Making a Dramatic Impact on Water Loss

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Overview

- The Problem
- Management
- 3 Success Stories
The United States will need to spend up to $200 billion on water systems over the next 20 years to upgrade transmission and distribution systems.

Of this amount, $97 billion (49%) is estimated to be needed for water loss concerns.

Average water loss in systems is 16%.

Up to 75% of that is recoverable.
AWWA Best Practice in Water Loss Control: Improved Concepts for 21st Century Water Management

In 2003 the American Water Works Association (AWWA) adopted improved best practice methods for defining and measuring water loss in water distribution systems. This transition into a new era of effective water management marked a departure from previous terms and practices no longer useful to the industry. The following explores this departure from obsolete practices and articulates key points and best practices in water loss control today.

Improved Terminology: Non-revenue Water

In 2003 AWWA abandoned the term "unaccounted for water" (UFA) because all volumes of water supplied within a distribution system go towards either beneficial consumption or wasteful loss. All water sent into the distribution system can be accounted for today. The industry welcomes AWWA's and its Water Loss Control Committee's redefinition of non-revenue water as "non-revenue" water (NRA).

NRA is specifically defined to include the sum of specific types of water loss and any authorized, unbilled consumption that occurs within water distribution systems.

Enhanced Performance Indicators to Measure Progress

Although percentage indicators—typically the rate of authorized customer consumption to distribution system input—still exist in the industry, AWWA discourages use of percentage indicators such as the "unaccounted for water" percentage. Using percentage indicators to assess water loss in distribution systems gives a misleading and unreliable measure of utility performance because percentage indicators are greatly affected by changing levels of customer consumption.

It cannot distinguish among the specific components of non-revenue water occurring in a distribution system.

Today, the industry best practice for water loss auditing created by the International Water Association (IWA) and AWWA now quantifies several key performance indicators, which provide vastly superior means for assessing water loss performance in distribution systems, while recognizing that contributing factors and potential corrective measures are specific to each water utility.
## Water Loss management

### The IWA/AWWA Water Balance Table

<table>
<thead>
<tr>
<th>Volume From Own Sources (corrected for known errors)</th>
<th>System Input Volume</th>
<th>Water Supplied</th>
<th>Water Exported (corrected for known errors)</th>
<th>Billed Water Exported</th>
<th>Revenue Water</th>
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<td>Customer Metering Inaccuracies</td>
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<td>Leakage on Transmission and Distribution Mains</td>
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**NOTE:** All data is volume for the period of reference, typically one year.
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Water Loss management

Control Programs
- Water Audit
- Intervention
- Evaluation
Three Success Stories
1. SR6 Waterline Replacement

Aqua PA, Western Area
Mt. Jewett, PA
McKean County
SR6 Waterline Replacement

- Water Sources:
  - 6 wells
  - 1 spring
- Pumping capacity 180,000 gpd
- 1 booster pump station
- 2 tanks
- 1,500 customers
- Aqua PA bought in 2015
SR6 Waterline Replacement

- 2016 PennDOT resurfacing project
- Lower Lindholm Rd to Bridge St.
SR6 Waterline Replacement scope

Pipe
• 8,670 LF of 12” DIP
• 854 LF of 8” DIP
• 65 LF of 4 & 6” DIP
15 Hydrants
74 Services
SR6 Waterline Replacement
SR6 Waterline Replacement results

Construction between 5/31/16 and 8/2/16
• Project Cost: $1,822,050
• Pre-Project NRW: approx. 60% (2MG/month)
• Current NRW: approx. 10% - 15%

SUCCESS!!
2. Milfred Terrace Reservoir Improvements

Tri County Joint Municipal Authority
East Millsboro, PA
Washington County
Milfred Terrace Reservoir

Also Fayette and Greene Counties
WTP permitted capacity 2.0MGD
- 5 tanks and 1 reservoir
- 6 booster pump stations
- 10,000 customers
Milfred Terrace Reservoir

- Built in 1950’s
- 198.5’ x 198.5’ trapezoidal
- 8’ max. depth
- 2.0MG storage
Milfred Terrace Reservoir

- 12” waterline connection
- Floating cover
- Concrete tile floor
- Suspected problems?
Milfred Terrace Reservoir  scope

Cover
- Existing floating cover modified to serve as liner
- Cut to expose floor for installation of mixing system
- New Cooley Inc. floating cover installed
Milfred Terrace Reservoir **scope**

**Mixing - passive**
- Tideflex Hydrodynamic Mixing System
- Bidirectional pipe header
- 8 Inlet duckbill valves
- 6 Outlet check valves

Level monitoring instrumentation
Before: 1.4 to 1.5 MGD

After: 1.2 to 1.3 MGD
WTP Power

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<th>2017</th>
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Milfred Terrace Reservoir results

- Construction Cost: $303,905 (including mixing system)
- Power Savings:
  - June: $56.58/day
  - July: $77.16/day
  - August: $63.27/day
- Total Power Savings: approx. $2,000/month
- Reduced chemical costs
- Shift eliminated
- Operational flexibility

SUCCESS!!
3. SR18 Waterline Replacement

Beaver Falls Municipal Authority
Beaver Falls, PA
Beaver County
3. SR18 Waterline Replacement

Eastvale Water Treatment Plant
10MGD permitted capacity
• 8 booster pump stations
• 15 tanks
• 50,000 customers in 23 municipalities
SR18 Waterline Replacement details

- Near Geneva College
- 2014-2015 utility relocation
- PennDOT resurfacing project
SR18 Waterline Replacement  

- Surface elevation adjustment
- ~3,000 LF 12” PVC
- Sandy “wet” soil
SR18 Waterline Replacement results

Total Production (in thousand gallons)

WTP production reduced by 175,185,000 gallons (~500,000 gpd)

SUCCESS!!
Summary

- No project had a goal to impact water loss
- All projects had been deferred
  - Available budget
  - Difficult site conditions
  - Operational challenges
  - PennDOT implications
- Outcomes had measurable positive impacts
  - Financially
  - Operationally
- Reduction of *Actual Losses* is difficult to predict, and not fully understood until *after* project completion
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www.entecheng.com

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Questions?