

Internal Monitoring Report

Policy # O-2E Sustainability

Date: January 25, 2022

Frequency: Twice a year

Policy Language:

Madison residents will benefit from a sustainably managed ground water supply to ensure that water is available to protect public health, and to maintain and improve the economy and environment in Madison, now and in the future.

Accordingly,

- 1. Aquifers and wells will be monitored and the data evaluated to identify trends in water levels and potential contaminants.*
- 2. Appropriate city, county, state and federal agencies will be called upon to enforce all pollution control and prevention measures within their authority, in order to protect water quality in the well head protection area of each unit well.*
- 3. The adopted Conservation Plan shall be monitored and evaluated regarding progress to fulfill its goals. Plan goals should include reductions in energy use, avoiding the cost of additional wells, and minimizing complications related to over-pumping the groundwater system.*
- 4. To prevent over pumping and improve redundancy, the Utility's service level for capacity planning shall be 50% utilization for each unit well. Therefore, the Utility shall strive to limit the average pumpage to 50% of the annual rated capacity of each well. This can be achieved through water conservation, water supply system expansion, and operating procedures.*
- 5. The Utility shall track the carbon footprint of Utility operations using quantitative tools (for example, energy intensity analysis) so that sustainability may be considered in planning for water treatment facilities, distribution system improvements, and other infrastructure projects.*

Aquifer Levels

The water levels in the aquifers beneath Madison continue to be monitored on a routine basis. A deep groundwater monitoring well located in the basement of the State Capitol has provided water levels since 1946. A review of the monthly data indicates aquifer levels continue to vary on a seasonal basis, a direct result of discharge (COM pumping) and recharge (precipitation.)

As in past years, summer water levels in the aquifer were lower than those experienced during the winter months. On average, levels were as much as 15 feet lower during the months of May through October. The water levels beneath the central part of our city during the last 30 years are displayed in Figure 1.

Water Levels in Water Utility Wells

The static and pumping water levels in many of the Utility's wells varied somewhat during 2021. Almost all of the wells experienced progressively lower water levels as the year developed. Late

May and early June were hot and dry with MWU pumping a higher than normal volume of water. As a result, water levels in the wells during these months dropped. Water levels in some of the wells approached summer of 2012 levels, a period of hot and dry weather. Water levels (both static and pumping) increased/rebounded as the year ended. Figure 2 depicts the water levels in UW 20 over the last 10 years.

Longer term, static and pumping levels in most of the MWUs wells have been increasing over the last 10 years. Levels continue to fluctuate seasonally and are greatly influenced by both pumping and precipitation events. Sufficient water levels in all of the wells appear to be sustainable for the near future.

Total precipitation during 2021 was below average. Madison received 22.8 inches of precipitation for the year which is about 11.6 inches less (34% less) than the yearly average of 34.4 inches. This is the first year since 2012 that Madison's average annual precipitation has been below average. Although it is anticipated that precipitation amounts in the Madison area will be above average in the near future, there will be periods of lower than normal precipitation. This is important to note as the aquifers are recharged to a great extent by precipitation events.

UW 8 Sentinel Well Install

The installation of a groundwater monitoring well located between the groundwater contaminant plume beneath the Madison Kipp Corporation and UW 8 is scheduled for this spring. A consultant has been retained to assist and oversee the installation process. An RFP was issued for the well installation services and a licensed driller was selected. The process involves a significant amount of water so we will need to wait until temperatures remain above freezing. We hope to have this well installed and operating as a sentinel system before UW 8 is brought back on line this summer.

UW 14 Chloride Study

The mitigation study regarding the chloride contamination at Well 14 is proceeding. An environmental consultant (SCS Engineers) has been hired to lead the study. An investigation plan has been devised and a driller brought onboard for the borehole sampling. It is hoped that the fieldwork can begin soon. A project page and email distribution list have been developed to keep neighbors and customers up to date on the study's progress.

UW 15 PFAS/PFOS Removal

UW 15 has been out of service since March of 2019 because of PFAS/PFOS concerns. The Utility continues to entertain possible remedial options that might be applicable at this site. Utility staff has been meeting with Madison residents regarding the status of this well. It is likely that this well will not be brought back into service until a remediation system to address the PFAS/PFOS compounds is installed.

UW 19 – Fe/Mn/Radium Removal

MWU is in the process of hiring a consultant to complete the design work, including plans &

specs, for the filter system being proposed at the UW 19 site. An RFP has been issued and proposals are due back on January 28, 2022.

Tentative timeline for the filter project:

Preliminary Design – March 2022 to June 2022

Final Design -- July 2022 to January 2023

Bidding and Contract Award – February 2023 to March 2023

Construction -- May 2023 to May 2024

The UW 19 site is located on land owned by the University of Wisconsin (UW). As a result, MWU staff will meet with the UW Design Review Board on 1/18/2022 and the Joint Campus Area Committee on 1/27/2021 to introduce project concepts.

UW 23 Well Abandonment

UW 23, a water supply well located at 4502 Leo Drive, was abandoned in July of 2021. This well site was constructed in 1958 and its building and equipment needed upgrades. The well itself had a small diameter hole (12") and was shallow (500') making it MWUs smallest producer. Because of its water quality (elevated levels of iron and manganese), it was used only on a seasonal basis. When in service, the Utility received a large number of consumer complaints. The addition of a booster station at UW 9 provided a substitute source of water for the area, allowing the abandonment of UW 23. The building shell and reservoir currently remain standing.

Regulatory Agencies

The Utility continues to work with the Mayor's office, City Engineering, Public Health, the WDNR, and the WGNHS in addressing contaminated groundwater issues within the City limits.

2021 Pumpage

MWU pumped a total of 8.9 billion gallons of water to the distribution system during 2021. This is approximately 2% more than what was pumped last year (2020). Average, maximum and minimum day volumes were similar to last year:

Average Day: 24.3 mgpd

Max Day: 36.1 mgpd (June 10)

Min Day: 18.7 mgpd (January 1)

Average daily consumption for residents was **50.8 gallons per day**.

Well Utilization

Our service level for capacity planning is 50% utilization. One of the ways to accomplish this level is through system expansion and/or modification. The Utility continues to propose and build additional booster stations, PRVs, and new well facilities to help achieve this goal. In addition, variable frequency drives (VFDs) are being added to existing motors/pumps each year to optimize system flows.

Overall, utilization rates during 2021 were very similar to those experienced in 2020. Through December 31, 2021, two different wells (UW 7 and UW 30) slightly exceeded the 50% utilization

rate (see table 1).

- The rate at UW 7 was higher this year because UW 11, an adjacent well, has been down for service since October of 2021. In addition, UW 15 (another adjacent well) remains out of service because of PFAS concerns.
- Rates at UW 30 were higher this year because the neighboring UW 18 was down for 3 ½ months this summer as it underwent a major rehabilitation.

Well repair/reconstruction projects and the necessary use of seasonal wells on a year round basis continue to significantly influence individual well rates.

The addition of VFDs on the deep wells at a number of its sites has allowed the Utility to directly minimize the utilization rates of these wells. In addition, they help in lowering the Utility’s electrical use/costs. Seventeen of our 22 deep wells currently have VFDs. Two more deep wells are scheduled to be outfitted with VFDs in 2022.

Indirectly, VFDs on booster pumps have also allowed us to minimize deep well pumping at some sites. Almost all of our booster pumps utilize VFDs. With the exception of the booster pumps at UW 19, all of our boosters will have VFDs by the end of 2022. UW 19 is scheduled to be rebuilt in 2023 and will receive VFDs at this time.

MWU continues to automate the operations at a number of its well sites utilizing its SCADA system. Certain wells and boosters now operate on a time basis, insuring that a certain amount of run time/volume is produced on a daily basis. This, where implemented, has allowed us to control utilization rates significantly. We will continue to expand the automated operations where possible in the near future.

Pressure Zone Resiliency Projects

MWU is currently planning/working on a series of Pressure Zone Resiliency Projects which will allow the transfer of surplus water between regional/pressure zones. These four projects, estimated to cost a total of \$500,000, have been added to the 2022 Capital Budget. These new transfer points will increase the Utility’s operational flexibility while reducing distribution system risk at an affordable investment.

Operational Resiliency Projects	Region (Zone)		Maximum Flow		Completion
	From	To	GPM	MGD	Date
UW 12 Booster Upgrade/Transfer Point	C (7)	D (8)	2100	3	May-22
UW 14 Transfer Point	C (7)	C (6W)	1200	1.7	Jul-22
Isthmus Transfer Point	A (6E)	C (6W)	2000	2.8	Nov-22
UW 9 Transfer Point	A (6E)	B (4)	1200	1.7	Nov-22

100% Renewable Madison

MWU has been invited to participate in in the City's 100% Renewable Plan that was compiled in November of 2018. The plan calls for 100% renewable energy and zero net carbon by the year 2030. Baseline numbers for carbon emissions for all city operations including Water Delivery and Facilities were identified. The Utility has agreed to meet with the City's sustainable staff and determine how it can help in alleviating the amount of energy it uses and carbon it emits.

Attachments

Figure 1: Aquifer Water Levels – State Capitol Well

Figure 2: UW 20 Static Water Levels

Table 1: 2021 Unit Well Capacity