

Internal Monitoring Report

Policy #: O-2B Water Quality

Date: June 23, 2020

Policy Language:

Madison Water Utility consumers will receive high quality water that meets or is better than all primary and secondary drinking water standards, including their public notification requirements, and complies with board-adopted water quality goals, incorporated by attachment.

The Madison Water Utility recognizes that drinking water standards are subject to revision and that new compounds of concern will be determined. This dynamic is a result of health studies being conducted by health organizations and government agencies on the state, national and international level. The technology to quantify compounds at increasingly minute levels is constantly improving.

The Madison Water Utility shall maintain and promulgate a Watch List of compounds of concern by unit well of compounds that are increasing and may approach the primary and secondary drinking water standards. The Watch List shall identify which wells require action.

CEO's interpretation and its justification:

Few things are more vital to a community than the availability of high quality drinking water. It promotes public health, public safety, and the economic interests of our community. To that end, the water utility will consistently deliver water that meets the primary, health-based drinking water standards, the secondary (aesthetic) standards, and the additional policy goals established by the Board.

Water Utility Board Procedural Guideline GUIDE 8 – Executive Summary of Water Quality Treatment Policies – establishes monitoring requirements and the utility's approach for responding to increasing contaminant levels. Generally, the policy establishes two thresholds – one when a contaminant exceeds 50% of a maximum contaminant level (MCL), secondary MCL, or other numerical guideline, and two when it surpasses 80% of this mark. The first triggers increased monitoring and an investigation into treatment

alternatives, operational changes, or other actions to reduce contaminant levels while the second leads to implementation of a mitigation strategy.

The policy applies to any contaminant, regulated or not, that is capable of impairing the health, safety, or aesthetic quality of drinking water. Utility staff will remain vigilant in following developments related to currently unregulated and emerging contaminants like pharmaceuticals, endocrine disruptors, per and polyfluoroalkyl substances [PFAS], chromium(VI), and 1,4 dioxane that may pose challenges in the future.

The utility will use multiple communication methods to adequately inform consumers of the safety and quality of their drinking water including the federally required Consumer Confidence Report (CCR), the water utility website, e-mail distribution lists, neighborhood listservs, citizen meetings, and through direct staff contact in the field and office.

Data directly addressing the CEO'S interpretation:

Contaminants with a primary MCL, Action Level or Enforcement Standard

Coliform Bacteria - Between October and May, 2048 water samples were collected from routine monitoring points in the system including the entry point at well houses (176 samples). No sample tested positive for coliform bacteria. Sixty untreated (non-chlorinated) well samples also were collected during this reporting period. All were found to be free of coliform bacteria. In January, the utility discontinued the routine practice of collecting treated water samples at the entry point to the distribution at each well house.

Volatile Organic Compounds - Nineteen wells were sampled during the monitoring period. Six are tested once a quarter; they include Wells 6, 7, 9, 11, 14 and 18. PCE is the most commonly detected VOC. It was found at six wells with levels ranging from 0.4 to 3.4 µg/L. The maximum contaminant level (MCL) for PCE is 5 µg/L. A detection summary for each well is shown in **Table 1**.

Low levels of ethyl benzene and xylene have been detected intermittently at Well 9 since 2018, after the painting of the interior surface of the reservoir. The two chemicals were found in October, neither was detected in January, and only xylene was found in April testing.

Table 1. Summary of VOC Detections, October 2019 to May 2020

| Well # | | #6 | #7 | #9 | #11 | #14 | #18 |
|---------------------------|-------------------|-----------------------------------|-------------|-------------|-------------|-------------|-------------|
| Number of Samples | | 3 | 3 | 3 | 3 | 3 | 3 |
| VOC Contaminant | MCL (µg/L) | Maximum Test Result (µg/L) | | | | | |
| Chloromethane | -- | <0.40 | <0.40 | <0.40 | <0.40 | <0.40 | 0.72 |
| Ethyl benzene | 700 | <0.27 | <0.27 | 0.27 | <0.27 | <0.27 | <0.27 |
| Tetrachloroethylene (PCE) | 5 | 1.3 | 0.80 | 1.9 | 0.67 | 0.43 | 3.4 |
| Trichloroethylene (TCE) | 5 | <0.46 | <0.46 | <0.46 | <0.46 | <0.46 | 0.42 |
| Trichlorofluoromethane | -- | <0.30 | <0.30 | <0.30 | 0.64 | <0.30 | <0.30 |
| Xylene | 10,000 | <0.88 | <0.88 | 1.6 | <0.88 | <0.88 | <0.88 |

Radium – Radium monitoring follows the guidance provided in GUIDE 8. In 2020, all wells will be sampled at least once. Well 19 and Well 27, which have higher radium levels, are tested quarterly while five other wells that also exceed 2.5 pCi/L combined radium (226 + 228), or one-half the MCL, are subjected to annual testing.

Table 2 summarizes the radium results for samples collected during the October to May period at wells that are tested at least annually. Results of twelve wells sampled in May 2020 are not included in Table 2. Combined radium ranged from 0.77 to 2.4 pCi/L for those twelve wells.

The utility’s Capital Improvement Plan includes construction of an iron and manganese filter at Well 19, currently scheduled for construction in 2023, which is expected to reduce the radium level at the well.

Table 2. Combined Radium (226 + 228) Results Measured in pCi/L.

| | Number of Samples | Results | Annual Average of Quarterly Samples |
|---------|-------------------|-----------|-------------------------------------|
| Well 19 | 6* | 3.0 – 5.0 | 4.6 |
| Well 24 | 2* | 2.8 – 2.9 | n/a |
| Well 27 | 4* | 2.8 – 4.3 | 4.1 |
| Well 28 | 3* | 2.9 – 4.6 | 4.1 |

* Includes duplicate samples

Contaminants with a secondary MCL

Iron and Manganese - Monthly well samples are collected when iron and manganese are elevated. During the period from October to May, all five samples from Well 8 exceeded the secondary MCL for iron [0.3 mg/L]; in addition, one sample each from Well 8 and Well 19 exceeded the manganese standard [50 µg/L]. Test results are shown in **Tables 3 and 4**.

Seven wells have iron levels above the Board Policy level [0.1 mg/L] that mandates treatment. These wells include 8, 17, 19, 24, 27, 28 and 30. Six of these wells, not including Well 30, also exceed the Board Policy level for manganese [20 µg/L], the level above which treatment is required.

Table 3. Monthly Iron Test Results, in mg/L

| Source | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
|---------------------|-------------|-------------|-------------|-------|-------|-------|-------------|-------------|
| Well 7 – filtered | <0.05 | n/s | n/s | <0.06 | <0.01 | <0.01 | <0.01 | <0.01 |
| Well 8 | 0.56 | 0.58 | 0.53 | n/s | n/s | n/s | 0.33 | 0.42 |
| Well 17 | n/s | n/s | n/s | n/s | n/s | n/s | n/s | 0.10 |
| Well 19 | 0.22 | 0.22 | 0.21 | 0.19 | 0.22 | 0.21 | 0.21 | 0.19 |
| Well 24 | 0.21 | 0.21 | 0.15 | 0.18 | 0.18 | 0.19 | 0.21 | 0.19 |
| Well 26 – deep well | <0.01 | 0.01 | <0.01 | 0.02 | <0.01 | <0.01 | 0.03 | <0.01 |
| Well 27 | 0.16 | n/s | 0.11 | 0.11 | 0.14 | 0.13 | 0.17 | 0.05 |
| Well 28 | 0.19 | 0.18 | 0.17 | 0.16 | 0.16 | 0.18 | 0.19 | 0.17 |
| Well 29 – filtered | <0.05 | n/s | n/s | <0.06 | <0.01 | <0.01 | <0.01 | <0.01 |
| Well 30 | 0.22 | 0.21 | 0.19 | 0.18 | 0.18 | 0.18 | 0.20 | 0.19 |
| Well 31 – filtered | <0.05 | n/s | n/s | <0.06 | <0.01 | <0.01 | <0.01 | <0.01 |

Table 4. Monthly Manganese Test Results, in µg/L

| Source | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May |
|---------------------|------|------|-----|------|-----------|------|-----------|------|
| Well 7 – filtered | <0.7 | n/s | n/s | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Well 8 | 48 | 49 | 48 | n/s | n/s | n/s | 50 | 49 |
| Well 17 | n/s | n/s | n/s | n/s | n/s | n/s | n/s | 35 |
| Well 19 | 46 | 42 | 47 | 43 | 51 | 48 | 41 | 45 |
| Well 24 | 29 | 28 | 22 | 29 | 28 | 30 | 30 | 28 |
| Well 26 – deep well | <3.9 | <3.9 | 11 | 3.9 | 18 | 11 | <2.0 | 3.1 |
| Well 27 | 33 | n/s | 33 | 33 | 32 | 33 | 32 | 36 |
| Well 28 | 23 | 22 | 22 | 21 | 22 | 23 | 22 | 22 |
| Well 29 – filtered | <0.7 | n/s | n/s | 3.6 | <2.0 | 2.1 | <2.0 | <2.0 |
| Well 30 | 14 | 13 | 13 | 14 | 13 | 13 | 13 | 14 |
| Well 31 – filtered | <0.7 | n/s | n/s | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |

Filters at Well 7, Well 29, and Well 31 continue to show significant iron and manganese reductions. Test results are shown in **Tables 3 and 4**. In all cases, iron was reduced to below the detection limit, <0.05 or <0.01 mg/L, while manganese was also often lowered to below detection, <2.0 µg/L.

Iron and manganese monitoring also takes place in the distribution system at all coliform sample locations. Test results, summarized in **Table 5**, show iron and manganese did not exceed the established benchmarks during this period and that over 90% of the samples are below one-half the policy goals. These results demonstrate our effective control and management of iron and manganese accumulation in the distribution system.

Table 5. Summary of iron and manganese levels in the distribution system.

| Manganese, µg/L | | Iron, mg/L | |
|-----------------------------------|-----------|-----------------------------------|-------------|
| | Oct - May | | Oct - May |
| Policy Goal | 50 | Policy Goal | 0.3 |
| Median | <2.0 | Median | 0.02 |
| Average | 3.8 | Average | 0.03 |
| 95th Percentile | 19 | 95th Percentile | 0.18 |
| Maximum | 24 | Maximum | 0.20 |
| Number of Samples | 87 | Number of Samples | 87 |
| >50 | 0 | >0.3 | 0 |

Chloride - Monthly chloride testing continues at Well 14. Eleven samples were collected between October and May with chloride ranging from 150 to 170 mg/L, compared to the secondary MCL of 250 mg/L. Well 14 is the only Madison well with chloride above 100 mg/L; however, some wells (6, 9, 11, and 16) have experienced considerable increases in chloride in recent years.

Monitoring of the chloride level in two monitoring wells installed in Spring Harbor Park concluded in June 2019. Monitoring there began in December 2017 and continued for eighteen months. A data logger was placed into one well to continuously record water level and conductivity (a surrogate for chloride). Water utility staff are currently processing the data to evaluate the potential influence of stormwater runoff at Spring Harbor on water quality, particularly chloride and sodium, at Well 14. An earlier review suggested

that stormwater drainage and municipal well pumping both influence the water level and water quality in shallow groundwater near the monitoring wells.

City Engineering and Water Utility staff continue to work cooperatively to help ensure that stormwater management solutions, including installation of green infrastructure, do not compromise groundwater quality around the City's municipal wells. Specifically, the two agencies agreed to prohibit the installation of new infiltration basins or the expansion of existing wet ponds in wellhead protection districts. The most vulnerable municipal wells are now protected by the creation of an additional buffer, which extends beyond the wellhead protection area, where green infrastructure is discouraged.

Finally, water utility staff continue to work with regional partners to help raise awareness on the issue of chloride contamination of the lakes and our ground and drinking water resources. The partnership helped develop and implement a Winter Salt Certification program emphasizing training, equipment calibration, and record keeping. Outreach efforts promote the training workshops that are a prerequisite to individual or organization-level certification.

Unregulated and Emerging Contaminants

1,4-Dioxane - Two samples, one in October and another in March, were collected at Well 11 and tested for dioxane. The results were 0.39 and 0.29 µg/L, respectively. The level of dioxane has varied from 0.26-0.43 µg/L since 2015, with an average equal to 0.35 µg/L. This level corresponds to the estimated 10^{-6} cancer risk level. Five other wells are tested once every three years, most recently in 2018.

Per and Polyfluoroalkyl Substances [PFAS] - A [comprehensive report](#) on PFAS testing at Madison wells was prepared for the Water Utility Board in 2019. Earlier this year, utility staff collected additional samples at twenty-one wells that are currently operating. Results are not yet available.

Sodium - In accordance with GUIDE 8, monthly sodium testing continues at Well 14. Eleven samples were collected between October and May with samples ranging from 52 to 62 mg/L sodium. Sodium levels above 20 mg/L can be concerning for individuals on severe sodium-restricted diets. Health officials recommend these individuals account for sodium in drinking water when calculating their daily sodium intake.

Water Quality Watch List

The Water Quality Watch List has been updated with current test results for organic, radiological, and unregulated contaminants. Minor changes were made to the list since the last reporting period.

Water Quality Technical Advisory Committee

Due to COVID-19, this committee only met once since the last monitoring report. At the January meeting, the utility invited staff from the Wisconsin Department of Health Services and Department of Natural Resources to discuss proposed groundwater enforcement standards – how they were developed, why they differ from other state’s standards, and how these standards might inform drinking water regulations. The meeting mostly focused on PFAS with DHS and DNR expressing a willingness to attend a future meeting to discuss chromium (VI) and 1,4 dioxane – two currently unregulated drinking water contaminants. The meeting was well attended with over a dozen members of the public. Meeting notes are included as an attachment to this report.

Annual Water Quality Report – Consumer Confidence Report

The water utility released the annual Consumer Confidence Report (CCR) last week. The report details the extensive water quality testing conducted in 2019 and summarizes those test results for our system as a whole. An important conclusion of the report is the utility’s full compliance with all federal and state drinking water standards. In addition to reporting results for currently regulated contaminants, the report presents results for other contaminants of concern that are not regulated including PFAS (PFOA & PFOS), chromium (VI), and 1,4 dioxane. The report serves as an important communication tool and directs our customers to our website where there is more detailed water quality information specific to the individual wells that make up our water system.

Rather than deliver a paper copy to each customer or mailing address in the City, the utility opts for “electronic delivery” to satisfy this regulatory requirement. Over 130,000 postcards were printed and mailed using the US Postal Service “Every Door Direct Mail” saturation mailing lists. The

postcards contains a direct link (URL) to the report and encourages our customers to view the report to learn more about their drinking water. The report and information in the notice is translated into Spanish to reach our Spanish-speaking customers. A notice will also appear on the monthly municipal services bill. Finally, an announcement was posted to our social media platforms to encourage readership of this important report.

Normally, copies of the report, in English and in Spanish, are delivered to public library branches and many community and neighborhood centers throughout the City; however, this practice has been suspended due to the pandemic. Paper copies are available upon request.

Additional Water Quality Outreach

Water Quality Testing – A wealth of water quality data is available on our website, madisonwater.org. The [Water Quality Testing](#) page includes links to updated information on a range of potential biological and chemical contaminants in drinking water. There is information on lead, nitrate, PCE and other volatile organic compounds (VOC), radium, PFAS, hexavalent chromium, and more.

The *Water Quality at My Address* application on our website allows users to enter their address to determine the primary well(s) that serve their home or business. The application also provides links to detailed Well Reports that provide results of the most recent water quality tests at each well. This is a popular service on our website.

Finally, the **Report on 2019 Water Quality Monitoring**, prepared by water quality staff, contains a comprehensive review of all water quality testing conducted in 2019. This report is included as an attachment.

PFAS Meetings - Water Utility staff continue to remain active in sharing our experiences with PFAS with the drinking water industry, regulators, City staff, as well as the general public.

Water Quality Manager Joe Grande has given several talks on PFAS including at the Wisconsin Utility Policy Institute in October, the Town & Country Engineering Public Works Seminar in December, meetings of the Glendale and Westmorland neighborhood associations this past winter, and at a community meeting held in February at Sennett Middle School to specifically discuss the PFAS levels at Well 9.

Attachments:

Report on 2019 Water Quality Monitoring

Annual Water Quality Report / Consumer Confidence Report

Water Quality Watch List

Water Quality Technical Advisory Committee Notes – January 2020