



Request for City Council Committee Action From the Department of Public Works

Date: September 27, 2005

To: Honorable Sandra Colvin Roy, Chair Transportation & Public Works Committee

Subject: Supervisory Control and Data Acquisition (SCADA) System

Recommendation: Receive and File

Previous Directives: None

Prepared by: Shahin Rezania, P.E., Interim Director, Water Treatment & Distribution Services, 673-2418

Approved by: _____
Klara A. Fabry, P.E., City Engineer, Director of Public Works

Presenter: Shahin Rezania, P.E., Interim Director, Water Treatment & Distribution Services

Financial Impact (Check those that apply)

- No financial impact - or - Action is within current department budget.
(If checked, go directly to Background/Supporting Information)
- Action requires an appropriation increase to the Capital Budget
- Action requires an appropriation increase to the Operating Budget
- Action provides increased revenue for appropriation increase
- Action requires use of contingency or reserves
- Other financial impact (Explain):
- Request provided to the Budget Office when provided to the Committee Coordinator

Background/Supporting Information:

The City of Minneapolis Department of Public Works conducted a two-day workshop for the purpose of soliciting the input of water industry professionals on two important issues: water system treatment and distribution capacity, and effective use of the Water Treatment and Distribution Services Division's new Supervisory Control and Data Acquisition (SCADA) system.

Water system capacity is an important issue for several reasons:

- ◆ The City is in the midst a \$150 million replacement and upgrade of its filtration capability from granular filters to membranes, and wants to be sure to implement sufficient (but not excessive) filtration capacity to meet its needs

- ◆ Although the City is essentially fully developed, its water production and storage requirements are somewhat complex due to current and potential obligations to other communities and the potential vulnerability of its single source of raw water.
- ◆ Since the proposed connection to the City of St. Paul's system would also provide for furnishing additional water to Minneapolis, an opportunity presents itself to forego planned water storage capacity increases in the Minneapolis system.

The City's Water Works Division is in the final stages of implementing a Supervisory Control and Data Acquisition (SCADA) system. This work began in 1995 in response to several factors including:

- ◆ Increasingly stringent regulatory requirements that cannot be met reliably or efficiently without state-of-the-art control systems
- ◆ Outmoded system components were unreliable and replacement parts difficult or impossible to find
- ◆ New technology offered the opportunity for the Water Treatment and Distribution Services Division to increase the efficiency of its operations

The City had already evaluated the technical aspects of these issues and was satisfied with those evaluations. For this workshop it wanted to take advantage of the experience of other water utilities that had faced similar issues. The City therefore decided to solicit the opinions of administrative and operations professionals from seven water utilities around the country.

Objectives

Workshop objectives were twofold:

Obtain an independent assessment of the validity of water system capacity determinations made by the City of Minneapolis.

Obtain the recommendations of industry professionals for optimizing the effectiveness of the City's SCADA system.

Findings and Recommendations Regarding Capacity

The panel found that the City's methodology for assessing its needs for water treatment and storage capacity is appropriate and reasonable. They think that the City's design treatment capacity of 165 million gallons per day (MGD) for summer needs is well supported by past experience and that the underlying assumptions used to determine the design capacity are reasonable. The most significant of those assumptions include: a 2% growth in the City's population and a 10 to 15% growth in the population of suburbs served by the City's water system but no appurtenant increase in water consumption over the next 25 years; no use of watering restrictions to assist in meeting normal system demands; and, past demand patterns are reasonably indicative of future patterns. The panel also found that the currently proposed winter design treatment capacity of 70 MGD is reasonable and that the amount of storage currently provided is appropriate for most operating scenarios. However, the panel expressed concern

whether the City has adequately considered its water supply obligations to the City of Bloomington and that any agreement to provide water to St. Paul could place excessive demands on the City's water system as currently planned. They also expressed concern that finished water storage capacity may not be sufficient if the City's only source of raw water, the Mississippi River, were ever compromised. The panel also suggested that the City use demand side management practices to address situations when demand exceeds capacity. The Panel endorsed the City's upgrade to membrane filtration and urged that the Fridley facility be implemented without delay. Currently, the Columbia Heights facility treats less than ½ of the City's water, leaving many of the City's customers with lesser quality water.

Among the more significant recommendations of the panel are the following:

- Develop alternative sources of raw water. The panel considered this option the most desirable way to address the concern associated with a single, surface water, source of raw water. If alternative sources of raw water are not feasible, consider additional finished water storage capacity.
- Periodically reassess capacity needs and delivery scenarios. In particular, carefully consider all of the possible impacts of the current water supply agreement with Bloomington and the future potential agreement with St. Paul on the City's capability to serve its current customers. Adjust treatment and storage capacity as changing circumstances warrant.
- Develop policies and procedures to address situations when the water system is incapable of meeting demand.
- Institute watering restrictions and other demand side management practices in favor of building "reserve or backup" treatment capacity.
- Implement the Fridley membrane system without delay.

Findings and Recommendations Regarding SCADA

The panel strongly endorsed the need for a modern monitoring and control capability for the City's water treatment and distribution system stating that "the choice is obvious". They believe that the system as currently planned reasonably addresses important control and monitoring requirements and that expansion of the system may even offer additional benefits. They suggested that the Public Works goal of performing 75% proactive maintenance (the remainder being reactive maintenance) may be too ambitious. Some panel members urged the City to consider allowing remote access to its SCADA system so plant personnel can monitor system performance and troubleshoot problems remotely, including from home. Other panel members cautioned that system security can be compromised by allowing such access. Some utilities also have a capability to access distribution information via the internet using laptop computers in trucks in the field, thereby significantly improving the efficiency of their field personnel.

Among the more significant recommendations of the panel are the following:

- Investigate the benefits of wireless remote access to distribution system information via laptop computer for the distribution system maintenance staff.
- Consider developing a capability for supervisors to monitor and troubleshoot plant performance by accessing the SCADA system from remote locations over the internet. In doing so, carefully consider security implications.
- Consider installation of more water quality monitoring points.