Utilizing Ultrasonic

By Justin Bennet

Township water authority avoids surcharges for exceeding peak limits

A suburban township in the upper Midwest U.S. buys its drinking water from a major municipal water district. The township's water distribution system network has four connections to the larger municipality's water transmission main. The municipality has many customers and has implemented contracts with each of its wholesale customers that limit the peak flows and times of day in which they may occur. If the wholesale customer exceeds the limit, it is assessed significant surcharges.

Because of the potential surcharges, the wholesale customers can financially justify investing in solutions to better control their water demand, minimize usage peaks and control the times of day they occur. These measures include employing elevated water storage towers, as well as control valves at each of the connections to the municipal provider's transmission main.

Metering Pitfalls

The major municipal water district owns and operates "metering pits" with magmeters immediately upstream of the control vaults owned by each customer. However, as a rule, the signals from these meters are not made available to the wholesale customers on a real-time basis. Wholesale water customers are only given data-log summary reports from these meters on a routine schedule for billing purposes.

Without a method of measuring flows or getting flow rate data from the water district in advance, the township customer had no means of knowing, in real time, the amount of flow it drew from the transmission main. Therefore, it did not know if or when it was exceeding the contractual peak flow rate limits and incurring surcharges from the water district until it was billed.

The township customer needed to know the flow rate at each of its four connections to the transmission main so it could control how much was being drawn at each site. It also needed the total flow from the municipality's transmission main, so it did not exceed its contractual peak demand.

The control vaults were initially installed without flowmeters. The intention was to use control valve position and upstream/downstream (differential) pressure readings to estimate the flow through the control valve using the characteristic curve of the valve. This proved to be too complicated and cumbersome for the SCADA system to effectively implement.

Reliable Readings

The local Siemens representative worked with the township and its engineer to find a solution to measure the flow rate and totalize the volume of flow at each of the customer's control vault sites. The most significant challenge was the piping configuration. All of the vaults were previously constructed without provisions for a flowmeter, as the control valve vaults are tight.

The Siemens representative used an ultrasonic clamp-on flowmeter demonstration kit to show the technology to the township, and prove that it would reliably meet its objectives. The vault with the worst piping configuration was selected for the demonstration. That would show that if the flowmeter worked in the worst site, it would work at the other three sites as well. However, if the Siemens flowmeter did not work at that site, the township would need to look at alternate flow measurement technology for a solution.

Within minutes of arriving on site, the unit was installed and providing reliable readings. It was allowed to log for a period of three days. After that, it was retrieved and compared to the readings from a competitive magmeter in the municipal water provider's metering pit.

The logger on the Siemens clamp-on flowmeter provides information on the quality of the velocity and flow measurements. This logged information helped establish and solidify the confidence of the township and the engineer that the clamp-on meter would work for these applications.

Key benefits of the flowmeter included:

- The capability to make the tough measurements

and provide information on the quality of those measurements;

- Service from the local Siemens representative;
- The field service to install the transducers on the pipe and commission the transmitters; and
- Assistance with evaluation of ultrasonic clamp-on flowmeter versus magmeters owned by the water district. The major water district supported the ultrasonic clamp-on technology used by the township customer after it attended a Siemens Level & Flow Seminar held in its district.

Significant Savings

If it was not able to use the Siemens ultrasonic clamp-on flowmeters, the customer would have had to excavate and install a below-grade vault to house a magmeter and associated isolation and bypass valves, along with conduit and wiring, at each of these four sites. This would have required cutting the water pipe and then going through a cumbersome disinfection process, both of which would have required lengthy permitting and costly testing. Further, some of the sites had little or no room to accommodate such a structure or piping modifications. It is estimated these modifications would have cost more than $250,000. In comparison, the customer ended up spending $25,000 for the meters, and field service to install some conduit from the pipe to an existing above-grade SCADA panel.

The customer already had made improvements to the distribution system and installed four new control vaults. Its construction contracts were closing and it could not use its water tower until the new flow controls were added. Time was a critical factor. The customer saved three to six months by using the clamp-on flowmeters instead of having to construct new vaults to house magmeters.

Now that the meters are in place, the customer can control how much water it is taking from the water district at each of these four locations, and ensure it does not exceed its contractual peak. It also can now properly manage the fill and draw of its elevated storage tank to offset peak demands, and fill the tank to store water during periods of low demand. W&WD

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