2015 NAWC Management Innovation Awards

Recognizing the ideas and companies shaping the future of water management.
Every day, private water service companies help provide essential water and wastewater services to nearly 73 million people in the United States. That’s almost one quarter of our nation’s population.

The National Association of Water Companies (NAWC) is the voice of the private water industry—the organization exclusively representing this group of quality service providers, innovation drivers and responsible partners. We are an association defined by our members and by working together we can leverage our strengths to more effectively address the opportunities and challenges facing our nation.

WE SERVE as a credible resource and qualified professional partner for anyone who cares about safe and high-quality water.

WE ENGAGE with municipal leaders and the concerned citizens they represent, as well as educators, reporters, legislators, regulators and other water industry experts. We help shed light on all water-related issues, including the issues that often go unseen.

WE DO our best for our members and the people, communities and businesses they serve.

Our nation is facing serious challenges, and the NAWC and our members are providing powerful solutions.

We’re moving water forward. We invite you to join us.
For nearly 40 years, the NAWC Management Innovation Awards competition has been recognizing National Association of Water Companies members for their groundbreaking, industry-changing ideas. Today’s innovation is tomorrow’s industry standard, and our members are moving water forward through their leadership and work at the forefront of the water industry.

The 2015 Management Innovation Awards attracted entries from across the nation that were as diverse as they were dynamic. These entries truly reflect the “outside-the-box” thinking of the private water industry and the solutions created to benefit the customers and communities they serve. Entries submitted for the 2015 awards program represented a wide range of innovations, including conservation efforts, management plans, technological advancements and community support initiatives, among others. We applaud all of these efforts and the dedicated professionals who are working to keep moving water forward through innovation.

The 2015 winner was chosen by a panel of water industry professionals with a range of expertise.

2015 Judges

**John B. Tang, P.E.**
Vice President of Government Relations & Corporate Communications
San Jose Water Company

**Nick Santillo**
Director, Cyber and Physical Security
American Water

**Gretchen Toner**
Manager, Strategic Communications
Aqua America

**Gregory M. Galiffa**
Marketing & Communications Specialist
Aqua America

Judging Criteria

Entries were judged on the following criteria:
- Degree of innovation
- Short- and long-term benefits to the company
- Value to water utility industry
- The idea’s ability to be duplicated at other companies
- Presentation quality

We thank all member companies and their professionals for proudly sharing their ideas with fellow members. By participating in our annual competition, you are giving others the opportunity to learn from your example.
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FIRST PLACE - CONNECTICUT WATER COMPANY
Customer Protection Program-Be Sure Before You Open the Door

Background
As part of the Connecticut Water Company’s ongoing efforts to leverage technology and enhance service to our customers, the Company implemented a mobility platform to dispatch and schedule service personnel for field work orders and customer appointments. This system brought the expected benefits of increased operating efficiency and enhanced service with appointment schedule optimization, real time access to customer records for field personnel, and more timely and accurate work order information for the customer service representatives in the call center.

Innovative Use of Technology
We took the opportunity to go beyond the basic benefits and leverage the system to implement a unique and innovative Customer Protection program called ‘Be Sure Before You Open the Door’. The program uses automated features of the customer information system to link customer account records and generate an email to the customer with a photo of our service person when on route so the customer knows who to expect before our employee knocks on their door for a scheduled service appointment. The emailed photo is the same photo that our people have on their company issued ID, which features a unique background and holographic image over the photo.

An automated phone reminder call is generated the day prior to the appointment and the customer has the opportunity at that time to reschedule if necessary, which reduces the number of missed appointments and lost time for our field personnel.

Targets a Problem That Impacts Customers and Utilities Across the Country
This unique use of technology addresses the repeated incidents of homeowners, especially elderly, being targeted and robbed by people pretending to be water utility employees. This highly visible and powerful tool has drawn interest from several of our utility colleagues. As these types of incidents are reported all too often across utility sectors throughout the country, the program could clearly benefit water and wastewater utilities, as well as the customers of gas, electric and telecommunications utilities. It is likely that existing utility customer information systems can be leveraged to incorporate a similar feature.

Benefits
The program is consistent with our goal to provide world class service to our customers and to leverage technology to enhance service. The highly visible, innovative program has enhanced our brand and reputation with customers, community leaders, and regulators.
Our employees share the commitment to provide this additional protection for our customers and have embraced the program.

Providing the additional information in advance of an appointment, clearly helps protect our customers from utility imposters and, at the same time, provides greater safety for our employees, who are now expected and recognized by the property owner.

*Protecting Our Customers with More Information - What Our Customers See*

Sample of an email that is sent to from Connecticut Water to customer when field service representative is on route to an appointment. It includes the name and photo ID of our employee as well as contact information for our Customer Service team if the customer has any questions.

*Clear and Measurable Benefits of the Program*

The program has been very well received in the press, by customers, consumer protection advocates and utility regulators. Beyond the initial positive media coverage and regulators’ support, we continue to see the long term benefits for our customers and are proud to be providing this additional measure of protection for our customers and employees.

*Positive Media Coverage*

The Launch of the program helped generate media coverage that raised awareness of the utility imposter problem.
Coverage on local TV stations:


Industry publications:

- [Inflow line (CT Section AWWA magazine)](http://www.kelmanonline.com/httpdocs/files/InFlowLine/summer2015/index.html)r=26

**Customers**

Our customer service representatives regularly receive unsolicited positive feedback from customers on the new feature. In addition, a survey of customers who received the email indicated:

- 100% who recalled receiving the e-mail of our employee said ‘it made them feel better knowing they could identify the person at the door as a Connecticut Water employee before they entered your home.’
- 94% of customers said other utilities should offer the same feature.

In our customers’ own words:

- Great program
- Great service
- Love the new service with the picture ID
- This is a great service and will hopefully deter future occurrences
- Great professional service - thank you
- In this day and age any communication used to get information through to others is terrific. Much appreciated.
- I love it. I love technology. This is great.
- Here, here, to the email ID arriving ahead of the tech. What a professional person and job.

**Regulators**

- The Commissioner of the Public Utilities Regulatory Authority attended the press event announcing the program and commented that all utilities in the state should be encouraged to implement a similar program to protect customers.
- Connecticut’s Commissioner of Consumer Protection commented: “Information is power. A primary goal of the Department of Consumer Protection is to give consumers the information they need to protect themselves and avoid harm. This new process implemented by Connecticut Water is consistent with that goal and will go a long way in helping consumers protect themselves. We commend and thank Connecticut Water for this important effort.”

- The program was also praised by the Commissioner of the Department on Aging and the Office of Consumer Counsel.

Eric Thornburg, Connecticut Water’s President and CEO, is joined by regulators and law enforcement officials at a press conference at the State Capitol to announce the company’s new customer protection program, Be Sure Before You Open the Door.
Providing a Solution to a Persistent Problem ..... Similar Headlines Across the Country

Men Posing As Utility Workers Rob Woman

SAN FRANCISCO—Police are searching for two suspects posing as utility workers involved in the robbery of a 77-year-old woman that occurred on July 21.

The San Francisco Police Department told the San Francisco News that the suspects approached a woman dusked around 3 p.m. on the 1400 Block of Polk Drive, claiming that they were utility workers checking pipes in the neighborhood.

Men posing as utility workers entered two homes in Hanover Township, a handgun reported stolen from one residence

First Posted: 9:10 am - August 2nd, 2015 - 1120 Views

HANOVER TWP. — Police are investigating reports of two men posing as "water company employees" and entering homes on Charles Street Friday morning.

Police said a homeowner reported he was in his yard around 10:30 a.m. when the men asked to inspect his water meter. He allowed them in and one of the men spoke with him for approximately 30 minutes. The man left and the homeowner later discovered a lock on a file cabinet in his bedroom had been damaged and papers were scattered about the room. Nothing appeared to be stolen.

Imposter steals $51k from elderly woman in Stamford

John Walker 30

Updated: 11:04 pm, Monday, May 25, 2015

Public Arrest Records
instantcheckmate.com

An elderly woman who thought she was opening her home to a water company inspector last week instead was burglarized and had a $51,000 cash nest egg stolen from her, police said.

Police are warning residents to make sure they know who they are letting into their homes and to demand identification in order to substantiate who unexpected visitors are.

Police say last Tuesday's "Imposter burglar" netted the biggest cash haul that anyone can remember.
**Utility worker scam hitting St. Louis area**

*Posted: Aug 09, 2015 7:48 PM EDT*

*Updated: Aug 09, 2015 10:17 PM EDT*

By Adam McDonald, Online News Producer, KMOV

(KMOV.com) – Police in Frontenac are warning residents of a con that scammers are using to gain access inside their homes.

The scammers are posing as electric or water company workers in order to try to get into homes and steal items inside.

Police say you should never let anyone into your home—especially if you did not call for utility services—without first fully identifying them and verifying their employment.

Call authorities if you suspect a fake worker is in the neighborhood.

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Connecticut Water

Process from Customer Contact to Email Notification

1. Our customer reaches out to a Customer Service Representative (CSR) in our call center.

2. Our CSR works with the customer and schedules an appointment for a home visit, if required.

3. The CSR generates a work order for the visit to the customer’s home. An email is sent to the customer, confirming the appointment date and time.

4. Our customer service system assigns the work to a field service professional.

5. One day before the scheduled appointment, a call is placed to confirm or reschedule the appointment.

6. On the day of the appointment, an email is sent to the customer, with the name and picture of the field service representative scheduled to do the work.
SECOND PLACE—WEST VIRGINIA AMERICAN WATER COMPANY
Utilizing GIS Mapping and the Web for a Large-Scale Emergency Customer Communication System

Due to the introduction of a contaminant in the source water for the West Virginia American Water - Kanawha Valley Water Treatment Plant, which prompted a partial Do Not Use notification for more than 200,000 area residents in 175 pressure gradients, the company was faced with a challenge of effectively communicating to the public when the notification had been “lifted” for each area. The company created a web-based approach, utilizing an interactive status map which customers could access online. Individual customers could view their location, and determine by color coding if their area had been cleared (blue) or was still subject to the notice (red). The website was heavily publicized by local media outlets and on social media and enabled the company to quickly update area residents and visitors. The status mapping website received more than 2 million visits while the map was live and was found to be an effective communication tool utilized by many customers during the event.
SECOND PLACE - ILLINOIS AMERICAN WATER COMPANY
Moving Water Forward Through Education

Executive Summary

Responsible water utilities supply reliable, quality water service that meets Environmental Protection Agency (EPA) standards while providing excellent customer service, responding to customer needs and maintaining critical infrastructure. Truly responsible water utilities reach beyond these efforts into classrooms, community events and more to ensure customers are informed and have the opportunity to understand their critical water service. Even more important, this outreach results in engagement and action. Illinois American Water’s innovative approach to educating our customers, especially our youngest customers, about the water industry, water service, wise water use and environmental stewardship helps build our future scientists, employees and environmental stewards.

Background

Illinois American Water is the largest investor-owned water utility in the state – serving approximately 1.2 million people. Our team collects, treats and delivers about 109 million gallons of water a day to 128 Illinois communities. Over 4,100 miles of water main and 29,000 fire hydrants are maintained. Over $60 million is invested each year to improve our water and wastewater systems, ensuring drinking water, public health and fire protection. In addition to traditional water utility functions, we embrace innovative approaches and public/private partnerships for the betterment of the communities we serve and water resources.

At Illinois American Water we believe we have a responsibility to protect two very precious resources, our water and our youth. Both require an investment in education. Education is the foundation for cultivating an understanding of water service and its value. Knowledge leads to the protection of our precious, limited water supply and support for needed investment. Challenge Today’s educators are facing the challenge of less funding, more requirements and demand for innovation to engage, educate and prepare students. The water industry is also facing the challenge of an aging workforce and the need to interest students in a water-focused career. We are all facing the challenge of a threatened water supply.

Innovative Solution

Illinois American Water is committed to protecting the environment and our water sources to maintain the water supply for future generations. The Company encourages internal recycling programs and uses energy-saving technology, solar power, ultraviolet technology and other green business options throughout operations to protect the environment. Public outreach includes working with educators, community members, officials, environmental stewards and key stakeholders to educate the public about wise water use, watershed protection and the value of water service. We offer tours of our water treatment plants and our water quality experts participate in educational opportunities like:

- Sun Foundation’s Clean Water Celebration
- Illinois State Future Farmers of America Convention
- Lewis and Clark Community College Water Festival
- Livingston County’s Conservation and Agriculture Expo
- National Great Rivers Research and Education Center

The list goes on and, while these events remain important, there is an increased need to offer students and educators more. Coupled with the decrease in field trip funding, this need fueled Illinois American Water’s decision to design and have built a Mobile Education Center. In March 2014, the Mobile Education Center (MEC) began delivering a STEM-based educational program to classrooms and events across the state. The 18-foot learning center features two 6-foot windows (awnings) with drop-down shelving so multiple education sessions can be offered simultaneously. The outside of the MEC acts as a mobile billboard, proudly displaying the Company’s Value of Water messaging as it travels across Illinois.

The MEC is transported with an F250 truck. The MEC can be powered from a normal household type 110 outlet. If none is available, a generator is available to power the MEC. The MEC is equipped with a flat-screen television for viewing fun, educational videos with lessons on the water cycle, value of water, water quality, water conservation and water systems. These videos can be viewed here — http://www.amwater.com/ilaw/learningcenter/mobile-education-center-and-lesson-plans/index.html.

Illinois American Water also offers hands-on experience through water testing including chlorine and pH. Portable colorimeters and field pH meters are on board the MEC for the tests. Goggles and non-latex gloves are also available. A jar tester is used during education sessions to demonstrate the water treatment process. Throughout the session, water quality experts repeat key messages of lessons demonstrated and ask questions to reinforce learning. A question and answer session is also conducted to engage students and create dialogue. Students rotate between activities to ensure they receive the same experience. After completing activities, students earn a Jr. Lab Assistant Certificate. The certificate includes the Illinois American Water’s learning center web page so parents and students can continue learning at home. A water saver wheel is also handed out with tips to save water at home and wrist bands to remind students to use water wisely. In the short time since Illinois American
Water implemented the MEC, thousands of students have participated. Many times after an education session is completed, students tell us they are going to work for Illinois American Water when they grow up!

To promote a fun learning environment, Illinois American Water partnered with the Peoria Art Guild and The Hive art studio to create water-focused artwork. The artwork was completed by children during the Peoria Fine Art Fair as a part of the event’s children’s activity. With the popularity of the MEC, it has been critical to engage all aspects of the Illinois American Water team. To ensure a consistent approach, training is provided to Company volunteers. A training booklet includes a scheduling checklist with information to gather from the school or event coordinator, set up instructions including photos, water testing instructions and more. The booklet is onboard the MEC to ensure resources are available to safely set up the MEC and conduct lessons. The booklet also includes the Company’s photo/video consent form for children’s safety. Information is also included in internal communications.

To raise awareness with external audiences the MEC is included on our Company webpage. A fact sheet handout is also online and provided at community events. Information and photos are shared on Illinois American Water’s Facebook and Twitter pages. Our team also reaches out directly to our environmental partners, STEM partners, key stakeholders and public officials to inform them of the MEC’s unique learning opportunity and when it will be in their community. The MEC is often present at Company ribbon cuttings, open houses and tours. In addition to visiting schools, the MEC is provided as an inkind donation to community events. During National Drinking Water Week, our team was invited to the State Capital to demonstrate the MEC.

The MEC was also at the Illinois Section American Water Works Association’s (ISAWWA) Annual Conference and Expo (WATERCON) to introduce fellow water experts to this innovative tool. During this year’s conference, ISAWWA awarded Illinois American Water with the Outreach Award. Each year, the ISAWWA Water Efficiency Committee celebrates the best and brightest innovations, programs and ideas to conserve and protect our most precious resource with this award. Also, during the conference, municipal employees and community leaders had an opportunity to visit the MEC. This introduction to our team and brand is positive.
Our External Affairs team also raises awareness through media relations. This helps to get the word out to educators in our community and across the state. The MEC offers reporters an interesting visual and unique story. Many education reporters respond positively to covering its presence at schools and events.

**Benefits**

The MEC will be used for many years across the state of Illinois to educate our young customers, support environmental stewardship, introduce our Company to potential customers, promote wise water use, engage employees and enhance our brand. The MEC provides educators a field trip opportunity without the cost or transportation of traditional field trips. It adds to classroom activities and reinforces curriculum. Exposing students to STEM concepts and water-related careers introduces them to a profession they might not have considered. It also gets children excited about something they may take for granted – water service! This is a positive for the entire water industry.

Lessons offered also encourage customers to protect their precious water supply, helping to ensure water for future generations. The MEC is also a tool for in-kind donations with community and environmental partners. This helps to enhance our brand without increasing costs through monetary contributions. The MEC also exposes communities considering selling to a private water utility to the level of expertise, commitment and resources available through private ownership. This innovative tool enables our team to interact and engage with not only students and their parents, but also community leaders and influencers. Lastly, the MEC provides our team – individuals passionate about water service – the ability to share their knowledge in a fun, interactive setting. By volunteering at MEC events, our employees can also grow and learn from others.
**AMERICAN WATER COMPANY**

**State-of-the Art Algae Control**

**Brief Description of Innovation**

Algae blooms are a regular occurrence at the Canoe Brook Water Treatment Plant in Short Hills, N.J. Over the past five years, the plant has tried various methods to control the growth that typically persists for weeks, if not months, during late spring and summer. Contributing to the problem is a fairly shallow reservoir that allows sun to penetrate to the bottom of the lake and high levels of organics pumped in from the nutrient-rich Passaic River. Looking to attack the algae at its source, the treatment plant, which serves 126,000 customers in 25 municipalities, historically used copper sulfate, a chemical compound toxic to aquatic life, at the first sign of blooms. Although a short-term fix, the chemical created long-term problems. In an effort to reduce costs, improve operations, and reduce customer complaints, four solar-powered ultrasonic algae control buoys manufactured by LG Sonic (Netherlands) were installed in Reservoir No. 1. These buoys transmit ultrasonic waves continuously to disrupt algal cells, causing them to sink and prevent proliferation.

One of four solar-powered ultrasonic algae control buoys is placed in Canoe Brook Reservoir No. 1. The buoys continuously transmit ultrasonic waves to disrupt algal cells, causing them to sink and prevent proliferation.

(a) Problem attempting to solve

As much of North America has seen warmer summers, growth of algae in many surface water supplies has increased. Additionally, the 2009 National Lakes Assessment from the USEPA has estimated that 20 percent of the nation’s lakes are highly impacted by algae and one-third contain some level of harmful algal toxins. This presents a challenge for water treatment plants trying to control algae blooms, which can create problems for performance and increasing operating expenditure for cleaning and maintenance activities. American Water’s New Jersey subsidiary operates the Canoe Brook Water Treatment Plant in Short Hills, N.J. The reservoirs that serve as the plant’s water supply are shallow, and due to nutrient loading, also eutrophic. This combination of factors leads to seasonally severe algae blooms, which in turn can lead to customer complaints of disagreeable tastes and odors. While these are aesthetic, and not a cause for health concerns, they nevertheless can negatively impact customer satisfaction with our service.
Typically, the algae present in the lake were treated with copper sulfate, a compound toxic to algae and other aquatic life. However, this compound is expensive and can lead to the development of copper-resistant algal strains. Furthermore, the use of chemical algaecides can cause cell lysis leading to the release of taste and odor compounds and/or harmful algal toxins.

(b) The innovation introduced to achieve the solution

As an alternative to copper-based algaecides, the use of ultrasonic treatment is sometimes used to control algae. Ultrasonic treatment uses high-frequency sound waves to attack the algal cells. The treatment is widely used in commercial and residential applications but is relatively new for municipal drinking water reservoir. In an effort to reduce costs, improve operations, and reduce customer complaints, four solar-powered ultrasonic algae control buoys manufactured by LG Sonic (Netherlands) were installed in the Canoe Brook Reservoir No. 1. These buoys transmit ultrasonic waves continuously to disrupt algal cells, causing them to sink and prevent proliferation. These emitters have been incorporated into a buoy system that uses on-board analytical capability and algorithms to determine the type of algae present and alters the emitted frequency to control the different species present. Rather than cause cell lysis, the LG Sonic devices are targeted at the gas vesicles present in the algae causing them to collapse, thereby reducing the buoyancy of the cells causing them to sink to the bottom of the reservoir. At the bottom, less sunlight is available for photosynthesis and the cells stop growing. If other species of algae begin to predominate, the frequency can be changed to deal with the new population. Because of these advances, much lower sonic intensities can be used and thus, the ultrasonic buoys are capable of being powered by on-board solar cells.

Because of the tunable emitter, a single device is capable of treating the range of algae that may be present in a water body, including cyanobacteria (blue-green algae), green algae and diatoms. The effective diameter of treatment using these buoys is approximately 500 m (the effective area is approximately 50 acres). Because the algal cells are not lysed, metabolites (including taste and odor compounds, pigments, and toxins) are contained within the cells and are not released into the water.

This was the first installation of this relatively new technology for drinking water reservoirs in North America. This new system combines online water quality monitoring, telemetering and ultrasound technology to better prevent taste and odor events from occurring. Additionally, in keeping with American Water’s sustainability efforts, this system operates 100 percent on solar power and the technology will not harm fish or other wildlife.

(c) The benefit ultimately derived by the company and the community

Extensive testing conducted during 2014 showed the buoys had a significant impact on the algae, reducing algal counts, raw water turbidity and total organic carbon in the water. This improved water quality, allowed the plant operations staff to reduce coagulant consumption by more than 20 percent, and reduce the concentration of undesirable taste and
odor-causing compounds in the raw water entering the plant. This reduced chemical use resulted in lower filter effluent turbidity and significantly increased filter run lengths over the same period in 2013, all while pumping approximately 20 percent more water than the previous year. Based on the cost of the equipment and savings realized, it is estimated the payback period for the buoys is less than two years.

Based on the positive results of this study, Kentucky American Water recently installed seven solar-powered, sonic buoys in the reservoir at the Jacobsen Reservoir, which will help address a periodic problem associated with using reservoirs for drinking water supply. In addition, Hawaii American is installing basin-mounted units to control algae in a wastewater plant, and several other installations are planned across the American Water system.

The different configurations of the equipment will allow for many utilities to use these ultrasonic systems either in plants for control of algal growth in small to medium sized raw water reservoirs or in treatment plants where the units can be located in sedimentation basins.

**Data**

- Test data showed a 20 percent reduction in chemical usage in 2014, allowing for 83 percent longer filter runs, despite pumping 20 percent more water than the previous year.
- Annual savings are estimated at $78,000 ($18,000 in chemical use and $60,000 in reduced monitoring and algaecide costs).
- Water turbidity and total organic carbon also declined, reducing the concentration of undesirable taste and odor-causing compounds in raw water entering the plant.
- Geosmin (one specific taste and odor compound) concentrations in Reservoir No. 1 were less than 5 nanograms per liter compared to 55 nanograms per liter at one point in untreated Reservoir No. 2.
AMERICAN WATER COMPANY
Acoustic Monitoring Minimizes Water Loss and Risks of Pipeline Failures

Brief Description of Innovation

Early detection of leaks before they surface enables water utilities to minimize water loss, extend asset life, schedule and prioritize repairs on an informed, proactive basis, and minimize the risks of catastrophic failures. In 2009, American Water agreed to participate in a consortium focused on the development of fixed leak detection technology for water distribution systems using acoustic monitors communicating on a daily basis. After a series of successful developmental field trials, the first commercial system, known as EchoShore-DX, was installed in Charleston, West Virginia. In just six months of operation, the acoustic monitoring system has detected 60 leaks, many that had not surfaced before repairs were made. It appears this technology can drastically improve the way that water main leaks are identified, prioritized, and repaired.

Challenge

Main breaks are the most visible signs of aging water and wastewater infrastructure, the impact of leaks and their repair interrupt customer service and add costs to water utilities operation. Leaks represent failures that can give indication that a pipe may be approaching the end of its useful life. However, many pipes will leak and yet remain in service for some time after so leaks are often an everyday occurrence in most water systems. As pipes approach the end of their useful life they will leak more (background leakage), leak quieter (more difficult to find), and have higher risks of catastrophic failure. For many systems, leaks can run for extended periods of time without surfacing adding to subsurface damage and the loss of water intended to serve the customer.

Attention is often focused on pipeline renewal as the key to mitigating the impacts of aging infrastructure. However, few if any water utilities have enough capital to replace every deteriorating water main in a short time period. Simple economics would dictate it is often less expensive to repair leaks periodically that to install a new pipe. To minimize water loss and maintain customer levels of service, water system managers turn their attention to leak detection, pressure management and efficient response time.

In 2005, American Water deployed its first automated leak reporting system in Connellsville, Pennsylvania. Approximately 500 sensors were placed on service pipelines and connected to an advanced metering infrastructure that returned acoustic information daily to the vendor’s software that interpreted the leak noise and through a computer cloud made the data available to American Water staff. The daily

Figure 1 Even large leaks may not surface, discharge direct into sewer
return of data found some leaks and provided some advantages over traditional leak detection approaches, e.g., listening surveys, but still had many limitations, including:

• Too many false positives that resulted in time consuming investigations without finding leaks
• Difficulties detecting leaks through multiple materials, commonly found with old repair sites where plastic pipe was inserted to replace deteriorated iron or steel pipe
• Inability to characterize a leakage noise to determine leak size
• Despite a historic profile of acoustic sound, resources were required to interpret the data.

With grant monies from Sustainable Development Technology Canada, American Water and the City of Ottawa were both approached by Echologics Engineering (now a division of Mueller Canada) to participate in the development of the next-generation permanent monitoring system for leaks. American Water provided a core set of operations requirements for the system, significant guidance during the design process, and provided three pilot sites to help develop and then alpha and beta test the monitoring system.

Technology Platform

With feedback from American Water and other utilities on the shortcomings of the first generation of acoustic monitoring systems, Echologics began development of the product which is now known as Echoshore-DX. At the heart of the EchoShore-DX platform is an intelligent node that is embedded into a standard fire hydrant cap. The node is pre-assembled and consists of an acoustic sensor, analysis software, network hardware, batteries, and an antenna. The nodes communicate with a central data collection hub, and multiple data collection hubs are used for larger monitoring zones, which can be expanded in phases. When an acoustical anomaly is identified, the node sends a data file to analysis software (dashboard). The software automatically requests additional correlation data from surrounding nodes, and automatically performs multiple correlation combinations to accurately target the location of the leak or acoustic anomaly. When a leak is confirmed, a notification can be sent to the utility. More sophisticated utilities do have the option of operating the user friendly software directly. Samples of the software display are shown below.

Echologics constructed their latest generation of acoustic sensors that have proven to be effective for correlating leaks on a variety of pipe materials and large diameter mains. The sensors are capable of identifying extremely faint acoustical noises emitted by leaks before they become detectable by conventional methods. The EchoShore-DX platform provides more accurate
information on the location of a leak. The system performs a system-wide leak detection correlation when first activated. By identifying and repairing any existing leaks, the system creates an accurate and known acoustical baseline for the monitoring zone. This results in exceptionally high detection accuracy of any leaks that may develop in the future.

**American Water Results**

**Uniontown, Pennsylvania**
Service Area: 0.5 mi² (approx.)
Total Nodes: 18
Pipe: 4” – 12” Mostly DI (mixture of pipe types)
Service Start: June 2013
Experience: First installation site (alpha testing) helped characterize extraneous noise. Field validations included multiple successful leak simulations. First true leak found with hydrant sensors over 1700 feet apart.

**Metro Chicago, Illinois**
Service Area: 1 mi²
Total nodes: 79
Pipe: 4” – 12” Mixed metallic
Service Start: August 2014
Experience: Beta test corrected software issues. Project in small system was driven by the high cost of purchased water. Found one leak in first year running into a sewer manhole that would have cost over $5,000 per month if undetected. Plans to expand deployment to over 1200 nodes in 2016.

**Liberty, Pennsylvania**
Service Area: 0.6 mi²
Total Nodes: 43
Pipe: 4” – 12” DI and CI
Service Start: January 2014
Experience: Beta test was second engagement with American Water. Total of 3 leaks found, including an “out-of-bracket leak (i.e., a leak outside the in monitored area). The very first leak found by the acoustic monitors was tracked over 4 weeks and progressed from an estimated 1 gpm leak to 5 gpm leak. The leak could not be detected by on site microphones for 3 weeks. The split at a pipe bell at the pipe invert would have been undetected likely for months. Upon excavating the leak, the top of the pipe was dry and the water was clearly flowing towards to nearby river. Without this intervention, the pipe would continue to slowly split and eventually rupture. A hidden split pipe leak of this kind is literally a leak burst time bomb.
Charleston, West Virginia – First Commercial Deployment
Service Area: 5 mi^2
Total Nodes: 386
Pipe: 4” – 12” DI and CI
Service Start: December 2014
Experience: 11 leaks found in the first month; 60 leaks found in the first 6 months of operation, 90% which had not yet surfaced prior to repairs. Phase 1 of multiple phased deployments.
NOTE: Charleston has typical daily production of 25 MGD. WV American credited the Echo-Shore-DX system with reducing water loss by 2.3 MGD in the distribution since turn-up on February 22, 2015. In addition, another 2 MGD of water loss was recovered from a 36” PCCP main leak, that was picked-up by the DX system through ground vibration.

Benefits Summary
By using existing fire hydrants as points of distribution system monitoring to identify leaks nearly when they first begin, water utilities are able to:
1. Maximize non-revenue water loss from nonsurfacing leaks
2. Monitor leak progression, and prioritize field crew schedules
3. Significantly reduce pipe repair costs including reduction for emergency (overtime) repairs
4. Minimize the risks of catastrophic failures
5. Improve the safety of field personnel by eliminating the need for traffic controls during current leak investigations.
CH2M
Integrated Health and Safety Management System

The CH2M Operations Management (OM) Services group, comprised of nearly 3,000 associates, has created an advanced management, training and performance-tracking approach to drive safe operations in the field, train operators in proper safety procedures and promote a culture focused on safety. Our integrated Health and Safety Management System (HSMS) has driven wholesale improvement in safety performance statistics, improved operator training throughout the enterprise and yielded measurable results against specific performance indicators.

The Challenge

Let’s face it, we work in an industry prone to injury and incident. Our day-to-day work operating water and wastewater facilities in communities across the U.S. can be dangerous. An effective safety program must be deployed to establish behaviors that help assure employees go home safely to their loved ones every day. Adding to the challenge is the potential for a rising number of recordable incidents. In 2005, the OM Services group’s safety performance needed special attention. Our total recordable rate (TRR) was 6.5. We needed a way to reach all staff members at 200-plus project sites to influence behavior and mitigate safety incidents.

The Innovation

Our solution was to create a plan to prevent incidents before they happen by promoting safe behavior. More than 90 percent of safety incidents involve unsafe behavior. While statistics such as TRR and Days Away/Restricted Transfer (DART) receive substantial attention in the industry, they are lagging indicators. That is, they measure incidents that already have happened. We developed and implemented a Safety Scorecard to drive accountability at all levels of our organization. There are ten scorecard criteria, eight of which concentrate on leading indicators. A Scorecard is generated for each project, regional manager, and operating unit every month. Each of the scorecard criteria carries a points value, and projects score points according to their level of completion and performance in each area. Company leadership also can issue challenges to projects, incenting them to track safe behavior carefully. For example, our leadership team challenged projects to score 90 percent or higher on the Safety Scorecard in the third quarter of 2015. High-scoring project teams receive prizes and recognition via company communication channels.

Scores are based on leading indicators including:

- **Safe Behavior Observations (SBOs) and Pre-Task Plan Audits.** This is a powerful tool that we use for behavioral modification to help identify ways to work safer and look at our work behaviors with a critical eye. SBOs and audits are required of each member of the project management team to be 1.19 performed at least 3 times per week. A SBO must be documented and corrective actions must be taken to prevent events and accidents from occurring in the future.
• **Required Health and Safety (H&S) Training Completed Prior to Job Assignment and/or Expiration.** Required H&S training includes all new employee-required training and specific program, project, client-required, and regulatory training as specified by the H&S team. Employees are trained on how to effectively deal with the hazards they may encounter in their work spaces. All training is managed through an internal webbased tracking system, and reports are prepared each month to validate compliance.

• **Weekly Inspections.** Similar to SBOs and audits, we can proactively look at our environments and make them safer. An H&S inspection shall be scheduled and conducted by the Project Manager or designee once per week, unless the Regional Health and Safety Manager (RHSM) deems more or less frequent inspections necessary. A weekly inspection can help identify accidents before they happen.

• **Pre-Qualification of Subcontractors.** At many of our projects, subcontractors work side-by-side with our employees, therefore all subcontractors must be prequalified to meet H&S performance expectations. Subcontractors are a reflection of our company and can cost time and money if proper safety rules are not followed. Pre-qualification must be accomplished prior to execution of the subcontract and commencement of work.

• **Corrective Action Performance.** It is critically important to identify where hazards exists at our projects through SBOs, audits, weekly inspections, incident inspections, or root cause analyses. These issues are documented on corrective actions log and then a plan to correct the action is created with appropriate steps and deadlines to ensure the incident does not occur again.

• **Audit Scores.** Project audits are completed by CH2M third-party, safety trained Regional Health and Safety Managers. These audits occur routinely at projects and use a scoring system for administrative and operational H&S program compliance.

• **Commercial Driver Requirement Compliance.** It is CH2M’s responsibility to assure all employees holding Commercial Driver’s Licenses (CDL) are valid, a current medical card is on file, and that they have passed our drug screening. The highest cause of fatalities in our industry is vehicle and heavy equipment usage. Confirming our employees are properly licensed and trained is one way to mitigate potential incidents.

• **Injury Care for Employees (ICE).** CH2M has established a work care line when injuries occur that is staffed by registered nurses and doctors. It is the responsibility of the employee to notify their supervisor within one hour of injury. Their next step is to contact ICE for guidance on the most effective, rapid treatment whether onsite or at a local clinic. CH2M has learned that if injury notification occurs within an hour, we can help mitigate further injury so that our team members go home safe and miss less work.

Two lagging indicators are utilized in our Scorecard process including: TRR and at-fault Motor Vehicle Accidents (MVAs). However, we have found by heavily weighting the overall scorecard and accountability on performance against leading indicators that we are driving the behaviors that will ultimately prevent accidents from occurring.
In addition to our Scorecard program, OM Services also implemented the following:

- Full rollout of enhanced Health and Safety Management System (HSMS)
- Increased accountability for overall safety performance and program implementation by project management and frontline leaders
- A thorough communications and outreach strategy structured to deliver safety-related messages via a variety of communication channels—from regular web communications to printed newsletters and online reference sources
- A daily “Safety Counts” e-mail message sent to all OM Services associates that acts as both a tracking/sharing system of “days since our last recordable” as well as an opportunity for associates to share their personal safety perspectives, lessons learned, or general safety wisdom often combined with humor. This a grassroots communication vehicle that is led and authored by volunteers at all levels of the organization. The authors rotate weekly.
- A comprehensive plan for establishing health and safety management systems and behaviors even before initiating new contract operations. Our Health and Safety Program Integration Process starts during pursuit of a new project, and initiates phase-appropriate safety administration systems from initiation of services through project closeout.
- Upgrade of Health and Safety resources throughout organization including:
  - Assigning one of CH2M’s most experienced new Safety Directors to OM Services and replacing the majority of our Regional Safety Leadership team with more experienced professionals
  - Adding additional safety staff at the regional and project level
- A “Stand-up for Safety” effort at all projects to share recent lessons learned, prepare for upcoming seasonal safety challenges such as heat in the summer, or snow and ice in winter, and reinforce key safety messages such as pre-job planning and use of work care and excavation activity hazards analysis training.
- Town Hall meetings where members of management address safety-related issues and remind employees of resources, policies, and procedures for working safe every day
- A required “All Hands” meeting to address safety-related issues or concerns
- Bi-weekly safety review call with all regional operations management across OM Services to review all safety related incidents for the prior period to share lessons learned and best practices
- Detailed incident investigation for all incidents as well as an incident review call to include the OM Services Senior Vice President/Managing Director and CH2M Enterprise H&S Director
• Our Target Zero program designed to eliminate injuries, incidents, environmental impacts, and errors/omissions. Our Target Zero culture is based on individual commitment to take responsibility for their behavior and the behaviors of those around them at work, at job sites and at home.

The Results

The Scorecard program and redoubled focus on safety training and outreach has improved safety performance and consistency across the CH2M OM Services group. Through these programs and initiatives we have:
• Reduced our TRR from 6.5 in 2005 to our best ever TRR of 1.19 in 2015, decreasing our TRR by 82% in 10 years
• Improved our TRR 9 out of the last 10 years
• Reduced the percentage of recordables due to program implementation issues by 28% compared to the same period in 2014
• Reduced our DART by 19% compared to the same period in 2014
• Installed enhanced back-up sensors on vehicles at major programs reducing OM Services overall at-fault MVA rate by more than 50 percent since 2014
• Decreased the severity of injuries due to continuous emphasis on safety, communications, and training
• Received a record 465 safety awards in 2011, including the National Safety Council (NSC) Occupational Safety Award of Excellence, in recognition of having no recordable injuries or accidents at multiple site locations, and the Corporate Culture of Safety Award, given to a select number of companies every year that receive more than 50 NSC awards
• Observed through our SBOs in 2015 more than 87,000 behaviors resulting in identifying more than 2,000 potential at-risk behaviors or incidents before they occur

The Relevance to Other Water Companies

CH2M OM Services has deployed the Safety Scorecard, communication strategies and training programs to hundreds of projects around the U.S. and in numerous international locations. Much of our work supports water and wastewater utilities whose safety-management needs match those of NAWC members. Therefore, our safety programs would translate effectively to nearly any member water utility or similar organization willing to adopt and tailor the approaches outlined in this entry for training, outreach and performance tracking. CH2M safety experts are available to answer questions and provide guidance to NAWC members who want more information. We are happy to assist NAWC members who wish to establish similar programs, or who wish to optimize existing safety systems.
EPCOR
Customer Care Home Agents

Brief description of innovation

Excellent customer care isn’t a luxury, it’s a necessity. By having a dedicated group of people serves as the primary touchpoint for customers, a utility can resolve issues faster, increase customer satisfaction and reduce operational costs.

Serving more than 150,000 active customer accounts – about 300,000 people – in Arizona and New Mexico, EPCOR determined that an in-house call center would be cost-prohibitive, but an off-site call center in another state or country wouldn’t provide customers the personal connection they desired. So, in partnership with Vertex, EPCOR developed a Home-Based Customer Care Agent program.

Through this program, all 35 of EPCOR’s customer care agents work from their homes in Arizona or New Mexico. When a customer calls, he or she knows that they’re speaking to someone who’s familiar with their area or neighborhood, who can talk about the weather or construction in the area. They feel connected and cared for. As EPCOR increases its customer base, Vertex hires and trains new agents, all local – some are even EPCOR customers themselves.

And the results speak volumes. EPCOR handles approximately 20,000 calls per month, answering each call in an average of 35 seconds. Customer satisfaction metrics are routinely above 85 percent, and the team is always pushing to get that number closer to 100 percent.

Caption for photos

Included are photos of the home office of one of EPCOR’s customer care home agents, Onie Matthews. From her home office, Onie Matthews helps EPCOR customers set up new accounts, answers billing questions and more.
EPCOR
Leroy Encinias, Hydrant Innovation

Brief description of innovation

Leroy Encinias, EPCOR’s distribution foreman for the Clovis (New Mexico) district, takes problem solving to a new level. Not only does Leroy find solutions to mechanical problems, he often builds his own tools to safely and efficiently solve common issues his team encounters in the field.

Among his inventions is a hydraulic hydrant seat tool, which he created to help his team repair hydrants in a safer manner. The previous method required that four members of his team would have to work in concert using a tool, sometimes deep into the ground. If anyone slipped, an injury could result. And often, the tool couldn’t jar loose the operating nut, which meant replacement was the solution, and not maintenance. It was time-consuming, costly and potentially dangerous.

Encinias knew there had to be an easier way, and so he sketched a solution on a napkin and went home to build it. He manufactured a wooden prototype out of his own garage, tested it and welded a fully-functioning metal version from there. The result? Using Leroy’s tool, it only takes one person, two levers and a little force to remove the seat and attached gasket.

Now, Encinias’ team can easily maintain the more than 800 hydrants in the Clovis system. It’s estimated that his invention will save $300,000 in replacement hydrant costs, and more than $100,000 in labor costs over the next 10 years.

Caption for photos

Encinias started with a wooden prototype, which he made in his own garage. After testing, a fully functioning device was manufactured. His invention is now used in the field, helping to keep crews safe.
PENNSYLVANIA AMERICAN WATER
Keystone Alliance to Stop Utility Imposters

Statement of the Problem

Across Pennsylvania, thieves have gained access to residents’ homes by posing as utility workers. Once inside the home, the imposters typically divert the resident’s attention by sending him/her to another floor while they or an accomplice robs the home. There have been numerous documented utility imposter incidents in Pennsylvania American Water’s service areas over the past few years, in addition to many imposter-related crimes targeting other utility customers throughout the Commonwealth. This campaign created a launching point for continued awareness activities by all participating utilities to protect customers.

Innovation Introduced to Achieve a Solution

Pennsylvania American Water spearheaded the formation of The Keystone Alliance to Stop Utility Imposters, a coalition of water, gas and electric utilities, the Pennsylvania Public Utility Commission (PUC), the Pennsylvania District Attorneys Association and the Pennsylvania Chiefs of Police Association. The group collaborated to launch a public awareness campaign about criminals impersonating utility workers to gain access and rob homeowners. Utility members of the coalition included members of Pennsylvania Chapter of the National Association of Water Companies, the Energy Association of Pennsylvania (gas and electric utilities) and four regional water providers.

Elements of the public awareness campaign include

Government Relations
• State Representative Mike Regan (R-York) introduced House Resolution 341, which designated June 8-12, 2015, as “Utility Imposters Awareness Week.”
• Pittsburgh Councilman Corey O’Connor introduced a Will of Council resolution declaring the week of June 22-26, 2015, as “Utility Imposter Awareness Week” in the City of Pittsburgh.
Media Relations
• Press conferences were held in the Pennsylvania Capitol and the City of Pittsburgh to announce the “Utility Imposter Awareness Week” designations and the launch of the awareness programs.
• Three additional regional press conferences were held with local law enforcement and government announcing the launch of the awareness campaign. The press conferences yielded front page stories in newspapers across the Commonwealth, as well as television and radio coverage.

Marketing Communications
The coalition underwrote the creation of a communications tool box. The communication vehicles featured an Elvis-impersonator theme to engage our audiences and call attention to knowing real utility employees from imposters. Elements of the campaign include the following elements:
• Television and Radio Public Service Announcements (PSAs) that were submitted by the PAPUC to media outlets throughout the Commonwealth.
• Bill inserts, posters and print advertisements that can be customized by members of the alliance
• Press release template that can be customized by members to notify customers about an imposter event
• Social media graphics including memes and cover photographs for Facebook, Twitter and Instagram

Benefit to Customers and Companies
Imposters represent a threat to homeowners, specifically older adults, and damage the trust they place in the utility companies that serve them. An ongoing public awareness campaign presents opportunities to blunt utility imposter crimes by educating residents how to protect themselves. The coalition also enhanced the participating utilities relationships with key regulatory, legislative, municipal and third-party stakeholders. The initiative also presented an opportunity to demonstrate we care about our customers and value our employees. This campaign can be adopted by utilities outside of Pennsylvania and build upon its successes, which include:
• Increased awareness by Pennsylvania American Water customers and senior citizens of ways to prevent being victims of utility imposters
• Media generated public dialogue about the need for caregivers/family members to discuss how to prevent older Pennsylvania American customers/adults from being victims of utility imposters
• Engagement of third-party stakeholders such as the Better Business Bureau, Pennsylvania Public Utility Commission (PUC), Pennsylvania District Attorneys Association and Pennsylvania Chiefs of Police Association, which reinforced the importance of the campaign’s message.

Public outreach strategies have already paid off as one documented case of an attempted utility imposter incident was thwarted by two elderly customers who turned away several individuals who did not have the proper Pennsylvania American Water identification. The advice was presented in a bill stuffer received by the customers several weeks prior to the event.

Some Impersonators Are Easy to Spot. Others Are Not.

Beware of Criminals Pretending to Be Utility Workers.

Pretending to be a trusted utility worker is a trick some criminals use to gain access to your home. Other than rare emergencies, real utility workers seldom need to get inside. When they do, the utility company makes an appointment in advance. Of course, before letting any worker into your home you should always ask for company issued photo ID.

If you suspect someone may be a utility imposter, call 911.

Customizable print advertisement.
SUBURBAN WATER SYSTEMS

*Every Drop Counts* Conservation Campaign

With the current severity of the drought, Suburban rolled out an *Every Drop Counts* campaign. Suburban wrapped two vehicles and made t-shirts for employees. Suburban Water is working hard to promote the drought in their service area to get customers to conserve.
UNITED WATER NEW YORK
Ramapo 29 A GWUDI Well Treatment

Summary

One of United Water New York’s most productive wells (Ramapo 29 A) was classified as Ground Water Under the Direct Influence of Surface Water (GWUDI). When a well is upgraded to treat for GWUDI, the well typically becomes a surface water treatment plant, thereby necessitating that the treatment at the well be upgraded to what is required at a surface water treatment plant and that all operators have surface water treatment plant certification. The innovative upgrades at Ramapo 29 A met the more stringent disinfection and filtration requirements while maintaining the existing treatment facility rating. By eliminating the need to upgrade the facility to a surface water treatment plant classification, the innovative design achieved significant benefits including better water quality, compliance with regulatory standards, cost savings and environmental protection.

Description of Innovation

GWUDI treatment requires filtration and ultraviolet processes that are not required at a typical well. Extensive assessment by the project team determined the optimal combination of treatments and the layout at the Ramapo 29 A well site. They also created a solution to keep new filters and ultraviolet disinfection equipment above the 100-year flood elevation. This treatment process involves 5 steps which produce water exceeding 4 log removal:

1) Run water to waste until turbidity is less than 1 NTU
2) Filter water until turbidity is less than .3 NTU (the limit for surface water treatment)
3) Send water through ultraviolet unit
4) Inject sodium hypochloride for disinfection
5) Send water through Contact Time (CT) pipe to distribution system

The facility was built in a manner which did not reduce flood storage, disturb wetlands or interfere with the habitat of endangered species.

Results

Retrofitting the existing well and utilizing this new treatment train provided health, safety, environmental, and financial benefits. The extra treatment processes result in higher quality water. The new building and piping were constructed in such a way that it limited the negative impacts on the surrounding wetlands. The upgrades were the most economical option for continuing to produce 2 million gallons per day from this well.

Problem Attempting to Solve

When Ramapo 29 A was declared GWUDI, United Water was required to stop using one of its more productive wells. It became necessary to upgrade the treatment systems at the well to meet the requirements and standards that apply to wells that are affected by surface water.
In addition, the well is surrounded by swampy marshlands and prone to flooding. The worst instance at this site took place during Hurricane Irene when it was covered by seven feet of water. Therefore, a major aspect of this well redesign was to move all essential components safely above the floodplain, including the well pump, filters, UV, etc., to protect the equipment from damage during flooding events and ensure continuous well operation.

**Benefits to Company/Community**

- **Efficiencies**: The equipment selected made it possible to easily manage and operate the facility, to meet pressure restrictions, and to satisfy treatment requirements.
- **Cost savings benefits**: It was much more economical to retrofit the existing structure and treatment system to handle GWUDI well water than to construct a new well with the same capacity. Because of the innovative design, operators are not required to have a surface water treatment certification—resulting in ongoing operational savings.
- **Environmental benefits**: The upgrades provided the least amount of disruption to the surrounding wetlands and wildlife including endangered species.
- **Health and safety benefits**: The upgrades directly affect the quality of the water being released into the distribution system. The water from this well is much cleaner and safer than it would otherwise be without the added treatment (filtration, UV disinfection, CT piping).
- **Customer benefits**: The customers can now rely on Ramapo 29 A to provide clean and high-quality drinking water.

**Benefits to the Water Utility Industry/Ability to be Duplicated**

- This treatment process train can considered for any well with GWUDI classification.
- It provides a cost effective way to convert from conventional well treatment to more sophisticated GWUDI treatment.

**Photo Captions**

**UWNY_Ramapo_29A_1** — United Water’s Ramapo 29A well site prior to final erection of the well motor enclosure. This picture shows the filtration facility (top) and the ultra-violet disinfection building (right). The UV piping exiting the wall is 10 feet above the flood water elevation.

**UWNY_Ramapo_29A_2** — Members of United Water’s team who oversaw the Ramapo 29 A GWUDI Well Treatment project include John Mase, Gerry Remsen and Bill Prehoda.

**UWNY_Ramapo_29A_3** — The interior of the filtration building at United Water’s Ramapo 29A well site. The filter vessels extend 4 feet below the gratings. Note the filter cartridges (left corner) prior to installation.
UNITED WATER WESTCHESTER
Design & Management of District Metered Areas (DMAs)

Summary

The creation of a District Metered Area program resulted in early identification of leaks, notable reduction of non-revenue water, lower costs associated with purchased water, and compliance with regulatory standards for permissible amounts of non-revenue water. An important component of the program involved the first U.S. implementation of a Suez Environnement computer program called “Aquadvanced.” By comparing the flow entering and exiting the District Metered Area with expected usage, the team is able to quickly find and address leakage.

Description of Innovation

United Water Westchester completed a system-wide district flow metering project as part of an overall distribution system management and water loss reduction strategy. The company created sub-metering districts which strategically divided the distribution network into 19 smaller, more manageably-sized zones called District Metered Areas (DMAs). Each DMA can be treated as a separate water system from a production and consumption standpoint. This allows for high resolution water audits and non-revenue water profiles to be developed for each of these sub-districts. A total of 61 high-accuracy magnetic flow meters were installed to create 19 sub-districts, each consisting of approximately 1,500 to 3,800 service connections. The battery-operated, direct buried meters monitor flows entering and leaving the DMAs on a real-time basis. The data is wirelessly transmitted to United Water’s Supervisory Control and Data Acquisition (SCADA) operational reporting platform via custom-built data recording and telemetry pits at each meter site. The data is then captured by the Aquadvanced tool to process the information and present it to the user in a graphical format.

Results

Leakage/real-loss reduction led to lower non-revenue water (NRW) levels, greater operational efficiencies, and significant reductions in purchased water costs. The company has found numerous undiscovered or non-surfacing leaks amounting to approximately 350 Million Gallons of Production, leading to a total NRW reduction of 3-4% since the DMA systems were implemented. The overall cost savings achieved is approximately $850,000 per year, and will continue to grow as NRW is reduced further.

Problem Attempting to Solve

United Water needed to reduce high non-revenue water rates (NRW) for a variety of regulatory, environmental and financial reasons. Prior to implementing the DMA, the company had not able to reduce the NRW because many leaks did not reach the surface and remained invisible underground.
Benefits to Company/Community
• Efficiencies: Effective deployment of resources based on the zones with the highest water loss profile. Ability to monitor and evaluate production and consumption patterns to characterize the nature of water loss within the zones. Find-to-fix times were minimized for new/developing leaks, and non-surfacing leaks. Higher productivity, as personnel are easily deployed in very close proximity to water losses/leakage. In addition, it is more efficient to repair a leak in its early stages before it turns into a full main break which requires emergency repair.
• Cost savings benefits: Leakage/real-loss reduction led to lower Non-Revenue Water levels, greater operational efficiencies, and significant reductions in purchased water costs. The overall savings achieved within the first year of full deployment was approximately $850,000 and will continue to grow as the company continues to reduce the NRW.
• Environmental benefits: Conservation of water through reduced leakage and improved system efficiency. Pumping less water reduces power needs and costs associated with treatment chemicals.
• Customer benefits: Identifying and repairing leaks in early stages prevents problems associated with larger main breaks such as loss of water, boil water orders, road damage or traffic disruptions.
• Regulatory requirements: Reducing NRW enables United Water to comply with NY Public Service Commission standards.

Benefits to the Water Utility Industry/Ability to be Duplicated
• Ability to conserve water and reduce costs associated with pumping and treatment.
• Potential to defray the need to put new water supplies in service.
• Reduced costs associated with purchased water.
• Minimize customer inconvenience by early identification and repair of non-surfacing leaks.
• Reduced potential for violations (BWO) associated with large main breaks.

Conclusion
This unique solution to DMA system design and management has enabled the operations team to quickly and efficiently identify, locate, and resolve water loss events and operational anomalies which occur throughout the system. It has enabled the company to continuously monitor system performance and efficiency, and deploy field crews in the most efficient manner based on the specific needs of each smaller, more manageably sized DMA zone. The solution will also make it easier to perform water loss audits on the zones, and better match production information to customer usage with higher resolution and accuracy. The resulting cost savings will provide for a reasonable payback period of the initial capital investment, and enable the company to meet more stringent regulatory requirements surrounding water loss reduction and system efficiency.
Photo Captions

**UWWC_DMA_Design_1**— This is a Siemens MAG8000 installed on a water main in United Water Westchester’s service district. Conduits carry the meter data back to the telemetry pit at the curb.

**UWWC_DMA_Design_2**— This is an open telemetry pit in United Water Westchester’s service district. It houses the MAG meter head, Telog data logger, and wireless communication.

**UWWC_DMA_Design_3**— United Water’s Keith Kolkebeck and Nick Curcio partnered to deliver the DMA project design, implementation, and related data analytics.

**UWWC_DMA_Design_4**— The graphic shows the DMA data evaluation, leak localization, and repair process, along with a schematic of United Water Westchester’s DMA zones.
WEST VIRGINIA AMERICAN WATER
Reducing Water Treatment Plant Sludge Through Sand Removal

Faced with dwindling space for the land application of water treatment plant sludge and significant cost increases related to the transport and disposal of the sludge, West Virginia American Water constructed a 24 MGD Grit King system at its Huntington Water Treatment Plant. Conventionally utilized in the wastewater industry, the installation of this system at the water treatment plant enabled the plant to remove sand, which comprised the majority of the treatment plant’s sludge volume. Benefits of removing sand prior to treatment include reduced wear on treatment plant equipment, reduced labor costs associated with removal of sludge from basins, and cost avoidance for disposal. Furthermore, the sand is removed prior to the introduction of chemicals and therefore can be used as pipe bedding or by local landscaping and concrete companies, which benefits the company, community, and customer.