

Automated Meter Reading System Helps Track Water Usage

By Cory Dobbie and Scott Durham

Shrinking budgets, aging infrastructures and diminishing revenues are making efficient water utility management a critical need for many municipalities across the country. Many water utilities are considering implementation of an Automated Meter Reading (AMR) system to reduce the cost of collecting and reading data from water meters throughout their area. In fact, many have found that deploying AMR technology provides several additional much needed benefits such as enhanced system management, optimization and improved customer service.

A North Texas town recently found out exactly how beneficial an AMR system can be. McKinney, TX, which is nestled north of Dallas, currently employs 26,000 water meters in a combination of suburban, city and rural areas. The city elected to begin using AMR technology to more efficiently manage its water distribution, reduce overhead costs and improve meter reading efficiency.

After evaluating several AMR system manufacturers, McKinney officials chose to install the Datamatic Firefly® AMR System. Of particular interest to City officials was the system's ProfilePLUS load profiling capability which archives hourly consumption patterns every 74 days. This tool provided the city with data previously unavailable, allowing officials to begin monitoring usage trends and patterns of each account.

"In addition to providing vital profiling information, AMR technology has allowed McKinney officials to address staffing concerns and reduce expenses by cutting the manpower and cost required to read meters," said Ken Kercher, CEO of Datamatic. "The system also allowed officials to focus resources on more pressing issues affecting McKinney residents such as system demand in various areas around the city."

Suspicious Behavior

Texas summers are typically hot and dry, as was the case in 2000. As a result, large



amounts of water were used to irrigate community lawn and garden landscaping.

Upon installation of Datamatic's AMR technology, McKinney Meter Reading Supervisor, Cory Dobbie, noticed that water meters in one section of town registered lower than expected water consumption. He suspected that larger amounts of water were being used to maintain lawns and gardens in the affluent neighborhood.

Upon physical inspection of the area, $\frac{3}{4}$ x $\frac{1}{2}$ -inch meters were found on 1-inch services. At this time, the usage profile of a sample meter was examined. The ProfilePLUS data indicated that during times when automatic sprinkler systems were operating, the registered usage often approached or exceeded the meter's rated capacity. Further investigation revealed that many 1-inch service lines had been incorrectly reduced and that $\frac{3}{4}$ x $\frac{1}{2}$ inch meters were being used where larger meters were necessary.

Staff feared that any usage that exceeded the meter's capacity was not being captured.

"Meters rated for 20 gpm on lines that service a pull of 33 gpm can experience magnetic separation and will not catch all usage and may stop completely," Dobbie said. "In fact, the meter readers did not register any data during peak periods that grossly exceeded its maximum flow rate, which

was confirmed by the meter manufacturer. As a result, many of the meters were not registering the correct water usage rates by customers with automatic sprinkler systems. This meant that potentially tens of thousands of gallons of water was being consumed at the cost of other city residents."

The Test

To confirm or banish their suspicions, staff replaced a meter with a 1-inch unit designed to register expected flows for that service, along with a Firefly MIU. ProfilePLUS data was extracted for the next 30-day period from the new meter and officials predicted that the data would show usage

that exceeded the rated capacity of the original meter.

Analysis showed that peaks on usage graphs corresponded precisely with customer irrigation timer settings. Consumption averaged out to a flow of 20 to 32 gpm. This greatly exceeded the manufacturer's specification for the $\frac{3}{4}$ x $\frac{1}{2}$ inch meters, which measured a continuous flow of 15 gpm and a peak of 20 gpm. This initial data led the city to immediately install new meters on other suspect areas.

Startling Results

The final results of data accumulated during the pilot testing of the AMR system were startling. One consumer was measured to have used 16,000 gallons in August, but that figure then surged to 93,000 gallons in September once the proper meter was installed. Data collected from another resident on the same street saw consumption jump from an average of 6,000 gallons a month to 77,000.

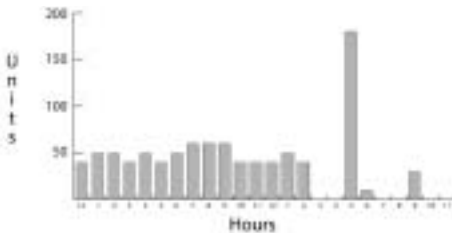
Data garnered from the ProfilePLUS technology proved that $\frac{3}{4}$ x $\frac{1}{2}$ meters were inadequate for these applications. Initially, it was thought the problem was small in scope since only the west side of the city was affected — mostly homes that were recently constructed. However, further investigation indicated that

approximately 8,000 meters were undersized and thousands of gallons of billable water were going unmeasured each month.

Growing Concerns

While the city was delighted about finding this large discrepancy, officials anticipated a public relations backlash from residents. Customers were startled to find their monthly water charges had dramatically increased, which led to questions about how a water bill could have jumped from \$45 to as much as \$250 a month.

City officials relied on the load profiling data to show customers that their bills were accurate and justified. The McKinney Water Department distributed ProfilePLUS graphs to residents, which encouraged water conservation. Virtually every customer reduced their usage in response to the higher bills. In addition, other residents were



This chart shows a customer that had a 40-gallon/hour leak. The graph even shows the precise time that leak was fixed: 3 p.m. on March 7, 2003.

pleased to know they would no longer subsidize high volume water users' bad habits.

Presenting the Facts

A thorough, citywide resolution required a detailed analysis of the problem, research, project plan, estimated cost savings and all proposed project costs to the city council for approval. The City Council immediately realized the value of the project and approved the changes.

It was equally important for the utility's staff to support the new program.

"That was one of the reasons the city planned to use its own installation teams to change the affected sections as quickly as possible," said Dobbie. "The public was notified two weeks prior to any work so they would know what to expect in their neighborhood. It was important that everyone, from the City Council to the installation team and residents, embrace the new program."

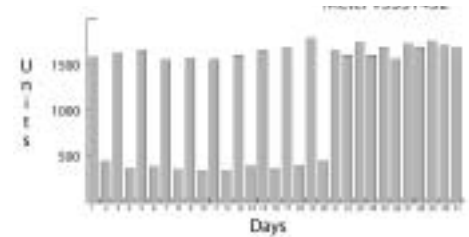
Within only a few months, the program exceeded expectations. The city government was pleased with the outcome of the study. Due to the AMR system, the City nearly

saved \$222,000 a month and \$2.5 million a year in previously lost revenues.

"Those savings alone more than covered the costs to install the AMR system," said Scott Durham, Vice President for Datamatic. "In addition, there has been a greater effort to enforce conservation efforts among McKinney residents, even among the few residents who were initially dissatisfied with the city's effort to improve efficiency."

The full benefit of implementing the AMR system is still being researched. However, for McKinney residents it has become a key management tool used for the following:

- Dispute Resolution – McKinney uses profile data to resolve customer disputes by providing daily data to customers.
- Leak Detection – Profile data has the potential to indicate a leak within the system. In one case, a usage profile revealed an approximated 40 gallon per hour leak. On March 7, 2003, the leak was repaired between 3 p.m. and 5 p.m. The city used this capability many times to identify leaks and to explain the bill to a customer. In one case, a resident complained that a bill was excessive due to a leak. The city reviewed the data and notified the resident the precise day and time the leak was corrected. The resident acknowledged this by responding, "You're right, how did you know that?" at which time he agreed to pay the bill.
- Conservation Monitoring – Measures such as odd/even watering days are easily monitored using daily profile data. Enforcement now has a tool to verify compliance with city regulations.
- Regulation Enforcement – A very large commercial food-processing customer was suspected of improperly flushing grease and contaminants into the city sewage system. Profile data was extracted to evaluate water usage patterns. It was found that great amounts of water were periodically being used late at night when the location was supposed to be closed. Upon showing this data to the customer, the activity stopped. It should be noted that in this case, the data recorded 15 minute intervals for greater resolution and to better measure peak flow rates.
- Documenting Proper Meter Deployment – Profile data had been used to document proper installation of



This sample graph shows a customer that stopped complying with mandatory odd-even watering restrictions on August 21, 2002.

commercial meters. The city wanted to verify that meters were not exceeding rated register capacity. Recording of flow data can be adjusted down as low as one minute. This allows a minute-by-minute review of peak and flows through the meter. The importance of this capability has been highlighted during warranty disputes with meter manufacturers.

The full extent of AMR's value is still emerging with new benefits constantly being realized. Some additional benefits are a safer work environment for utility works and reduced personnel needs.

"Our AMR System has proven to be a valuable ally for the city," Dobbie said. "Our meter reading costs have been greatly reduced. The ability to profile accounts is a critical part of our success and a key element of daily system management. We have a complete new way of managing our system and providing service to our customers. It's the best tool that I have." **WW**

About the Authors City of McKinney Meter Reading Supervisor Corey Dobbie is an expert in the meter reading field with over a decade experience. He has overseen every aspect of AMR system deployment, from meter conversion to planning and implementation of new systems. He can be reached via e-mail at cdobbie@mckinneytexas.org. Scott Durham, Vice President of Sales and Marketing, is responsible for Datamatic's advertising, marketing and sales programs. His background includes market research, sales management, analysis, operations and business planning/strategy.



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