New Mexico Statewide Water Loss Control Training Program – A Brief Overview

New Mexico Rural Water Association Annual Conference

Albuquerque, NM

April 2016

Peter Nathanson, PE
DWB Technical Services Manager
505.222.9509
peter.nathanson@state.nm.us
Today’s Topics

1. The Team
2. Background
3. Program content
4. Program logistics
5. Next Steps
Training Program Team

New Mexico Environment Department
env.nm.gov/

Southwest Environmental Finance Center
southwestefc.unm.edu/main.php

Cavanaugh
cavanaughlösolutions.com
Introduction to the New Mexico AWWA Water Loss Control Training Program

Current condition public drinking water suppliers across NM are facing:

» Aging and failing infrastructure
» Aquifer depletion & well production decreases
» Drought & watersheds impacted by wildfire

Current conditions in the state limit available drinking water sources for water systems and increase the cost to produce safe water for the long term.

The value of safe drinking water production is very high.

» Protects public health
» Provides fire protection
» Allows economic development
» Improves the quality of life
Utilizing the AWWA Water Loss Control Program in New Mexico

Importance of quantifying and understanding water loss

- Improved asset management for repair and replacement
- More targeted and cost efficient water infrastructure projects
- Maximizing produced water served to customers
- Maximizing revenue for produced water

The AWWA method is nationally renowned, utilized by states across the country and is supported by state agencies in New Mexico.

Training all stakeholders in NM by the same AWWA method allows improved communication and coordination.

- Public water systems
- State agencies
- Assistance providers
Benefits to Attending the Program

• Critical for any system seeking State funding
• Critical for any system seeking water right permitting with the State
• Using these practices improves revenue & reduces cost
• Provides additional water supply, from within
• Eligible for operator and board training CEUs
• The entire program is FREE
Targeted Attendees

Representation from these key areas:

• Operations
• Finance
• Management
Program Highlights

Water loss auditing - foundations

Data validation

Water loss analysis

Developing the strategy
Water Auditing Foundations - Basic Concepts

1. Utilize the Water Balance.

2. Separate Total Water Loss into Real and Apparent Loss.

3. Separate Real and Apparent Loss into their subcomponents.

4. Use metrics in units of Volume, Value & Validity.
AWWA Standard Water Balance
AWWA Standard Water Balance

- Own Sources
  - Total System Input
    - Water Exported
      - Authorized Consumption
    - Water Supplied
      - Unbilled Authorized Consumption
      - Apparent Losses
      - Real Losses
    - Water Losses
      - Non-Revenue Water

- Water Imported
  - (allow for known errors)

Revenue Water
- Billed Water Exported
- Billed Metered Consumption
- Billed Unmetered Consumption
- Unbilled Metered Consumption
- Unbilled Unmetered Consumption
- Unauthorized Consumption
- Customer Metering & Data Inaccuracies
  - Leakage on Mains
  - Leakage on Service Lines (before the meter)
  - Leakage & Overflows at Storage

Total System Input (allow for known errors)
Unbilled Authorized Consumption

Apparent Losses

Real Losses

Non-Revenue Water
- Fire Dept Usage
- Operational Flushing
- Tools for control include efficient flushing practices and awareness campaigns

- Non-physical / revenue loss - slow meters, billing issues and theft
- Cost impacts at ‘retail’ rate.
- Tools for control include data management, quality control policies/practices, & meter testing & repair

- Physical loss - leakage
- Cost impacts at ‘wholesale’ rate
- Tools for control include leakage and pressure management
## Water Audit Report for:

**Reported Year:** 2013

**Northern San Leandro Combined Water Sewer Storm Utility District** (0007900)

All volumes to be entered as: MILLION GALLONS (US) PER YEAR

### WATER SUPPLIED

<table>
<thead>
<tr>
<th>Source</th>
<th>Volume (MG/YR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume from own sources</td>
<td>1,000.000</td>
</tr>
<tr>
<td>Water imported</td>
<td>100,000</td>
</tr>
<tr>
<td>Water exported</td>
<td>100,000</td>
</tr>
</tbody>
</table>

**WATER SUPPLIED:** 825.000 MG/YR

### AUTHORIZED CONSUMPTION

<table>
<thead>
<tr>
<th>Type</th>
<th>Value (MG/YR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Billed metered</td>
<td>700.000</td>
</tr>
<tr>
<td>Billed unmetered</td>
<td>50.000</td>
</tr>
<tr>
<td>Unbilled metered</td>
<td>10.313</td>
</tr>
</tbody>
</table>

**AUTHORIZED CONSUMPTION:** 760.313 MG/YR

### WATER LOSSES (Water Supplied - Authorized Consumption)

**Apparent Losses**

- Unauthorized consumption: 3.000 MG/YR
- Customer metering inaccuracies: 7.071 MG/YR
- Systematic data handling errors: 5.000 MG/YR

**Apparent Losses:** 15.071 MG/YR

**Real Losses (Current Annual Real Losses or CARL)**

**Real Losses = Water Losses - Apparent Losses:** 49.617 MG/YR

### NON-REVENUE WATER

**NON-REVENUE WATER:** 75.000 MG/YR

### SYSTEM DATA

- Length of mains: 100.0 miles
- Number of active AND inactive service connections: 1,000
- Service connection density: 10 conn./mile main
- Are customer meters typically located at the curbstop or property line? Yes
- Average length of customer service line: 100.0 ft
- Average operating pressure: 60.0 psi

### COST DATA

- Total annual cost of operating water system: $1,000,000 /
- Customer retail unit cost (applied to Apparent Losses): $3.50 /1000 gallons (US)
- Variable production cost (applied to Real Losses): $3,000.00 /Million gallons

**WATER AUDIT DATA VALIDITY SCORE:**

**PRIORITY AREAS FOR ATTENTION:**

1: Volume from own sources
2: Customer metering inaccuracies
3: Total annual cost of operating water system

Based on the information provided, audit accuracy can be improved by addressing the following components:

- Unauthorized consumption volume entered is greater than the recommended default value
- Customer meters typically located at the curbstop or property line
- Average length of customer service line has been set to zero and a data grading score of 10 has been applied

**YOUR SCORE IS: 60 out of 100**

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score.
AWWA M36 Water Audit Data Validity Scoring

In computer science, **data validation** is the process of ensuring that a program operates on clean, correct and useful data.

- AWWA developed a detailed grading matrix for Water Audit inputs
- Based on the utility’s policies and practices for data collection, data management, data archiving, quality control procedures, and derivation of audit inputs
- Provides a quantitative measure of the reliability
AWWA Free Water Audit Software © (V5.0)
Data Grading for each Water Audit input (excerpt)

### Reporting Worksheet

- **Water Audit Report for:** << Please enter system details and contact information on the instructions tab >>
- **Reporting Year:**

Please enter data in the white cells below. Where available, metered values should be used, if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades.

#### PLEASE CHOOSE REPORTING UNITS FROM THE INSTRUCTIONS SHEET BEFORE ENTERING DATA

**Master Meter Error Adjustments**

**WATER SUPPLIED**

- Volume from own sources: [ ]
- Water imported: [ ]
- Water exported: [ ]

**WATER SUPPLIED:**

**AUTHORIZED CONSUMPTION**

- Billed metered: [ ]
- Billed unmetered: [ ]
- Unbilled metered: [ ]
- Unbilled unmetered: [ ]

Enter a positive value, otherwise a default percentage of 1.25% (of billed meters).

**AUTHORIZED CONSUMPTION:**

**WATER LOSSES (Water Supplied - Authorized Consumption)**

**Apparent Losses**

- Unauthorized consumption: [ ]

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

- Customer metering inaccuracies: [ ]
- Systematic data handling errors: [ ]

**Pcnt:** 0.25% **Value:** 0.000

**Pcnt:** 1.00% **Value:** 0.000
<table>
<thead>
<tr>
<th>Functional Focus Area</th>
<th>Level I (0-25)</th>
<th>Level II (26-50)</th>
<th>Level III (51-70)</th>
<th>Level IV (71-90)</th>
<th>Level V (91-100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Audit Data Collection</td>
<td>Launch auditing and loss control team; address production metering deficiencies</td>
<td>Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.</td>
<td>Establish/revisit policies and procedures for data collection</td>
<td>Refine data collection practices and establish as routine business process</td>
<td>Annual water audit is a reliable gauge of year-to-year water efficiency standing</td>
</tr>
<tr>
<td>Short-term loss control</td>
<td>Research information on leak detection programs. Begin flowcharting analysis of customer billing system</td>
<td>Conduct loss assessment investigations on a sample portion of the system: customer meter testing, leak survey, unauthorized consumption, etc.</td>
<td>Establish ongoing mechanisms for customer meter accuracy testing, active leakage control and infrastructure monitoring</td>
<td>Refine, enhance or expand ongoing programs based upon economic justification</td>
<td>Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation</td>
</tr>
<tr>
<td>Long-term loss control</td>
<td>Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement program, new customer billing system or Automatic Meter Reading (AMR) system.</td>
<td>Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.</td>
<td>Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Target-setting</td>
<td></td>
<td></td>
<td>Establish long-term apparent and real loss reduction goals (+10 year horizon)</td>
<td>Establish mid-range (5 year horizon) apparent and real loss reduction goals</td>
<td>Evaluate and refine loss control goals on a yearly basis</td>
</tr>
<tr>
<td>Benchmarking</td>
<td></td>
<td></td>
<td>Preliminary Comparisons - can begin to rely upon the Infrastructure Leakage Index (ILI) for performance comparisons for real losses (see below table)</td>
<td>Performance Benchmarking - ILI is meaningful in comparing real loss standing</td>
<td>Identify Best Practices/Best in class - the ILI is very reliable as a real loss performance indicator for best in class service</td>
</tr>
</tbody>
</table>

**Water Audit Data Validity Level / Score**

- **Level I** (0-25)
- **Level II** (26-50)
- **Level III** (51-70)
- **Level IV** (71-90)
- **Level V** (91-100)
Program Layout

When you know better you do better

Maya Angelou
SMALL SYSTEMS TRAINING PROGRAM

LARGE SYSTEM TRAINING PROGRAM
Small System Training Program

- Introductory Webinar
- Training Session 1
- Training Session 2
- Training Session 3
- Training Session 4
- Final Webinar
Meeting Topics: Small Systems

Meeting 1: Water Audit Foundations

Meeting 2: Data Validation

Meeting 3: Component and Economic Analysis

Meeting 4: Real & Apparent Loss Control Strategies
Large System Training Program

- Introductory Webinar
- Training Session 1
- Final Webinar
- Training Session 2
Meeting Topics: Large Systems

Meeting 1: Water Audit Foundations & Data Validation

Meeting 2: Real & Apparent Loss Control Strategies
Content of Meeting

Presentations on Water Loss Topics
Content of Meeting

Activities
Content of Meeting

Presentation of Results of Activities from Previous Session
Between Sessions

Assistance to Systems via Phone or In Person (if issue can’t be resolved over the phone)
Participant Commitment

- Same 1 or 2 people attend all the meetings
- Willing to do the water loss applied activities
- Willing to present the water loss applied activity
- An open mind
- A willingness to learn
New Mexico Statewide Water Loss Control Training Program