drought HANDBOOK

SOLUTIONS TO MINIMIZE LOSSES & IMPROVE EFFICIENCIES OF WATER NETWORKS

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Smart monitoring aids Las Vegas

Echoshore®-TX detects leaks early on transmission main, p. 6

Pressure management to prevent main breaks, p. 8

Curbing water loss with autoflushing, p. 9

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Minimizing Losses in Face of Drought

Drought-stricken areas of the United States continue to carefully monitor their water resources and examine the state of their water infrastructure as supplies dwindle, impacting nearly every corner of the regions affected. In California, residents voted drought as its top concern over other issues such as the economy and employment, according to a 2015 poll commissioned by the California Water Foundation. The survey also indicated residents were willing to pay more to fund infrastructure improvements. With mandated water usage restrictions in place, communities must work to ensure water resources are managed efficiently and wisely.

There are a variety of approaches and methods available to help water utilities combat the effects of extreme drought in their communities. This publication, fittingly titled the *Drought Handbook*, highlights solutions that can help your organization monitor water networks, detect pipeline leaks, assess the state of your water infrastructure and more. With the need to improve infrastructure cited as vital in much of these drought-affected areas, it is important to take a look at your water network and gauge areas where you can rein in costs, reduce non-revenue water and manage resources effectively. The more tools utilities have in their arsenal, the more they can combat drought and keep precious water systems intact.

Mueller Water Products

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A PUBLICATION OF MUELLER WATER PRODUCTS

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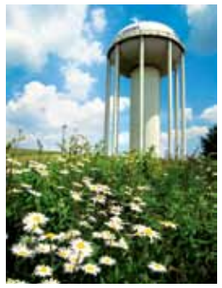
Balance Act: The Importance of Auditing



What is a water balance?

A water balance, or water audit, is a method of identifying and tracking the abstraction, treatment and distribution of water for sale to a utility's customers, and identifying where and why any losses of water are occurring in addition to the volume and value of the losses.

Why is it beneficial for a utility to have one in place and what kind of information is gathered?

Just like any business, a city needs to know how much product (water) is produced and placed into the system for sale to the customers, so the revenue can be used to operate and maintain components of the water system. In developing a water balance, all components and operational areas where losses, such as leakage and metering errors, can occur are identified and evaluated. Strategies are then developed to efficiently reduce the impact of these losses and to increase revenue recovery and reduce operational costs.

With a plan in place, can a city access any state/federal funding, or does it help in capital improvement planning (CIP) efforts?

Yes, the U.S. Environmental Protection Agency (EPA) Drinking Water State Revolving Funds (DWSRF) are one source of loans and financing for non-revenue water studies, which are one component of water conservation, sustainable infrastructure and water efficiency programs. Recently the DWSRF allowed the inclusion of the purchase of leak detection equipment, water meters, AMR/AMI systems, and water mains rehabilitation and/or replacement. The funds have a category called "Green Project Reserves" that are to be specifically used for water audits, replacement of malfunctioning meters, leak detection studies and water use efficiency baseline studies.

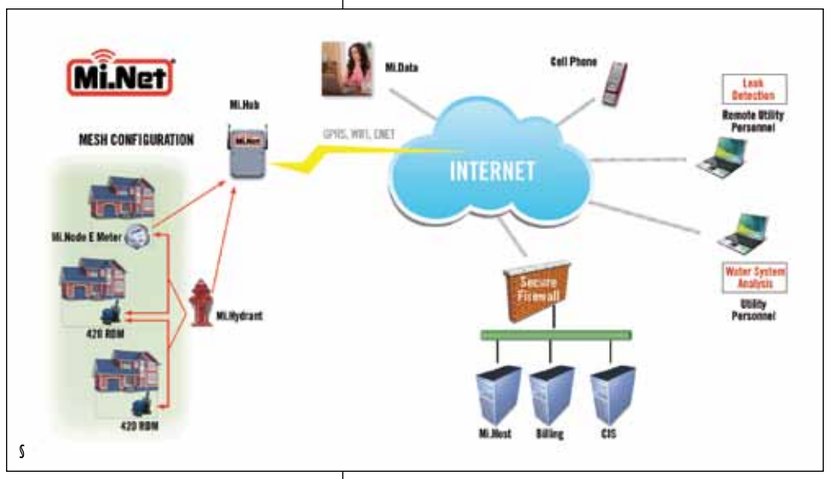
About the Author

James Fisher is the Manager of Non-Revenue Water Solutions and the North Midwest Regional Sales Manager for Echologics, an affiliate of Mueller Co., LLC. He has more than 40 years' experience working in the water and wastewater industry, holding positions in both the municipal and private sectors. He is a member of the AWWA Water Loss Control Committee and Customer Metering Practices Committee. He has spent most of his career working on projects in more than 300 cities in North America and abroad.

8 Tips on How and Where a Utility Can Start a Water Balance

1. Download the free Water Audit Software from the American Water Works Association (AWWA).
2. Obtain one of the many free resources available from AWWA and the EPA relating to water use efficiency, conservation and water loss studies.
3. Start developing an internal team of people from each department that will be involved and discuss the basic data needs.
4. Gather and review previous operational, maintenance, engineering and water master plan reports for key data.
5. Meet with key stakeholders to discuss data recorded by each department, explain how it will be used in the water balance, and enter what you currently have into the AWWA software and review the results.
6. Determine the accuracy of the finished water production meters. Inaccuracies in these meters have the largest impact on the results of the water balance and the determination of where water losses and non-revenue water may be occurring.
7. Review the validity and accuracy of the data used in the water balance and work to improve the confidence of the data before jumping into full leak detection or meter replacement programs.
8. Remember that percentages do not relay the value of the water loss. Each city has a different cost to produce water and a different water and sewer rate structure. A water balance or non-revenue water study should be completed annually to track the operational efficiency of the system and identify areas for improvement.

Meter Reading and Reporting Gets Smarter



A utility's water infrastructure is a delicate, difficult system to manage, with much of the equipment—water mains, hydrants, meters and more—operating underneath cities and out of sight. Tracking water distribution and usage becomes a particularly important task, especially in times of drought, to ensure meter readings and billings are accurate and efficient. Traditional data collection and reporting, often through automatic meter reading (AMR) systems, are giving way to smart advanced metering infrastructure (AMI), enabling two-way communications across utility networks. With AMI systems, processes can be automated and devices linked throughout the entire infrastructure, giving utilities more control over how and where their water is being distributed and helping to reduce non-revenue water.

How One Utility Gains Information in Real Time

In Washington, the Nob Hill Water Association has been serving customers in the Yakima Valley since 1908. Most of its infrastructure is located underground, making it a challenge for managers to gauge water distribution. But with the use of a two-way AMI system, operations have become more streamlined for both utility officials and customers alike.

Nob Hill Water utilizes the Mi.Net Mueller Infrastructure Network, which provides two-way meter communication and control across its water system, one of the largest in the Yakima region. The AMI allows Nob Hill Water to gain more information in the field in real time, says Nob Hill Water manager Zella West, who calls it "vital" for the utility to know what's going on. The technology links meters, distribution sites and control devices in a single, highly efficient data network.

Since implementing Mi.Net, billing processes were reduced from two weeks to about three days, and the ability to pull data from the system within a few hours has given Nob Hill Water the opportunity to more quickly address issues and improve communications with their customers. The system helps Nob Hill prioritize resources and optimize efficiency, a clear example of just how important automated tracking and reporting of data has become for water utilities.

For more information about Mueller Systems' infrastructure network for utilities, visit www.droughtbook.com/#metering.

Mi.Net® AMI

The Mi.Net Mueller Infrastructure Network for Utilities from Mueller Systems is a true two-way advanced metering infrastructure (AMI) system that fully automates the meter-reading-to-billing process through its wireless fixed network and mesh configuration. Ongoing access to customer data and information allows utilities to receive readings and vital alerts faster than before.

The Mi.Net system uses Mi.Node tranceivers on water and energy metering devices to collect and store information to area Mi.Hub collectors, or gateways that upload the data to either the utility's server or Mueller's hosted server. The benefits of implementing the Mi.Net system include improving water and energy management, identifying leaks and outages, offering flexible billing capabilities to customers, and more.

Finding Leaks Before Conventional Detection

In the Charleston, WV, distribution system, more than 45 leaks were confirmed in the first five months of operation, of which 90% had not yet surfaced when repairs were made.

Early leak detection is vital for distribution systems, with the ability to identify system failure points before they impact customer levels of service. When water resources are limited, early detection is a valuable tool in reducing non-revenue water and extending pipe asset life. A fixed leak detection technology, Echologics' EchoShore®-DX platform, is changing the way water main leaks are identified and repaired.

Pennsylvania American Water in Liberty, PA, was field-testing the new technology when it located a growing leak in a susceptible portion of the distribution system. After two attempts to detect leaks with conventional ground sounding equipment, a third inspection—this time accompanied by Echologics specialists—exposed a long crack in the bottom of the pipe, beginning in the spigot's end, that was saturating the soil at 5 gallons per minute (GPM).

"I've never seen anything like this, where a leak was identified so early in its history—almost immediately after it occurred," said David Hughes of American Water. "This leak would have gone undetected with our traditional equipment, and it likely would have become a catastrophic failure similar to pipes that literally burst apart, creating costly property damage and substantial water loss."

West Virginia American Water in Charleston, WV, which typically produces 25 million gallons per day (MGD), credits the EchoShore-DX platform with reducing water loss by 2.3 MGD in the first four months of operation. Another 2 MGD of water loss was recovered from a transmission main leak, picked up by the DX system through ground vibration.

American Water has been piloting and implementing the automated acoustic monitoring system, which is capable of detecting noise signatures of potential leaks and other problems within the system. The EchoShore-DX platform uses sophisticated sensors and processing algorithms that analyze data from events detected by two or more nodes, which are installed and fixed onto existing fire hydrants, to identify and locate potential leaks or flow issues. The nodes collect essential data on the pipeline and is readily available for analysis by water operators, giving utilities like those in Liberty and Charleston the chance to find potentially costly—and difficult-to-detect—leaks.

For more information about Echologics' fixed leak detection platform technology, visit www.droughtbook.com/#echoshore-dx.

Compact Correlator Enhances Leak Detection

The LeakFinderST correlator offers leak detection crews the opportunity to increase efficiencies with rapid and accurate correlation times on a variety of pipe materials, including PVC, pre-stressed concrete cylinder pipe (PCCP), asbestos cement, ductile and cast iron, and steel. It enables operators to locate "quiet" narrow band, low frequency leaks that may have previously identified as background leakage on water mains. The compact system is easy to use, with a simple software-based platform and streamlined interface developed in collaboration with end users, and can quickly and effectively locate quiet leaks that are long running and previously undetectable.

For more information about Echologics' compact leak detection correlator, visit www.droughtbook.com/#leakfinderst.

Smart Monitoring Keeps Major Metropolitan Utility in the Know: A Case Study

The EchoShore®-TX monitoring platform plays a central role in the Las Vegas Valley Water District (LVVWD) leak monitoring program. Part of the Global City Teams Challenge sponsored by the U.S. Department of Commerce's National Institute of Standards and Technology, the project has LVVWD teaming up with Echologics and several other innovative partners to ensure round-the-clock monitoring of the 30-in. diameter underground water main running beneath the Las Vegas Strip—no easy task when considering the multitude of resorts operating 24/7 above it.

The EchoShore-TX platform uses sophisticated acoustic sensors and proprietary processing algorithms to detect potential leaks in large-diameter pipelines long before they become detectable by conventional means. The importance of detecting such leakages early and before they become too serious and costly to fix—and more importantly, before they rupture and cause catastrophic damage—is emphasized by Charles Scott, engineering project manager for the LVVWD.

"This type of pipe doesn't just catastrophically fail all of a sudden," he says. "Rather, it fails by having a very small leak, which develops into a larger leak, eventually becoming a sinkhole. This technology enables us to monitor the pipe on a continuous basis, detect those small leaks before they get to be big leaks, and schedule repairs as needed—enabling us to significantly extend the life of our pipes."

Using wireless connectivity provided by Global City Teams Challenge partner AT&T, the 12 EchoShore-TX nodes installed in Las Vegas collect data about the pipeline and regularly upload it to a secure server, where advanced algorithms search for leak signals within the data and generate reports that can be easily viewed on a customized user interface. The system also sends alerts to the mobile devices of utility operators, enabling them to react to any detected leaks or problems immediately.

The entire deployment of the EchoShore-TX system—a noninvasive process encompassing installation, commissioning, testing and activation—was completed in a little over two weeks on the Las Vegas Boulevard, without interruption to water service or aboveground traffic. The city is already known for its efforts to conserve water and has reached one of the lowest rates of water loss in the country at 5-6%; implementation of the EchoShore-TX technology serves to strengthen its mission to bring water loss as close to zero as possible.

"This kind of advanced technology opens up a whole new world for water utilities," says David Johnson, LVVWD deputy general manager. "It gives us a new set of eyes and ears within our underground water distribution network, enables us to fully optimize the life cycles of our pipelines and helps us become more fiscally responsible."

For more information about Echologics' leak detection solution for large-diameter pipelines, visit www.droughtbook.com/#echoshore-tx.

Rapid Approaches to Pipeline Leak Repair

Once detected, pipeline water leaks should be addressed and repaired to prevent further water from escaping infrastructure systems, particularly those in areas hit hard by drought. There are a variety of technologies available to repair leaks, depending on their location within the system and their size. According to the EPA, the most significant portion of leak repair cost and time is due to the work involved in uncovering pipelines and dewatering sites. Because of this, the optimum solution for leak repair requires minimal disruption to pipeline locations.

One common approach is the repair clamp, which is a collar that can be fitted around the outside of the pipe. The clamp patches over the hole or break with a gasket that is compressed onto the surface of the pipe, providing a pressure-tight fitting to contain the leak. Mike Lent, superintendent for the Apple Valley Ranchos Water Company, discussed his use of Mueller's pipe repair products:

Q: Can you describe Apple Valley's water distribution system and what makes it so unique?

Mike Lent: We're a large system that covers 59 square miles and has almost 20,000 service connections, serving 65,000 people in Apple Valley, CA. Because of our elevation changes we have 16 different pressure zones, so we're serviced by tanks, wells, booster pumps and mostly gravity feed.

Q: Where are you using Mueller's pipe repair products, specifically repair clamps, in your efforts to prevent water loss?

Lent: We've used them for small service line leaks, from ¾-in. PE pipe all the way up to 12-in. welded steel pipes, and they seem to make it easier for us to fix the leak under pressure. With the age of our system we don't like to shut the water mains down, so just about everything we do is live. It helps us get the leak repaired in a cost-efficient, timely and also safe manner.

Q: What do you find unique about Mueller's products and services?

Lent: The ease of use, and they have so many applications that we try to stock everything that we might need. If we don't have it, our distributor will have it for us the next day. We use everything from a 3-in. clamp all the way up to a 30-in. clamp for our bigger pipes.

Q: What kind of results have you seen using these products?

Lent: It's made it that much more cost effective to get the water leaks repaired and get them repaired in a timely fashion, and when you have customers standing there looking over your repairs, it makes it easier to have the right product for the job.

For more information about Mueller Co.'s portfolio of pipeline repair products, visit www.droughtbook.com/#leakrepair.

Selected Leak Repair Solutions by Type & Application

Type	Application
Pipe couplings	Unrestrained couplings connect any two pieces of pipe of similar size without disassembly.
Repair clamps	Stainless steel clamps repair holes, leaks, splits, circumferential breaks and cracks, as well as correct pulled or leaking service connections.

Monitoring Pressure Helps Conserve Water

Pressure management throughout the distribution system is vital for maintaining system reliability. Fluctuations in pressure can negatively impact the physical integrity of pipes. A loss of pressure can result in groundwater contamination, while surges can create leaks and main breaks, all of which have a dramatic impact on the life of the infrastructure. By continuously monitoring pressure throughout the system, utilities in drought-stricken locations can be proactive by completing repairs or replacements before damage and water loss become costly.

Bridging the Gap

A November 2014 survey conducted by American Water revealed major gaps in the actions utilities have taken to address pressure. Of the 36 utilities surveyed, most had minimum-pressure requirements in place, but 56% had no maximum-pressure requirements. Sixty-seven percent of systems surveyed did not manage peak pressures, and only 13% conducted pressure monitoring at critical locations.

Many utilities only employ continuous monitoring at the distribution inlets and outlets, with limited monitoring in between. Of the systems surveyed in the American Water study, the most common areas for monitoring include pump stations, pressure-reducing valve stations, water production facilities and storage tanks—all utility-owned locations. Without systemwide pressure monitoring in between, it is difficult to pinpoint problem areas where leaks or pipe bursts could potentially occur.

Continuous Monitoring

Remote wireless pressure monitoring is the ideal solution and helps a utility continually monitor pressure and prevent unnecessary water loss, repairs or service interruptions. These systems typically consist of a sensor to collect and analyze data; a remote server for data acquisition and analysis; a browser interface to allow user interaction; and a method of transmitting and receiving wireless data. The systems are also integrated with existing network infrastructure and generally allow for customizable pressure and condition alerts for personnel.

By monitoring actual pressures throughout the entire distribution system, utilities can analyze pump operations and better manage water quality while reducing operations and maintenance costs. Through continuous monitoring, contamination, leaks and main breaks can all be minimized or avoided, decreasing non-revenue water loss and aiding a utility in its water conservation efforts.

Remote Pressure Monitoring System

The Mueller™ remote pressure monitoring system helps utilities reduce water main breaks and customer complaints by monitoring pressure throughout the distribution system. The system can be deployed virtually anywhere in a network, by either saddle or direct tap into the distribution main or at the meter vault.

The system features a remote telemetry unit with optional lock; lightweight composite valve box; sensor transducer rated at 250 or 300 psi; low-lead ball valve; and bronze service saddle. The system also includes a five-year battery and one year of cellular service with a renewable annual contract.

A designated system administrator will receive credentials to log into the secure Web portal to view data from all deployed pressure sensor devices. Captured data and high- and low-pressure alerts can be transmitted to a smartphone, desktop computer or SCADA system via cellular communication.

For more information about Mueller Co.'s remote pressure monitoring system, visit www.droughtbook.com/#pressuremonitoring.

Automatic Flushing Saves Birmingham $300,000 Annually

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As part of a distribution system maintenance program, hydrant flushing is the traditional method for clearing water lines and ensuring water quality. Typically performed annually, the process utilizes thousands of gallons of water per flush, resulting in non-revenue water loss for the sake of maintenance. In areas of drought, this water is a scarce resource and flushing makes conservation difficult.

In Birmingham, AL, routine flushing combined with resident complaints about poor water quality and the city's difficulty maintaining the required chlorine residual resulted in the city performing frequent flushing. In some cases, flush points would run for hours at a time, leading to a significant loss of non-revenue water. Furthermore, drought conditions caused the city to restrict routine flushing to save water, which made maintaining the chlorine residual even more difficult.

To meet these challenges, the city installed nearly 90 automated flushing units, which helped reduce water loss, man-hours and costs, while meeting chlorine residual requirements. Mac Underwood, general manager of the Birmingham Water Works Board, spoke about the experience:

Q: What challenges were the city of Birmingham looking to solve?

Mac Underwood: Birmingham is located at the foothills of the Appalachian Mountains and we have a total of 28 different gradients that we have to serve in a hilly area. We have a lot of flushing points and a lot of high-pressure zones, so we were looking to slow down or control water loss.

Q: What products have you been using?

Underwood: We went through an evaluation process back in 2004 and were looking for some automatic flushing units. We chose the Hydro-Guard® HG-2 unit.

Q: What results have you seen?

Underwood: The Hydro-Guard units have helped us reduce our costs by about $2,500 per unit; we have nearly 100 units installed. Those units are able to turn on in the middle of the night and flush for a certain period of time. It helps control chlorine residual and disinfectant byproducts, so we think the units work really well for us. In total we save about $2,500 per unit per year. That ends up being somewhere close to about $300,000 savings on an annual basis.

Q: How important is controlling water loss for Birmingham?

Underwood: Our water loss, at one point, was really high and with using the Hydro-Guard units and some additional metering for fire hydrant use, we've been able to cut that in half. It's at about 12% right now; at one point it was up to about 28%. With Hydro-Guard and metering the fire hydrants, we've been able to reduce our water loss significantly.

Hydro-Guard® HG-6

The Hydro-Guard HG-6 hydrant automatic flushing system allows for automatic and programmable flushing of a water distribution system wherever a fire hydrant is available. The system monitors water quality in distribution piping and automatically initiates flushing as necessary to help a municipality maintain water quality and meet required disinfectant residual levels. The portable and adjustable system can be connected to the hose nozzle of any brand of hydrant.

For more information on how Mueller's automatic flushing systems can help your utility conserve water, visit www.droughtbook.com/#autoflushing.

Hydrant-Defender®

The Hydrant-Defender security device provides protection to hydrants at two levels. The heavy stainless steel straps prevent unauthorized access to the nozzles and operating nut and offer visible evidence of tampering. When the device is securely locked, the nozzles and operating nut can only be accessed by cutting through the heavy straps or barrel lock. In case of emergency, fire personnel can quickly and easily remove the straps and access the hydrant. The recommended stainless steel barrel lock features keys that are uniquely coded for the purchaser.

Jones® Tell-Tail Break-Off Check Valves

Jones Tell-Tail break-off check valves are designed to minimize water loss associated with vehicular traffic accidents. When a hydrant is hit, the safety flange breaks, releasing the hydrant from the check valve. The hydrant and adapter plate are released from the lower barrel and the check valve closes, releasing only a small, vertical stream of water to indicate that the hydrant has been damaged, but not enough water to lead to a substantial loss.

Securing Fire Hydrants Prevents Unauthorized Water Loss

Maintaining hydrant integrity is vital to protecting a distribution system from vandalism and water theft, as well as unintentional damage from traffic accidents. These incidents lead to massive amounts of water lost in short periods of time. The effects are felt especially hard in areas of drought.

Safe and Secure

Keeping a hydrant secure can mean protecting water assets from a number of variables. Security is compromised when vandals or thieves attempt to break into a hydrant to cause intentional damage or steal water. While these acts can be major monetary losses to utilities, the water taken from the hydrants is equally valuable. An unsecure hydrant can also be an access point for someone seeking to contaminate the public water supply. Defending these assets is vital, as the city of Bozeman, MT, learned.

In the winter of 2003, the city faced an act of vandalism that led to more than 3 million gallons of lost water over a three-day period. The vandals improperly opened 13 hydrants, leading to costly damage throughout the city in addition to the enormous water loss. It took the city more than a week to regain the lost water.

After the incident, the city acted by installing Mueller® Hydrant-Defender® security devices in vulnerable areas of town. Soon after, the devices became part of the city's standard specifications. Today, when someone buys a fire hydrant to place into the city's distribution system, the Hydrant-Defender is included as part of the package. John Alston, operations superintendent for the city of Bozeman, said that since installing the devices, the city has not experienced any measurable water loss from hydrant tampering.

Unintentional Damage

Occasionally hydrant water loss occurs not from an intentional act but as a result of a traffic accident. In Southern California, where drought runs rampant, these accidents can waste enormous quantities of valuable water in a short period of time. In one hit-and-run incident in Sand City, CA, a car backed over a hydrant, causing a 40-ft geyser of water to shoot in the air for more than an hour. Not only did the accident lead to thousands of gallons of lost water, it also flooded neighborhood businesses and prompted area evacuations due to electrocution concerns.

When struck by a vehicle, unprotected wet barrel fire hydrants—commonly found in warm, drought-prone climates—will break, creating a geyser. Response time by emergency personnel can vary, but with the speed at which this water is lost, every second counts. By installing a device such as Jones Tell-Tail break-off check valves onto these wet barrel hydrants, municipalities still can be visually alerted of breaks while minimizing water loss.

Protecting hydrants from these potentially devastating events can save a municipality thousands of dollars and countless gallons of water—both valuable resources in today's water climate.

For more information on how Mueller's security solutions can protect your hydrants, visit www.droughtbook.com/#hydrantintegrity.

Pipeline Assessments Help Extend Tight Budgets

Figure 1. For distribution mains

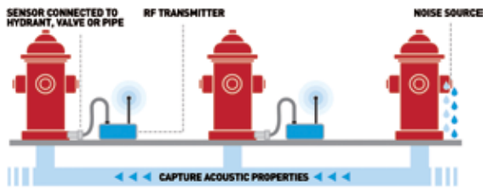
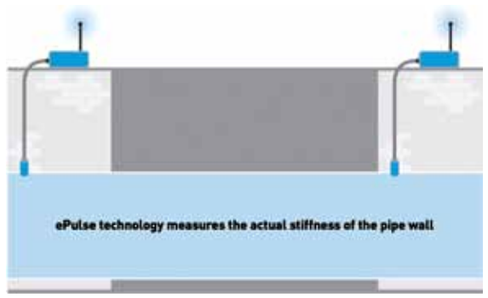


Figure 2. For transmission mains



During a drought, emphasis on water conservation is at a high. While utilities aim to reduce non-revenue water, customers are encouraged to use less billed water. Additional expenses—such as the energy required to pump water to these water-scarce regions, as well as regular infrastructure maintenance—can add up, leading to an overall loss of revenue.

To combat this issue, utilities should analyze their capital improvement programs (CIP) to identify areas in which spending cuts can be made. Performing a pipeline condition assessment can help determine whether pipe rehabilitation or replacement projects are necessary. Deferring or canceling these projects can help a utility cope with a revenue shortfall in a time of drought.

John Marciszewski, director of business development for Echologics, explained the pipeline condition assessment process and how it benefits the utility's infrastructure, as well as its bottom line:

Q: What is the purpose of a pipeline condition assessment?

John Marciszewski: The goal of condition assessment is to help utilities (owners) make more informed decisions about pipeline renewal decisions. Condition assessment data helps utilities to target their capital more effectively and mitigate risks of failure, particularly for critical pipelines.

Q: How can a pipeline condition assessment factor into a water utility's overall capital improvement program?

Marciszewski: New Jersey American Water, for example, explored a number of rehabilitation technologies for their cast iron pipes, and found their suitability was predicated on the structural condition of the host pipe and other factors. They used acoustic wall thickness testing, and associated remaining service life data, to determine whether pipeline renewal is best served by replacement, structural lining, semi-structural lining or non-structural (cement mortar) lining. New Jersey American Water saved 23% on their first pilot project using this approach, and have since continued the program into multiple other communities.

Pipe Assessment

Tacoma (Wash.) Public Utilities has more than 110 miles of asbestos cement (AC) pipe within its water system. As part of the Dumas Bay replacement project, Tacoma Water planned to replace 6,000 linear ft of AC pipe at an estimated cost of $1.4 million. The utility needed a means to assess the condition of this pipe and determine how much life was left in it. The utility chose the Echologics ePulse® acoustic condition assessment technology to perform this analysis. After performing the assessment, it was discovered that only 1,933 linear ft of pipe needed to be replaced, at a cost of $623,804.

"Echologics provided a quick, noninvasive technique to assess the condition of the pipe [and] understand how much remaining wall thickness we had left in our pipe," says Ryan Flynn, senior principal engineer for Tacoma Public Utilities. "Then we were able to insert that information into our economic model and assess the remaining life and understand the condition and overall priority of main segments in our system."

Overall, the utility has had three contracts with Echologics, assessing a total of 45 miles of AC and cast iron pipe throughout its system.

"As a manager of your assets it gives you greater peace of mind, that you're not replacing mains before they actually need to be replaced," Flynn said. "You're preserving that value that your ratepayers have paid for, and really mining that value out of the existing assets."

MONITOR MORE, WORRY LESS

Customize a Drought Solutions Lunch and Learn Seminar for your team. Learn more on page 7.

Broken water mains, water loss and property damage—why let a preventable problem cost large sums of money and damage your reputation?

While it often starts with a leak, historically many utilities have waited until there is an evident problem or rupture to react. Today's utilities have a cost-effective and easy-to-deploy monitoring option.

Imagine being immediately notified about a problem in a transmission main. The EchoShore®-TX platform will call, text or email you promptly after detecting a leak or anomaly.

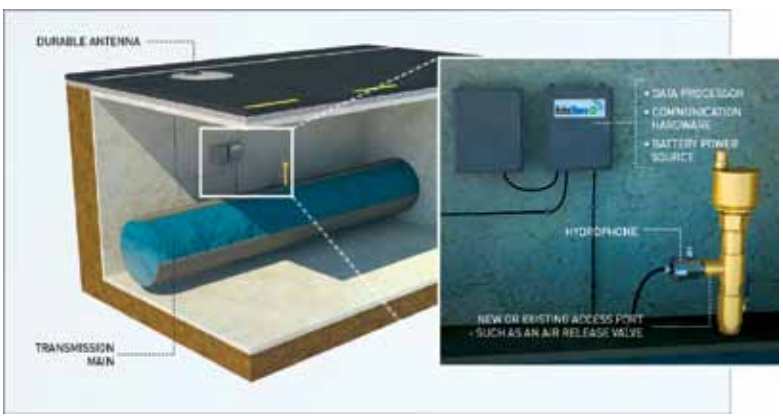
Through monitoring and notification, your response time can be significantly reduced to help mitigate the risk and cost of operating critical transmission mains.

For more information about the EchoShore-TX platform, visit www.droughtbook.com/#echoshore-tx.

GET TO KNOW YOUR WATER MAIN

The EchoShore-TX platform provides a high level of operation insight and can simultaneously monitor several parameters including:

- Leaks
- Static pressure
- Flow
- Temperature
- Chlorine levels
- Other operator requirements



EchoShore®

TX TRANSMISSION MAIN MONITORING