 0.267 | 2.094 | 0.283 | 0.275 | 0.791 | 0.453 | 0.336 | 0.864 |
| Hg | " | 0.002 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Mn | " | 0.15 | 0.024 | 0.031 | 0.012 | 0.011 | 0.011 | 0.026 | 0.007 | 0.006 |
| Ni | " | 0.1 | 0.006 | 0.024 | 0.017 | 0.016 | <0.002 | <0.002 | <0.002 | 0.004 |
| $NO_3^-$-N | " | 10 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 | <0.25 |
| Pb | " | 0.0075 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Sb | " | 0.006 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Se | " | 0.05 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 | <0.004 |
| Tl | " | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Zn | " | 5.0 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | <0.010 | 0.022 |
| Ra-226 | pCi/L | 20 | 1.54 | 1.50 | 1.82 | 1.82 | 1.60 | 1.60 | 1.60 | 1.20 |
| Ra-228 | " | 20 | 1.92 | 1.40 | 2.58 | 2.82 | 2.10 | 2.00 | 1.40 | 1.30 |

[1]Illinois Administrative Code Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]Duplicate sample.

TABLE 8: UPPER TOLERANCE LIMITS FOR INORGANIC AND RADIOACTIVE PARAMETERS IN EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE ESTABLISHED BY BACKGROUND MONITORING PRIOR TO OPERATION IN JANUARY 2018

| Parameter | Units | G-01 | G-02 | G-03 | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|
| Ag | mg/L | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| As | " | 0.0018 | 0.025 | 0.0028 | 0.0035 | 0.0027 | 0.025 | 0.0086 |
| B | " | 0.598 | 0.51 | 1.09 | 2.5 | 2.5 | 7.1 | 0.59 |
| Ba | " | 0.048 | 0.092 | 0.15 | 0.095 | 0.053 | 0.058 | 0.09 |
| Be | " | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 |
| Cd | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Co | " | 0.035 | 0.0081 | 0.0032 | 0.035 | 0.035 | 0.035 | 0.0048 |
| Cr | " | 0.025 | 0.633 | 0.13 | 0.035 | 0.035 | 0.035 | 0.035 |
| Cu | " | 0.0044 | 0.015 | 0.0095 | 0.0031 | 0.0025 | 0.0062 | 0.0074 |
| CN | " | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |
| F | " | 0.05 | 0.05 | 0.33 | 0.4 | 0.35 | 0.37 | 0.05 |
| Fe | " | 4.92 | 10.5 | 4.48 | 1.37 | 0.95 | 1.43 | 2.44 |
| Hg | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Mn | " | 0.099 | 0.103 | 0.21 | 0.036 | 0.026 | 0.021 | 0.012 |
| Ni | " | 0.011 | 0.25 | 0.065 | 0.0092 | 0.0062 | 0.05 | 0.01 |
| $NO_3^-$-N | " | 1.08 | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 | 0.075 |
| Pb | " | 0.00375 | 0.00375 | 0.0056 | 0.0077 | 0.00375 | 0.00375 | 0.00375 |
| Sb | " | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |
| Se | " | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Tl | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Zn | " | 0.01 | 0.01 | 0.01 | 0.057 | 0.1 | 0.069 | 0.01 |
| Ra-226 | pCi/L | 2.78 | 2.33 | 2.58 | 1.89 | 1.6 | 2.24 | 3.75 |
| Ra-228 | " | 3.19 | 1.51 | 4.12 | 3.08 | 1.65 | 1.89 | 4.64 |

TABLE 9: ANALYSIS OF ORGANIC PARAMETERS IN GROUNDWATER SAMPLED FROM EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE DURING THE FIRST LOW-STAGE SEMIANNUAL SAMPLING IN AUGUST AND SEPTEMBER 2021

| Parameter | Unit | Class I Standard[1] | Max RL[2] | G-01 | G-02 | G-03 | G-03DUP[3] | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Herbicides** | | | | | | | | | | | |
| 2,4-D | mg/L | 0.07 | 0.00689 | <0.00643 | <0.0065 | <0.00637 | <0.00622 | <0.00644 | <0.00689 | <0.00671 | <0.00649 |
| Silvex (2,4,5-TP) | " | 0.05 | 0.00344 | <0.00322 | <0.00325 | <0.00319 | <0.00311 | <0.00322 | <0.00344 | <0.00335 | <0.00325 |
| Atrazine | " | 0.003 | 0.00113 | <0.00106 | <0.00107 | <0.00107 | <0.00107 | <0.00109 | <0.00107 | <0.00113 | <0.00108 |
| Dalapon | " | 0.2 | 0.00199 | <0.00182 | <0.00199 | <0.00181 | <0.00184 | <0.00187 | <0.00197 | <0.00195 | <0.00196 |
| Simazine | " | 0.004 | 0.00113 | <0.00106 | <0.00107 | <0.00107 | <0.00107 | <0.00109 | <0.00107 | <0.00113 | <0.00108 |
| PCBs, total | " | 0.0005 | 0.0103 | <0.0005 | <0.0005 | <0.0005 | <0.0103 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| **Pesticides** | | | | | | | | | | | |
| Alachlor | " | 0.002 | 0.00113 | <0.00106 | <0.00107 | <0.00107 | <0.00107 | <0.00109 | <0.00107 | <0.00113 | <0.00108 |
| Aldicarb | " | 0.003 | 0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 | <0.003 |
| Carbofuran | " | 0.04 | 0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 | <0.01 |
| Chlordane (technical) | " | 0.002 | 0.00113 | <0.00106 | <0.00107 | <0.00107 | <0.00107 | <0.00109 | <0.00107 | <0.00113 | <0.00108 |
| Endrin | " | 0.002 | 0.0000453 | <0.0000424 | <0.0000427 | <0.0000428 | <0.0000429 | <0.0000435 | <0.0000429 | <0.0000453 | <0.0000431 |
| gamma-BHC (Lindane) | " | 0.0002 | 0.0000453 | <0.0000424 | <0.0000427 | <0.0000428 | <0.0000429 | <0.0000435 | <0.0000429 | <0.0000453 | <0.0000431 |
| Heptachlor | " | 0.0004 | 0.0000453 | <0.0000424 | <0.0000427 | <0.0000428 | <0.0000429 | <0.0000435 | <0.0000429 | <0.0000453 | <0.0000431 |
| Heptachlor epoxide | " | 0.0002 | 0.0000453 | <0.0000424 | <0.0000427 | <0.0000428 | <0.0000429 | <0.0000435 | <0.0000429 | <0.0000453 | <0.0000431 |
| Methoxychlor | " | 0.04 | 0.0000906 | <0.0000849 | <0.0000854 | <0.0000856 | <0.0000858 | <0.000087 | <0.0000858 | <0.0000906 | <0.0000863 |
| Toxaphene | " | 0.003 | 0.00227 | <0.00212 | <0.00213 | <0.00214 | <0.00215 | <0.00217 | <0.00214 | <0.00227 | <0.00216 |
| **Volatile Organic Compounds** | | | | | | | | | | | |
| 1,1,1-Trichloroethane | " | 0.2 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 1,1,2-Trichloroethane | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 1,1-Dichloroethene | " | 0.007 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 1,2-Dichloroethane | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 1,2-Dichloropropane | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| 1,2-Dibromo-3-Chloropropane | " | 0.0002 | 0.000143 | <0.000143 | <0.000139 | <0.000139 | <0.000135 | <0.000132 | <0.000139 | <0.000132 | <0.000135 |
| Ethylene dibromide | " | 0.00005 | 0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 | <0.00005 |
| Benzene | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.00077 | <0.0005 |
| Carbon tetrachloride | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |

TABLE 9 (Continued): ANALYSIS OF ORGANIC PARAMETERS IN GROUNDWATER SAMPLED FROM EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE DURING THE FIRST LOW-STAGE SEMIANNUAL SAMPLING IN AUGUST AND SEPTEMBER 2021

| Parameter | Unit | Class I Standard[1] | Max RL[2] | G-01 | G-02 | G-03 | G-03DUP[3] | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Chlorobenzene | mg/L | 0.1 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| cis-1,2-Dichloroethene | " | 0.07 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | 0.00183 | 0.00214 |
| Ethylbenzene | " | 0.7 | 0.00050 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Methylene chloride | " | 0.005 | 0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 | <0.002 |
| Methyl tert-butyl ether | " | 0.07 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Styrene | " | 0.1 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Tetrachloroethene | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Toluene | " | 1 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| trans-1,2-Dichloroethene | " | 0.1 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Trichloroethene | " | 0.005 | 0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 | <0.0005 |
| Vinyl chloride | " | 0.002 | 0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | **0.0036** | **0.053** | <0.001 |
| Xylenes, total | " | 10 | 0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 | <0.0015 |
| **Semivolatile Organic Compounds** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | " | 0.07 | 0.0023 | <0.00213 | <0.00214 | <0.0021 | <0.0021 | <0.00214 | <0.00215 | <0.00217 | <0.00225 |
| 1,2-Dichlorobenzene | " | 0.6 | 0.0023 | <0.00213 | <0.00214 | <0.0021 | <0.0021 | <0.00214 | <0.00215 | <0.00217 | <0.00225 |
| 1,4-Dichlorobenzene | " | 0.075 | 0.0023 | <0.00213 | <0.00214 | <0.0021 | <0.0021 | <0.00214 | <0.00215 | <0.00217 | <0.00225 |
| Benzo[*a*]pyrene | " | 0.0002 | 0.00225 | <0.00213 | <0.00214 | <0.00210 | <0.00210 | <0.00214 | <0.00215 | <0.00217 | <0.00225 |
| Bis(2-ethylhexyl)phthalate | " | 0.006 | 0.0225 | <0.0213 | <0.0214 | <0.021 | <0.021 | <0.0214 | <0.0215 | <0.0217 | <0.0225 |
| Hexachlorocyclopentadiene | " | 0.05 | 0.0168 | <0.016 | <0.0161 | <0.0158 | <0.0158 | <0.016 | <0.0161 | <0.0163 | <0.0168 |
| Pentachlorophenol | " | 0.001 | 0.00344 | <0.00322 | <0.00325 | <0.00319 | <0.00311 | <0.00322 | <0.00344 | <0.00335 | <0.00325 |
| Phenolics, total recoverable | " | 0.1 | 0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 | <0.05 |

[1]Illinois Administrative Code Title 35 Part 620.410 Class I Standards. Bold text indicates exceedance.
[2]Maximum laboratory reporting limit for analyses of an analyte at all monitoring wells.
[3]Duplicate sample.

TABLE 10: UPPER TOLERANCE LIMITS FOR ORGANIC PARAMETERS IN EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE ESTABLISHED BY BACKGROUND MONITORING PRIOR TO OPERATION IN JANUARY 2018

| Parameter | Units | G-01 | G-02 | G-03 | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|
| **Herbicides** | | | | | | | | |
| 2,4-D | mg/L | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Silvex (2,4,5-TP) | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Atrazine | " | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 |
| Dalapon | " | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Simazine | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| PCBs, total | " | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 |
| **Pesticides** | | | | | | | | |
| Alachlor | " | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 |
| Aldicarb | " | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 |
| Carbofuran | " | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 | 0.0015 |
| Chlordane (technical) | " | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 |
| Endrin | " | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 |
| gamma-BHC (Lindane) | " | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 |
| Heptachlor | " | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 | 0.00025 |
| Heptachlor epoxide | " | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Methoxychlor | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Toxaphene | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| **Volatile Organic Compounds** | | | | | | | | |
| 1,1,1-Trichloroethane | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| 1,1,2-Trichloroethane | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| 1,1-Dichloroethene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |

TABLE 10 (Continued): UPPER TOLERANCE LIMITS FOR ORGANIC PARAMETERS IN EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE ESTABLISHED BY BACKGROUND MONITORING PRIOR TO OPERATION IN JANUARY 2018

| Parameter | Units | G-01 | G-02 | G-03 | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|
| 1,2-Dichloroethane | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| 1,2-Dichloropropane | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| 1,2-Dibromo-3-Chloropropane | " | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| 1,2-Dibromoethane | " | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 |
| Benzene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.00057 | 0.0025 |
| Carbon tetrachloride | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Chlorobenzene | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| cis-1,2-Dichloroethene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0130 | 0.0029 |
| Ethylbenzene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Methylene chloride | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Methyl tert-butyl ether | " | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 | 0.035 |
| Styrene | " | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Tetrachloroethene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Toluene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| trans-1,2-Dichloroethene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Trichloroethene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0011 |
| Vinyl chloride | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.0052 | 0.203 | 0.001 |
| Xylenes, total | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0022 | 0.0025 | 0.0025 |
| **Semivolatile Organic Compounds** | | | | | | | | |
| 1,2,4-Trichlorobenzene | " | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 | 0.000025 |
| 1,2-Dichlorobenzene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| 1,4-Dichlorobenzene | " | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 | 0.001 |
| Benzo[*a*]pyrene | " | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Bis(2-ethylhexyl) phthalate | " | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 | 0.003 |

TABLE 10 (Continued): UPPER TOLERANCE LIMITS FOR ORGANIC PARAMETERS IN EACH MONITORING WELL AT THE McCOOK RESERVOIR SITE ESTABLISHED BY BACKGROUND MONITORING PRIOR TO OPERATION IN JANUARY 2018

| Parameter | Units | G-01 | G-02 | G-03 | G-04 | G-05 | G-06 | G-07 |
|---|---|---|---|---|---|---|---|---|
| Hexachlorocyclopentadiene | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Pentachlorophenol | " | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Phenolics, total | " | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |

The COD was undetected in both samples from well G-06, but the reporting limit was higher than the upper TL for this well. Total P exceeded the upper TL in the first semiannual sample from well G-01. Total P was below the reporting limit in all samples from wells G-04 and G-06, but the reporting limit was higher than the upper TLs for these wells. Ammonia exceeded the upper TL in the first semiannual sample from well G-01. Hardness exceeded the upper TL in both samples from well G-05. Groundwater elevation exceeded the upper TLs during the first semiannual monitoring event at well G-07, and during both semiannual monitoring events at wells G-04 and G-05. The TOC was below the reporting limit in all samples from wells G-01, G-02, and G-06, but the reporting limit was higher than the upper TLs for these wells. Fecal coliform bacteria were not detected in any sample.

Among the Inorganic parameters that are measured once per year during the first low-stage semiannual sampling event, only boron at well G-06 exceeded the Class I standard (Table 7); however, it did not exceed the upper TL for this well. Arsenic in well G-01, nitrate-nitrogen in wells G-02 to G-07, and beryllium and thallium in all wells was below the reporting limit, but the reporting limit was higher than the upper TLs for these parameters in these wells.

There were a few detections of Organic parameters in groundwater collected during the first low-stage semiannual sampling (Table 9). Vinyl chloride in wells G-05 and G-06 exceeded the Class I standard, but it did not exceed the upper TLs for these wells. Benzo[*a*]pyrene, bis(2-ethylhexyl) phthalate, and pentachlorophenol were below the reporting limits in all wells, but the reporting limits for each parameter were higher than the Class I standard and the upper TLs for all wells. Total polychlorinated biphenyls were below the reporting limit in all wells, but the reporting limit was higher than the Class I standard and upper TL in the well G-03 duplicate.

## REFERENCES

Illinois Administrative Code title 35, § 620.410 Groundwater Quality Standards for Class I: Potable Resource Groundwater (Amended at 36 Ill. Reg. 15206, effective October 5, 2012).

United States Army Corps of Engineers (USACE). 2014. Chicago Underflow Plan McCook Reservoir Lyons Township, Illinois. Groundwater Monitoring and Analysis Plan. Amended July 2014. Approved by IEPA April 2015.