



CITY OF LA CROSSE

DIRECTOR OF PUBLIC WORKS

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MEMORANDUM

June 30, 2016

Subject: Water Reservoir

The Incident

June 18, 2016 at approximately 6:40 pm low water system pressure and low reservoir water level alarms activated. Water Superintendent Lee Anderson was out of town and unavailable. Utility Manager Mark Johnson responded initially via remote computer access from home with which he should have been able to access the SCADA (supervisory control and data acquisition) system. When he was unable to connect to the system he immediately left for the Myrick pump station.

Upon his arrival at the pump station, Mark observed that the reservoir level was at approximately 6" and system water pressure was at approximately 36psi. He observed that only one well was running. In communication with Lee Anderson by cell phone, he manually started wells and observed that the system pressure quickly started to recover. Via phone Mark and Lee coordinated the actions needed to bring the SCADA system back on-line. Lee Anderson left the event he was attending out of town and drove back to La Crosse in response to the problem, arriving at Myrick around 8:00 PM. Mark and Lee remained at the Myrick station until approximately 8:30 pm. By that time the reservoir level had recovered to approximately 2 feet and system pressure was approximately 80 psi.

The events leading up to the low pressure and low level incident included a severe thunderstorm earlier in the week. That storm disrupted the Century Link digital communications between the SCADA control system at Myrick and the wells at various locations in the system. Well operations were changed to manual with time of day settings while Century Link worked to get communications restored. Lee Anderson worked closely with them throughout the week.

Wells 14 and 21 were also being worked on for preventive maintenance and were out of service. That combination of events earlier in the week resulted in wells that would normally start automatically not doing so. Consequently, the reservoir level dropped to the low level and the corresponding low system pressure which resulted.

Reservoir Hydraulics

The Grand Dad Bluff reservoir has a capacity of approximately 5 million gallons. Each foot of the reservoir represents approximately 250,000 gallons. Normal water system operating pressure ranges between 90 and 100psi.

The City completed a water system improvement project in 2008. That project added a 2nd, 20" supply pipe to the reservoir. The project also interconnected 2 system wells directly to the transmission main feeding the reservoir. That project significantly improved the reservoir and system hydraulics. Prior to the 2008 project, the normal reservoir fill rate was approximately 0.8 ft/hr. After the project the fill rate is approximately 3.0ft/hr.

There was been some reference to the Fire Department requesting or suggesting that the reservoir water level should not fall below 6 feet. That reference or guideline apparently originated many years ago, prior to the 2008 project and prior to the implementation of the automated SCADA system. Prior to SCADA, operation of the wells was largely manual based on the direction of the Water Superintendent at the time and the Pump House personnel. Because the reservoir fill rate prior to 2008 was much slower it may have been prudent to maintain more water in the reservoir.

In recently speaking with the Fire Chief, he indicates that there are no issues or concerns on the part of the Fire Department related to the water system or the water supply.

SCADA System Operation

The SCADA system is a computer based, automated control system that starts and stops well pumps and monitors system pressure and reservoir levels in response to an operating program. The program can be modified to account for time of day, day of week, and any number of customizable settings. Like any computer based program and system, when it is functioning and operating properly it is very efficient. However, if the system fails or if communication between the control system and the remote wells is lost the consequences can be significant. This can include system wells not coming on-line in response to low system pressure and/or low reservoir level. The system does include a fail-safe feature whereby 3 system wells should come on-line in the event of an emergency. In order for wells to come on-line in a fail-safe mode of operation they must be available for service.

Conclusion

The water system events of June 18, 2016 did raise a level of concern. SCADA programming is dependent to an extent on human intervention. Due to the thunderstorms earlier in the week leading up to the event, some programming was changed. Further, wells 14 and 21 were out of service for repair and maintenance. The SCADA programming controlling the weekend well operation and to account for those two wells out of service was not changed. That led to the low reservoir level and low system pressure. It was due in part to human error. If the programming had been changed the event likely would not have occurred. In my opinion it was not due to negligence.

Recommendation

Establish procedure to cross-check that fail-safe wells are always available for service.
Cross train additional water staff in the operation of the SCADA system
Post notices on SCADA panel informing which wells are out of service and unavailable due to maintenance.



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