Getting Optimized
PARTNERSHIP FOR SAFE WATER GUIDELINES

Control Water Loss in Your Distribution System

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Taking measures to minimize water loss is a component of optimized distribution system operation. Key factors that help utilities control water loss include metering, water audits, hydraulic data collection, and leak detection.

Water loss control is one of the performance improvement variables evaluated in the Partnership for Safe Water's distribution system self-assessment process and a component of ANSI/AWWA G200, Standard for Distribution Systems Operation and Management. The benefits of quantifying and controlling water loss are broad and can potentially include minimizing lost revenue, reducing demand on the utility’s raw water sources, decreasing treatment and distribution system operating costs, and improving public health protection through greater system integrity and a decreased risk of contaminant entry. An effective and optimized water loss control program involves a multidisciplinary effort to account for all water that enters a distribution system, evaluate the types of losses that occur, and develop and implement actions to reduce the losses.

WATER LOSS AND ITS IMPACTS

Distribution system water loss, as defined in AWWA's 2011 Benchmarking Survey, refers to “the difference between the volume of water distributed for use by all customer classes and the volume of water actually consumed by authorized users.” Water losses can be further broken down into real losses and apparent losses. Real losses include those that occur in the utility's distribution system and may include losses that occur because of leakage; breaks; or overflows on mains, service connections, and storage tanks. Apparent losses include such factors as unauthorized consumption and inaccuracies in metering and billing. AWWA's benchmarking surveys provide summaries of water loss rates and many other parameters for participating utilities and may help utilities assess their performance and establish performance goals.

The Partnership for Safe Water uses main breaks and leaks to help evaluate distribution system integrity. Higher levels of real losses, resulting from main breaks and leaks, can represent a potential for increased contamination risk in the system. Water loss can affect utility operation in a variety of ways, reaching far beyond the distribution system. For example, real and apparent losses are components of nonrevenue water, which can lower a utility’s financial performance. High levels of water loss can also result in increased pumping costs and an increased demand on treatment plant production, potentially resulting in higher operating costs for treatment and distribution system activities. Increases in treatment plant demand may also lead to greater raw water consumption and, in cases where raw water supply may be limited, the need to identify and secure supplementary supply sources.

Given the significant effects that water loss can have on utility operations and performance, optimized distribution systems, as defined by the Partnership for Safe Water, apply water loss control measures to quantify and reduce water loss and improve system performance.

OPTIMIZING WATER LOSS CONTROL

For an optimized system, the Partnership for Safe Water considers the following components of water loss control:

- Annual water audit
- Real-time hydraulic data collection and monitoring
- Measures to control apparent and real losses

These components focus on quantifying flow information and evaluating associated data. For example, accurate and reliable metering of production and consumption flows are critical to accounting for water losses. Optimized systems will meter all flows entering the distribution system, including transfer points between subsystems, pressure zones, and district metered areas, as well as customer flows, using properly selected and maintained metering equipment. Optimized systems will also conduct an annual water audit to track and trend distribution system inputs and outputs. Real-time hydraulic data collection and monitoring provides timely feedback about current distribution system conditions, allowing operators to quickly identify and appropriately respond to suspected water loss events.

Optimized systems also take measures to proactively control real and apparent system losses, including leakage control, asset management, pressure management, and field investigation of questionable customer consumption and billing practices. A more comprehensive description of water audits and water loss control programs is included in AWWA’s Manual of Water Supply Practices M36: Water Audits and Loss Control Programs (available at www.awwa.org/store) and in its associated free Water Audit Software (available at www.awwa.org/waterlosscontrol).

The Partnership’s distribution system optimization program encourages utilities to be proactive and avoid complacency with respect to all areas of system operation, including water loss.
This includes taking measures such as implementing a leak detection program to proactively identify leaks and address them before they become a larger issue. The case study on page 12 describes how Aurora (Colo.) Water implemented an aggressive leak detection program and took additional steps to minimize water loss for a utility located in the arid western region of the United States.

The Partnership’s self-assessment process also encourages data collection, tracking, evaluation, and interpretation. Systems may wish to correlate water system losses with other distribution system data, such as main breaks and pressure, to determine if connections exist among multiple distribution system parameters that can be addressed through actions taken by distribution system staff.

IMPLEMENTING IMPROVEMENTS

Once water loss control–related measures are identified as factors limiting optimized distribution system performance, utilities can develop and implement action plans to improve operations. Actions will be system specific and may include items such as setting water loss goals; expanding data collection, verification, and evaluation processes; establishing a regular leak detection or water audit program; or developing Standard Operating Procedures to define appropriate response activities.

Systems finding that water loss correlates with other distribution system parameters, such as pressure, may take steps to address these parameters (for example, minimizing pressures in the affected areas of the distribution system). Actions should be communicated to all involved staff, with training provided as needed to familiarize staff with new equipment or software, processes, performance goals, or procedures that may have been established. Performance monitoring is equally important; utilities are encouraged to review performance relative to established goals or action plans on a regular basis to monitor performance improvements and progress made toward achieving optimization goals.