Internal Monitoring Report

Policy #: O-2C Reliability **Date**: January 19, 2015

I certify that the following information is true.

Signed _____, General Manager

Policy Language:

The Water Utility General Manager shall not cause or allow conditions, procedures, or decisions that prevent Madison Water Utility from meeting its obligation to provide current and future generations of customers within City of Madison and its authorized service areas with reliable water service that is consistent in its availability and quality.

Accordingly, the General Manager shall not cause or allow conditions, procedures, or decisions that:

1. Assure that residents experience only minimal unplanned service interruptions.
2. Provide residents with adequate notice of planned service interruptions.
3. Provide residents with adequate notice in the case of planned maintenance work that would significantly reduce water flow or pressure, and/or cause water discoloration.

General Manager's interpretation and its justification:

The Utility shall budget for, fund, prioritize, plan for, and construct the necessary system improvements to replace and sustain the Utility's infrastructure both now and into the future. The Utility shall build in the necessary system redundancy, shall maintain all components of the system, and shall develop operational procedures to ensure reliable water service to all points in the system. To achieve this objective, the Utility will develop, routinely update, and implement long term facility and system comprehensive and master plans to identify system needs and funding opportunities. The Utility's maintenance program will be proactive and preventative to maximize component reliability, efficiency, and life cycle costs within the system. The Utility shall also establish work scheduling protocols and notification procedures that will minimize the impact to consumers during maintenance and repair work.

Data directly addressing the General Manager's interpretation:

1. *Assure that residents experience only minimal unplanned service interruptions.*

    a. *Planned Infrastructure Renewal: To reduce the risk of unplanned service interruptions, the Utility shall budget for, fund, prioritize, and construct the necessary system improvements to replace and sustain the Utility's infrastructure.*

Madison Water Utility experiences an average of 240 water main breaks per year. This equates to over 28 breaks per 100 miles of main per year. While no published standard exists for main breaks due to variance in construction and climatic conditions, it is a goal to reach a level of no more than 20 breaks per 100 miles per year. This would result in a maximum of 170 main breaks in the Madison per year. To reach this goal the Utility will have to replace or rehabilitate a majority of its aging water main system.

In 2005 the Madison Water Utility completed its first Infrastructure Management Plan. That Plan evaluated the condition of all facilities both buried and above ground and laid out a plan to systematically work through renewal of the system over the next 40 years. To continue to build on this, the Utility will be developing an asset management program starting in 2015 starting with the hiring of an Asset Manager.

The 2005 Infrastructure Management Plan recommended that the Utility invest $9 million per year (2005 dollars) in pipe replacement and $2.5 million per year (2005 Dollars) in facility upgrade and renewal. In 2007 the Capital Improvement Program was significantly revised to increase water main replacement work in compliance with the Plan recommendations. Due to a lack of available funding in 2007, the increase in facility work was delayed until the 2012 time frame. The Infrastructure Management Plan projected total compliance with the budget recommendation by the year 2020. For the year 2015, the Utility has budgeted $8,973,000 for pipeline replacement and relining. The 2015 goal based on the 2005 Plan is $11,090,000 so the Utility is making good progress toward its long term goal. For the year 2015, the Utility has budgeted $1,290,000 for facility renewal and upgrades. This compares to a goal of $3,360,000 which indicates that the Utility will be committing more resources to facility work over the next several years to get to the recommended 2020 goals.

From the infrastructure renewal need projections, Utility staff develops a Capital Improvement Program to establish the annual Capital Budget. Projects are identified and developed based on operational criteria, site inspections, and staff recommendations.

Utility Engineers work closely with City Engineering to coordinate water main replacement projects with ongoing street projects. This saves money in pavement restoration costs and minimizes disruption to neighborhoods. Pipe segments are selected for replacement based on their break history, hydraulic capacity, age, and

material. Over 400 miles of pipe were slated for replacement or relining throughout the system over the next 40 to 50 years. The Utility is currently replacing approximately 7 miles of pipe per year.

In an effort to repair decaying pipe at lower cost and thus extend the impact of the annual capital budget, a pipe lining program was started by Utility Engineers in 2011. Working closely with Wisconsin DNR engineers, the Utility successfully piloted and constructed the first water main lining project in the State of Wisconsin. Each year the program continues to grow as the Utility learns how to manage and process lining work. The cost of this operation, which rehabilitates the main to full pressure and structural capacity, is approximately 2/3 the cost of full replacement. It is expected that as competition increases in Wisconsin the cost of lining will go down. The Utility has budgeted $1,040,000 in 2015 for pipe lining projects.

A copy of the 2015 Executive Capital budget is attached for information and use. The approved budget includes carry over funding from 2014 to complete ongoing projects.

b. Redundancy and Reliability: The Utility shall build in the necessary system redundancy, shall maintain all components of the system, and shall develop operational procedures to ensure reliable water service to all points in the system.

Using utility engineering standard practices and regulatory requirements through the decades, a system of redundant pumping stations, standby power generators, and gravity storage reservoirs has been developed and implemented throughout the Madison Water Utility system. Using over 850 miles of pipe, twenty two wells are linked to feed the nine pressure zones. Pressure zones are established and defined using topographic conditions and isolation valves in the system piping. In the event of an emergency, these zone isolation valves could be opened to move water from zone to zone and maintain service. Pumping redundancy is designed and constructed into the system. If a pump in the system has a mechanical failure and is removed from service, pumping systems still have the capacity to meet anticipated system demands. With the exception of Pressure Zone 11 which is planned for the near future, all zones have a minimum of one gravity reservoir that provides emergency water supply. Storage reservoirs are designed and sized to provide up to 12 hours of supply based on the annual average demand. Reservoirs are also sized to provide fire fighting capacity and peak demand supply.

The Utility currently has access to 13 standby power generators, 9 owned by MGE and 4 owned by the Utility. A fifth Utility owned standby generator will be added to the Well 7 facility in 2015, a sixth generator is planned to be installed at BPS 115 in 2015, and a seventh Utility owned generator will be installed at new Well 31. MWU worked with Madison Gas and Electric to connect the Well 24 booster pumping station to the existing MGE generator located at Well 24. For new facilities not equipped with a generator, electric transfer switches have been installed that will

allow the connection of a portable generator. The Utility does not currently own a portable standby generator and intends to rent or lease a unit if needed.

c) *Comprehensive Planning: The Utility will develop, routinely update, and implement long term facility and system comprehensive and master plans to identify system needs and funding opportunities.*

Starting in 1964 the Utility has used a Water Master Plan to evaluate system needs, plan for the future, and establish projects needed to provide a reliable and robust water system, to expand the system to growing areas and to budget for those improvements. The most recent planning efforts by the Utility are 1) the 2006 Water Master Plan and 2) the 2012 East Side Water Supply Project. Both of these documents identify projects based on system wide hydraulic analysis, identified deficiencies, and projected growth patterns.

From the information developed in the Water Master Plan, a Capital Improvement Program is developed and a Capital Budget is set. The projects are established to meet MWU established level of service criteria for the system. Criteria were established to optimize existing facilities and to work toward a fully redundant and reliable water supply and distribution system. Utility engineering staff is currently starting the process of hiring a consultant to update the distribution system hydraulic model, to identify and itemize future projects and to update the capital improvement program. It is anticipated that a consultant will be under contract by April 2015 and the work will be completed by April 2016.

d) *Maintenance and Repair Programs: The Utility's maintenance program will be proactive and preventative to maximize component reliability, efficiency, and life cycle costs within the system.*

Wells, booster pumping stations, and reservoirs are routinely inspected, serviced, and maintained. System operation is monitored and recorded by the Utility SCADA system and by routine daily inspections by Utility Rounders. Well pumps are scheduled for removal, inspection, and rebuilding or replacing every 10 years. System reservoirs are inspected and cleaned every 5 to 10 years. The Utility budgeted $1,045,000 in 2015 for existing facility maintenance projects, and upgrades/additions.

The planned Asset Management Program that will be developed over the next several years will assess the condition of all Utility assets and plan and budget for repair and replacement. A system of inspection, evaluation, and preventative maintenance procedures will maximize the value of each component. Documenting condition and budgeting and planning for major repairs or component replacement will allow the Utility to maximize its investment in system infrastructure and sustain a high level of service.

e) *Minimizing unplanned Service Interruptions: Notification and management*

In the event of unplanned service outages due to water main breaks, either Utility repair crews or contractors working for the Utility notify impacted customers in person and inform them of the situation and the expected length of the outage. Utility employees work with impacted customers to the greatest extent possible to minimize the service disruption and will modify the work as needed. When water service is restored, Utility crews check with area residents to make sure that there are no further complications resulting from the water outage.

Frozen Services: During the winter of 2013/2014 the Utility experienced over 300 frozen services in the system. This far exceeded the normal number of frozen services of 8 to 12 per year. Nothing like this had been seen in the system since the winter of 1976/1977 and similar conditions were experienced all across the State of Wisconsin. Water Utility crews working with portable welders spent many long hours getting laterals thawed and back in service. At the peak of the operation, five crews were working on thawing services.

The Utility is updating its Standard Operating Procedures (SOP) for thawing services using an electric welder, we are reviewing our equipment, we are setting up agreements with equipment rental companies, and we are reviewing procedures with staff to ensure a quick, safe and consistent response to a frozen service to get customers back in water as quickly as possible. The Utility is also reviewing policy and procedures that would minimize the potential of a lateral freezing. Communicating and educating the public on how to reduce the risk of freezing will help decrease the number of incidents. Working with the PSC and other communities on policy procedures to reduce risk will aide in response to future frozen service incidents.

I report compliance.

2. *Provide residents with adequate notice of planned service interruptions.*

Planned service interruptions are necessary in the vicinity of pipe line replacement projects, valve and hydrants repairs, and many other maintenance and construction operations. Procedures established in construction contracts set the requirements for working with customers to minimize the disruption of their water service. Similar procedures are utilized by Water Utility crews during the various maintenance procedures that they perform throughout the year.

Prior to starting any planned work that will require an interruption of service; customers are individually notified. Either the contractor or a Water Utility employee contacts all impacted residents and explains the need for the work and the expected duration of the water outage. Contractors working on the system are

required to provide residents 48 hour notice of any planned service interruptions. This work is monitored and controlled by Utility construction inspection staff. Planned service interruptions are typically less than 4 hours. If the resident is unnecessarily inconvenienced by the planned outage, the work crew will modify the work plan to accommodate the customer to the greatest extent possible. When the work is completed and water service has been restored, customers are notified and asked to flush their services to minimize the risk of problems.

Due to the interconnected nature of the system service interruptions due to maintenance of wells, pump stations, and reservoirs is rare and localized in nature. If an interruption of service due to work on a well, pumping station or reservoir is unavoidable, those impacted customers are notified by post card or door hanger a minimum of 7 to 10 days in advance of the planned interruption. The Utility's electronic listserv is also used to notify area residents. It is hoped that planned service interruptions are kept to no more than 4 to 8 hours in these instances. During the past year there were no planned service interruptions due to work at a well, pump station or reservoir.

Consumers generally accept the inconvenience of water service interruption when proper notification is provided. Complaints resulting from planned service interruptions are generally caused by delays in re-establishing water service. Utility field personnel are diligent in minimizing the impacts of such delays.

I report compliance.

3. *Provide residents with adequate notice in the case of planned maintenance work that would significantly reduce water flow or pressure, and/or cause water discoloration.*

When a facility is taken out of service for planned maintenance work, the operation of other Water Utility facilities is modified to ensure that water service is not interrupted and pressures are stable. The water distribution system is interconnected and allows operating wells to provide service to all parts of the system.

In the event that the removal of a facility from service has the potential of reducing water capacity and/or pressure and poses the risk of water discoloration, those impacted customers are notified by post card a minimum of 7 to 10 days in advance of the planned interruption. The Utility may also use its electronic listserv to notify area residents of an anticipated reduction in service. During the past year there were no planned reductions in the level of service due to work at a well, pump station or reservoir.

Routine unidirectional flushing and cleaning of the distribution system does cause a temporary reduction in water pressure and flow. Flushing operations also include the risk of causing water discoloration. Residents are notified of routine flushing operations

in their neighborhood by yard signs, phone calls and an electronic listserv. Annual flushing schedules are published and posted on the Utility web page in the spring and a detailed schedule is maintained throughout the flushing work. Complaints received during the flushing operation are minimal.

I report compliance.

References

1. 2015 Water Utility Capital Budget