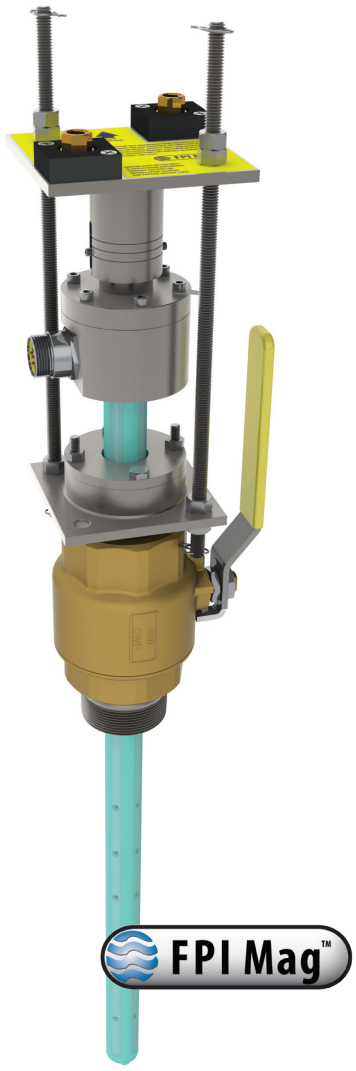
McCROMETER

CASE STUDY

Next Generation Mag Meter Helps Davidson with Non-Revenue Water



McCROMETER, INC. 3255 W. Stetson Ave., Hemet, CA 92545 PH 951-652-6811 FAX 951-652-3078
 Printed in U.S.A. 30121-00 Rev. 1.0/5-13

CASE STUDY

By Robert Walters, Assistant Manager, Davidson Water Inc.
Dale Draughn, Cross-Connection Control Coordinator, Davidson Water Inc.
Michael Fenk, Sales Engineer, W.K. Hile Company
Nick Voss, Product Manager, McCrometer, Inc.

Next Generation Mag Flow Meter Helps Davidson with Non-Revenue Water

Davidson Water Inc., located in Lexington, North Carolina, is one of the largest membership cooperatives financed by USDA Rural Development. In 1967, with the goal of creating a safe, dependable water system, citizens in northern Davidson County organized funding with Farmers Home Administration and in 1969 the construction of the county's first water service facility was completed. Four additional water systems were constructed with North Davidson Water Inc. supplying water, maintenance and management service to each. In 1973 the five systems were consolidated under The Davidson Water Corporation.

Figure 1: Davidson Inc. Water Tower

At present, Davidson Water has a plant capacity of 20 million gallons per day. To serve the future needs of its customers, an additional 15 mgd plant is currently under construction that will bring the total plant capacity to 35 mgd.

The Problem

Today it is estimated that the average US Drinking Water facility loses 20%± of its finished volume to non-revenue water. Non-revenue water is processed water that has left the plant but remains unaccounted for in terms of delivery and billing. As the Davidson Water's management team assessed the county's growth and needs of their customers, they targeted non-revenue water as a key area for improvement over the next three years. The utility estimates that their annual non-revenue water loss was, on average, 16.7% in 2012. This equates to as much as two million gallons per day during summer months. They have established a goal of reducing this figure to 10% by 2015.

As Robert Walters, Assistant Manager, describes, "some people think of non-revenue water as just being the loss of your product, the finished water that leaves your plant. That is important, but you also have to calculate all the chemicals, electricity and labor you have invested producing that lost water."

Until recently, Davidson Water had relied on Venturi flow meters to measure the produced water leaving the plant. This presented two challenges to overcome before a real audit of the system could be undertaken. First, the

Venturi flow meters in operation did not offer the rangeability required. Second, the management team acknowledged the need for a more precise measurement of the produced water leaving the plant. Dale Draughn, Davidson's Cross -Connection Control Coordinator, is charged with tracking the non-revenue water. Dale describes, "we had to start with an accurate reading of the finished water that was leaving the plant, in gallons-per-minute and total gallons per month. Once we understand this, we can move into the distribution network to understand non-revenue water loss." Facility managers determined that in order to achieve optimum operational efficiency, they had to find and implement a more comprehensive solution.

The Solution

Davidson Water contacted W.K. Hile and the McCrometer Applications Group to review their non-revenue water loss problem and flow meter options. Davidson staff knew that in order to profile their entire system they would have to install several new meters and replace some old ones. As Robert Walters explains, "we wanted to understand what was occurring at each critical point in our system. In total, we identified 14 metering locations. This included key measurement points coming in and leaving the plant, as well as the different pressure zones in distribution." Understanding the water moving into and out of each zone helps calculate water loss.

Figure 2: The FPI Mag™ Flow Meter

The McCrometer team recommended the FPI Mag™ flow meter. Its accuracy, application flexibility and ease of installation made the FPI Mag flow meter stand out from other flow measurement technologies.

Accuracy

The accuracy of the flow measurements throughout the system will validate the non-revenue water loss assessment. The Davidson Water team knew they needed several meters but needed to balance financial responsibilities while not sacrificing flow meter accuracy when considering the overall scope of the project.

As Michael Fenk, with W.K. Hile, describes, "the accuracy as well as the range of the FPI Mag is on par with a full pipe mag meter. You're talking about up to .5% accuracy over a very wide range which is going to cover almost any application you will run into in the water industry."

The FPI Mag flow meter is the industry's only Full Profile Insertion electromagnetic flow meter. Electromagnetic coils installed inside of the sensor produce magnetic fields. Stainless steel electrode pairs installed on the outside of the sensor collect the induced voltage caused by the flowing water. The total of each voltage signal is then transmitted to the converter electronics where it is converted to an average flow velocity. The converter then multiplies the average flow velocity by the pipe's cross-sectional area to create a volumetric flow rate. The meter offers accuracy up to ± 0.5% from 1 ft/s to 32 ft/s (0.3 m/s to 10 m/s), and up to ± 1% from 0.3 ft/s to 1 ft/s (0.2 m/s to 0.3 m/s), and covers pipe sizes from: 4-138 inches.

Application Flexibility

With 14 different measurement locations, it was important for Davidson Water to see if there was one flow meter technology that could be used in all locations. The installation locations represented a wide range of pipe sizes, flow rates and a mixture of existing and new construction. As Michael Fenk notes, "having all 14 units on the same meter platform with the same accuracy will

allow Davidson to easily collect and compare data across their system."

The wide flow range measurement capability of the FPI Mag flow meter gives the utility. a great deal of flexibility to support many different applications. As Dale Draughn states, "we can have a very wide range of flow rates. For example at the finished water pump station, six pumps can be turned on with a single meter measuring the full range of flow." With the FPI Mag flow meter, multi-electrode sensing makes accurate flow measurement possible without the need for long upstream and downstream pipe runs. The multi-electrode sensor design compensates for variable flow profiles, including swirl, turbulence and low-flow conditions.

Ease of Installation

The Davidson Water staff were able to install an FPI Mag flow meter within a couple of hours, as opposed to an entire day or more for other technologies. Typically it takes just two people to install an FPI Mag flow meter. Once the saddle and the ball valve are in place, all that's required is to hot tap the pipe, thread in the meter assembly, and insert the meter into the pipe.

Figure 3: Installing The FPI Mag Flow Meter

Installation costs were significantly lower than they would have been with full-bore pipe meters. There was no need to bring in heavy equipment or additional manpower nor was line shutdown or service interruption required.

The FPI Mag's ease of installation is an important feature for Davidson Water. The ability to insert the meter into existing piping simplifies retrofit work. The team has used this flexibility to full advantage when installing in booster stations and below-ground vaults where space is limited.

Conclusions

Davidson Water has recently finished installing the last of 14 FPI Mag flow meters for the project. The meters measure water leaving the plant as well as other destination points throughout the county, including rural water towers and booster stations. Improved system profiling helps staff identify leaks and other sources of water loss within the distribution system. The obvious benefit is a drop in production cost. But this also serves to support the utility's commitment to water conservation and resource preservation.

Davidson Water has already been able to decrease non-revenue water loss from 16.7% to 13%. Managers are confident that unaccounted water loss will continue to decrease as more of the newly installed FPI Mag flow meters are brought into full production. As Dale Draughn concludes, "the FPI Mag flow meters are allowing us to pinpoint pressure zones with issues. Once we know we have an issue, we can break it into subzones and start a rapid street-by-street investigation." With the results that have come in so far, it is likely the company will exceed its goal ahead of schedule.