SUCCESS STORY

GWINNETT COUNTY, GEORGIA IMPROVES METER PROGRAM THROUGH SCIENCE AND STRATEGY

BACKGROUND

Gwinnett County is located 30 miles northeast of Atlanta. With a population just over 907,000 (U.S. Census Bureau, 2016), the county is the second largest in Georgia. Gwinnett is one of the state's fastest growing regions, with population expected to increase to 1.2 million by 2030. Currently, Gwinnett County Department of Water Resources (GCDWR) provides services to approximately 240,000 residential, and 20,000 commercial/industrial customer accounts through 3,700 miles of distribution mains.

EVALUATING METER TECHNOLOGIES

Historically, GCDWR installed meter types based on the application and size of the meter. As an example, commercial applications with water services 3-inches and larger would receive compound meters. Standardizing meter type installations is a common practice among water suppliers.

However, a loss of accuracy can be accentuated at certain flow rates, depending on the meter type, and some meters lose accuracy over their years in service. Fine-tuning the meter installation protocol may provide more accurate measurements of water usage.

The utility is investigating methods to improve its strategic program for water meters. These improvements include updated testing equipment, a wider selection of approved metering technologies, and increased employee training. The goal is to install the most appropriate meter for each specific use, and to enhance the county's excellent customer service.

The department is also testing radio modules, and considering a future with automated metering infrastructure (AMI).

A METER COMPARISON TEST CASE

Testing meters for specific applications and flow rates is integral to developing this strategic program. GCDWR selected one of their commercial customers with a challenging water demand as a test case.

Master Meter had provided the utility with a 3-inch Octave™ ultrasonic meter. The utility installed this ultrasonic meter in-line with a 3-inch compound meter. This allowed them to compare performance of both types of meters for a specific application.

The 3-inch meters used in this test served an existing customer with a fairly continuous flow rate. The flow maintained an average of 27 gpm, with the lowest flow recorded at 8 gpm and the highest flow recorded at 42 gpm.

During the investigation, the department also reviewed the effects of different registers. They changed from mechanical to solid-state registers, and compared changes in registered usage.

Both manufacturer's representatives assisted with the comparison project. They supplied the solid-state registers/meters, provided data logging equipment, and logging results.

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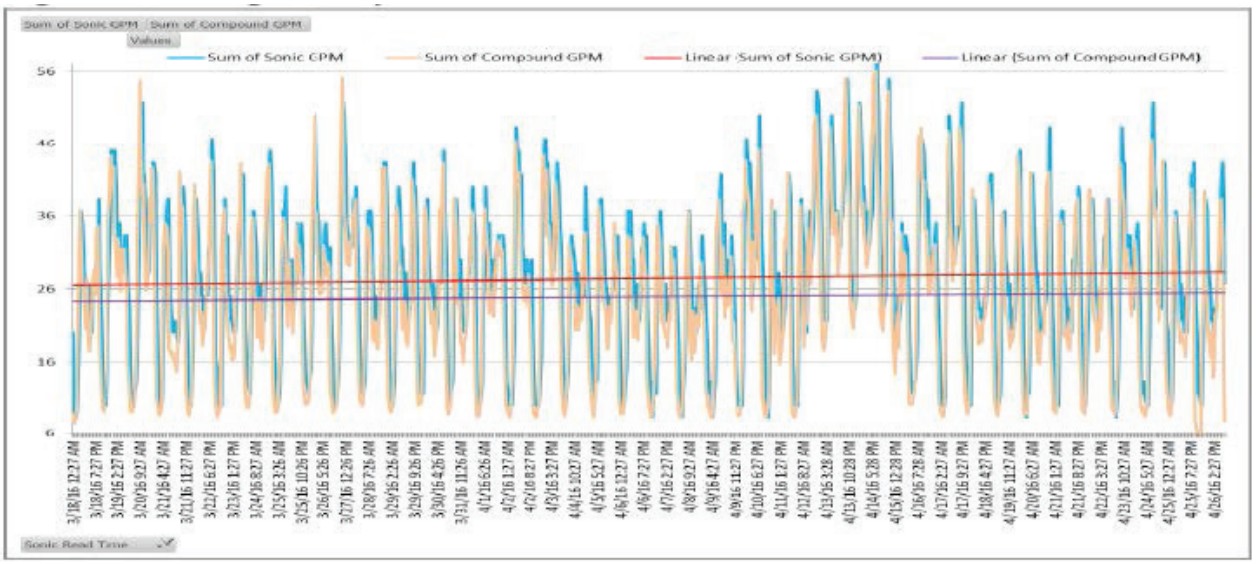

Figure 1. Average Flow, GPM from 3/18/16 to 4/26/16

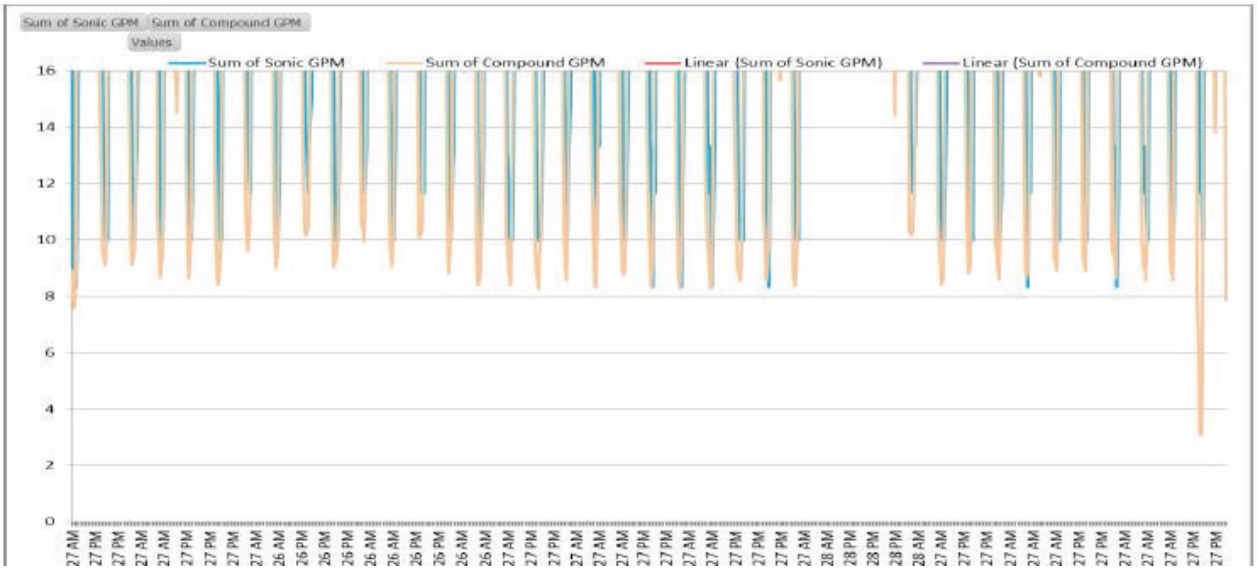

Figure 2. Low Flow, 0 to 16 GPM

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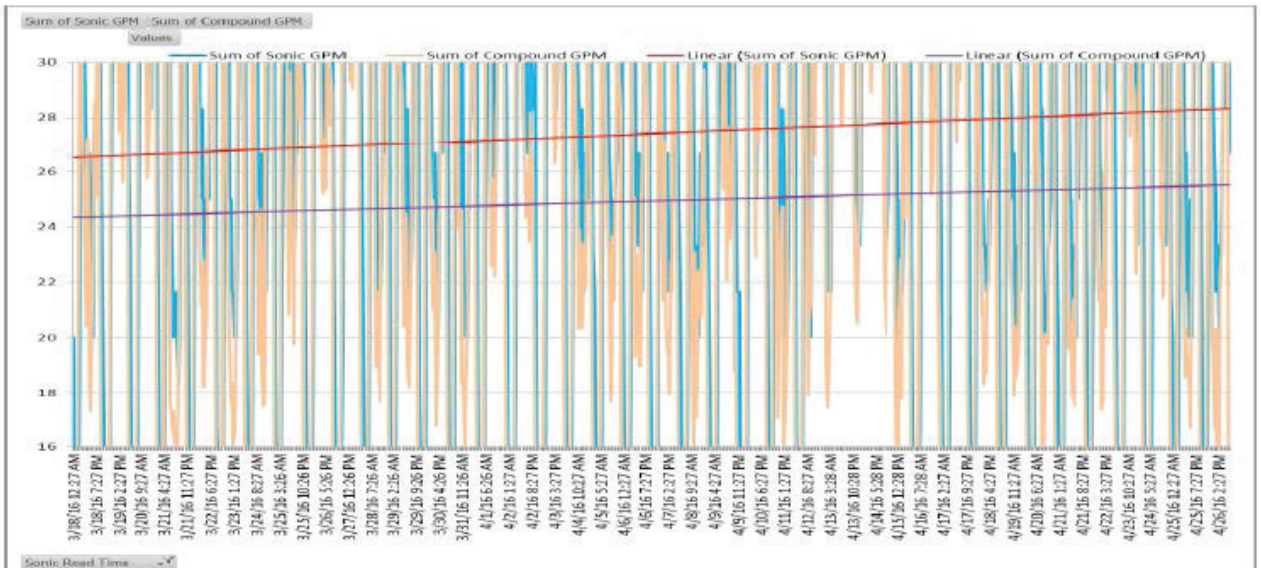

Figure 3. Medium Flow, 16 to 30 gpm

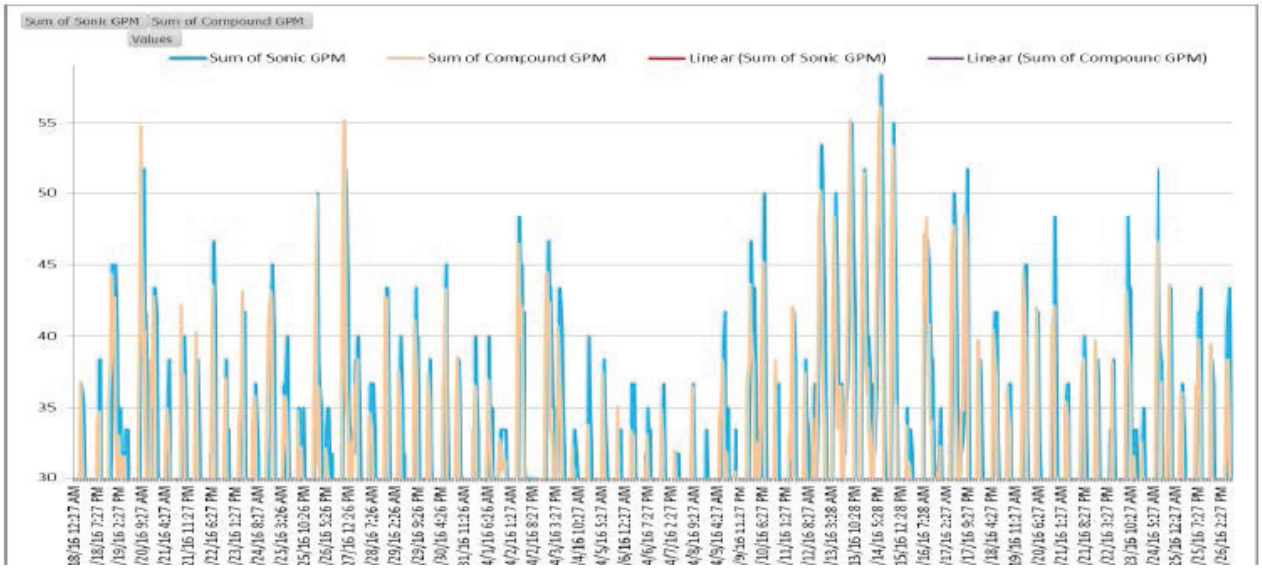

Figure 4. High Flow, 30+ gpm

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LESSONS LEARNED

VARIABLES AFFECTING METER ACCURACY

REGISTERS

The utility has the option of using digital encoders on the existing meters. A decision was made to replace mechanical registers with digital ones to determine their impact on meter accuracy. Digital solid-state registers are also capable of logging and transmitting data, but this option was not explored as part of this study.

METER ASSEMBLY CONFIGURATION

A "backflow condition" alarm occurred after the solid-state registers were installed on the compound meter. The team examined the installation configuration to determine what caused the alarm. A strainer bolted to the compound meter was apparently causing cavitation—which registered as backflow. The strainer was removed, which solved the cavitation/backflow condition. The County is looking into this further.

These changes resulted in approximately 3-4 percent increase in measured flow for the compound meter. The increase was likely due to the solid-state register's lack of moving parts and reduced drag along with the indicated backflow condition on the turbine register.

IMPROVED ACCURACY OF METER TYPES FOR SPECIFIC APPLICATIONS

Initially, manual readings were taken from the meters each day. These readings indicated consistently higher usage measurement from the ultrasonic meter. However, the utility needed more accurate data to fully understand how the meters performed at various flow ranges.

To enhance the accuracy of the comparison, electronic data-loggers were installed on both meters to transmit hourly usage logs. The logs allowed the utility to compute minimum, maximum and hourly flows in gallons per minute (gpm). Overlaying the flow graphs from the two meters allowed more in-depth analysis.

As shown in Figure 1, the ultrasonic meter consistently registered more usage on average. However, by expanding the low, mid-range, and high flow sections of the graphs, each meter's performance at those ranges is evident.

Looking at low flows from 0 to 16 gpm (Figure 2), the ultrasonic meter consistently registered more flow than the compound meter.

Analysis of the mid-range results (Figure 3) showed that the ultrasonic meter also consistently picked up more accurate registration in the 24gpm to 32gpm flow range. This mid-flow range is called the "crossover range." Compound meters are designed to measure a wide range of flow patterns by combining the efficiencies of positive displacement and turbine meters.

In a compound meter, when the flow changes from the low flow (positive displacement) chamber to the high flow (turbine) chamber, inaccuracies in registration may occur because the flow is split between the two measuring chambers. This compound meter's crossover range is approximately 10gpm to 30gpm.

Conversely, at ranges of 40 gpm and higher (Figure 4), the compound meter registered very close to or even higher than the ultrasonic meter. The similarity of the high flow accuracies corroborates the meter test results, which showed that both meters met industry standards. This also indicated that the data from lower flow ranges was accurate.

Both meters met AWWA standards throughout the course of the testing. However, for this specific flow scenario the ultrasonic meter appeared to offer an improvement in overall accuracy compared to the compound meter.

For the 370-day test period, the total additional flow registered by the ultrasonic meter was about 1.1 million gallons. Improvements from replacing the registers would also need to be factored into this computation.

AWWA STANDARDS AND PERFORMANCE

As previously noted, both meter types met AWWA standards throughout the course of the testing. However, in viewing this chart which shows assorted daily consumption totals (in USG), the ultrasonic meter appeared to offer an improvement in overall accuracy as demonstrated by the additional flow (shown in green), when compared to the compound meter.

This chart shows the correlation between an average daily registration loss in US Gallons, and the accompanying projected daily loss in revenue.

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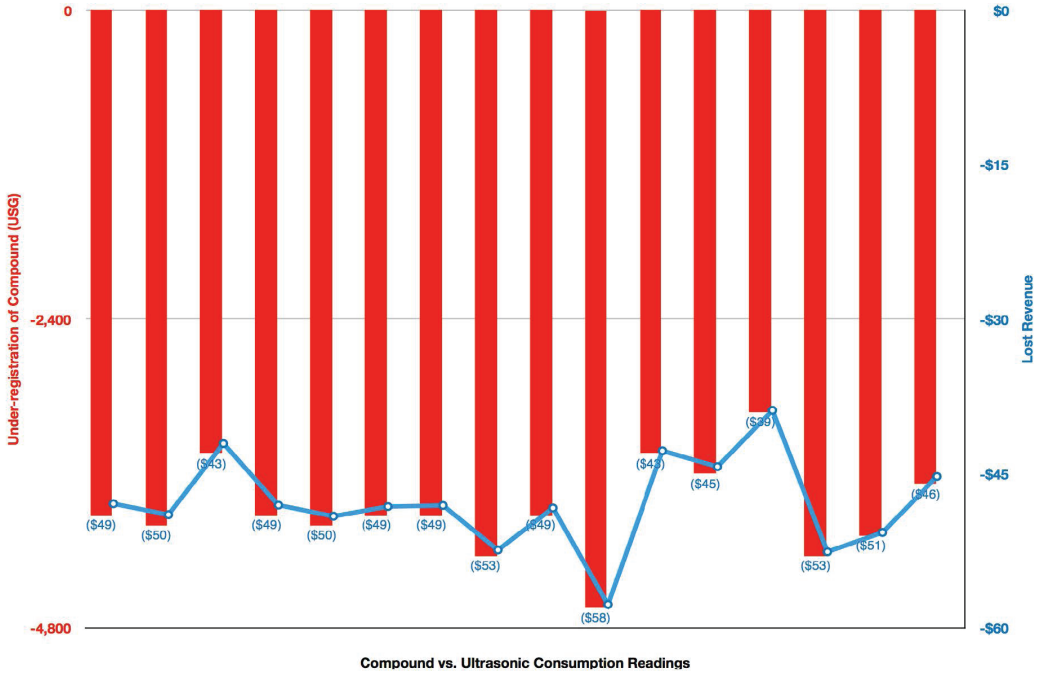
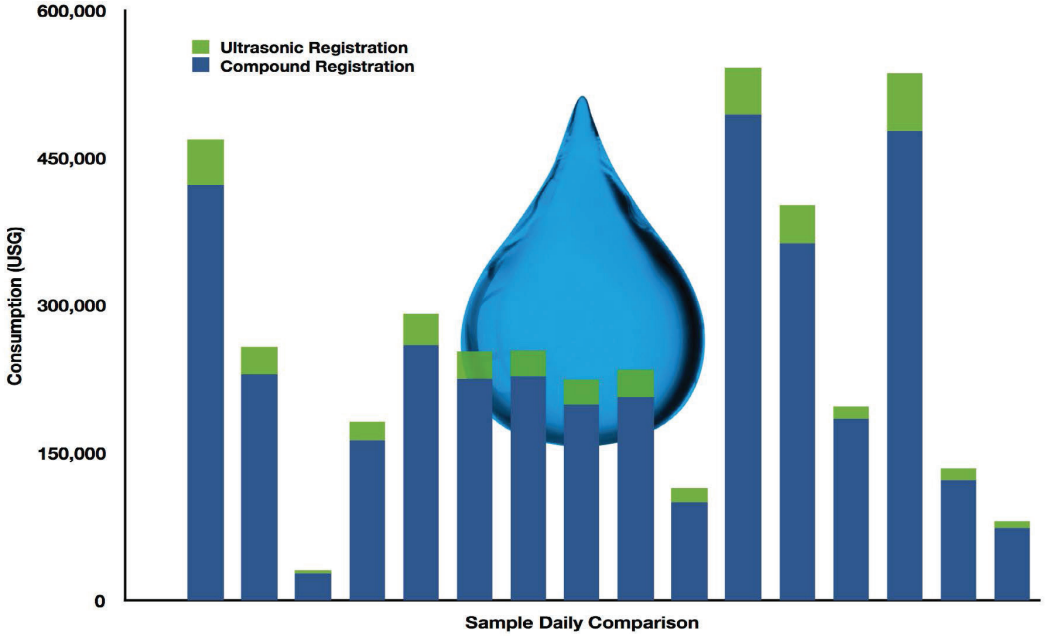


Compound vs. Ultrasonic Consumption Readings



Sample Daily Comparison

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CONTINUED METER PROGRAM MODIFICATIONS

The county is strategically assessing various meters, register types and manufacturers. As part of the process, they plan to upgrade their testing and training facility to include gravimetric testing and data monitoring. These changes will provide more scientifically-based meter selections. Additionally, a continual evaluation process will help determine the best meter for each service use, flow range and fluctuations.

After the test comparing the ultrasonic meter and compound meter, GCDWR purchased ten additional ultrasonic meters in order to analyze their performance in a variety of flow ranges and configurations.

The utility is installing the ultrasonic meters at locations with various flow rates and consumption types such as churches, schools, and businesses.

Based on this test case, the utility has added ultrasonic meter specifications as one of the commercial/industrial metering option.

CUSTOMER DETAILS

Gwinnett County, Georgia
www.gwinnettcounty.com

EVALUATING METER TECHNOLOGIES

- Developing a strategically-based meter program, by determining which type of meters work best for various, specific applications.
- Master Meter and another meter manufacturer assisted by participating in a 1-year meter test at a specific site, to compare a 3-inch ultrasonic meter versus a compound meter.

OUTCOMES

- The test found differences in measurement between solid-state and mechanical registers. Also, problems caused by meter installation configuration were identified.
- The test found for that particular application, the ultrasonic meter registered more usage at the low and mid-range flows than the compound meter. GCDWR added an ultrasonic meter specification to their commercial metering options.
- The ultrasonic registered an additional 1.1 million gallons of water vs. the compound during the 370-day test period.

To learn more about ultrasonic meters, visit us at

www.MasterMeter.com

Call us at 1-800-765-6518