Today’s Webcast

1. Meet the Team
2. Background for Pilot Training Program
3. An Overview of the Program – what to expect
4. Foundations
5. Next Steps

...If you have questions, please feel free to type them in at any time... We will have a Q&A at the end of the webcast...
Meet the Trainers

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Water Loss Control Drivers

No water loss reporting

Rudimentary water loss reporting

AWWA M36 terminology & metrics

AWWA M36 software

AWWA M36 software with validation (Level 1)
<table>
<thead>
<tr>
<th>State</th>
<th>Pilot Type</th>
<th>Systems</th>
<th>Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Utah</td>
<td>Pilot</td>
<td>105</td>
<td>4 months</td>
</tr>
<tr>
<td>Colorado</td>
<td>Pilot</td>
<td>50</td>
<td>1 month</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>Pilot</td>
<td>6</td>
<td>6 months</td>
</tr>
<tr>
<td>New Mexico</td>
<td>Pilot</td>
<td>105</td>
<td>4 months</td>
</tr>
<tr>
<td>Georgia</td>
<td>Full Scale</td>
<td>230</td>
<td>4 years</td>
</tr>
<tr>
<td>Georgia</td>
<td>Full Scale</td>
<td>250</td>
<td>12 months</td>
</tr>
<tr>
<td>California</td>
<td>Full Scale</td>
<td>460</td>
<td>2 years</td>
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</tbody>
</table>

**Map:**
- **U.S. Drought Monitor:** Shows drought conditions across the U.S.
- **High and dry in Texas:** Map highlighting dry regions in Texas.

**Attitude, Behavior, Technique:**

- Attitude
- Behavior
- Technique
Program Overview – What to expect

What you put in to the Program

- Today’s webcast
- Workshop participation (October)
- Give feedback for future training & technical assistance needs
- Apply workshop learning at your utility

What you get out of the Program

- Training on AWWA water balance and audit software
- Training on data validation for the water audit
- Forging next steps in your Water Loss Control Program

<table>
<thead>
<tr>
<th>Functional Focus Area</th>
<th>Audit Data Collection</th>
<th>Short-term loss control</th>
<th>Long-term loss control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target-setting</td>
<td>Benchmarking</td>
<td>Performance Benchmarking</td>
<td>Continue incremental improvements in short-term and long-term loss control interventions</td>
</tr>
<tr>
<td>Identification</td>
<td>Best Practices/Best in class</td>
<td>Performance Benchmarking</td>
<td>Establish long-term apparent and real loss reduction goals (+10 year horizon)</td>
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<td>Establish mid-range (5 year horizon) apparent and real loss reduction goals</td>
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<td>Evaluate and refine loss control goals on a yearly basis</td>
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<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>
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<td>Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.</td>
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<td>Conduct detailed planning, budgeting and launch of comprehensive improvements for metering, billing or infrastructure management.</td>
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<tr>
<td>Annual water audit</td>
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<td></td>
<td>Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation.</td>
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<tr>
<td>Research information</td>
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<td></td>
<td>Launch auditing and loss control team; address production metering deficiencies.</td>
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<td></td>
<td>Analyze business process for customer metering and billing functions and water supply operations. Identify data gaps.</td>
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<td>Establish/revise policies and procedures for data collection.</td>
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<td>Refine, enhance or expand ongoing programs based upon economic justification.</td>
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<td>Stay abreast of improvements in metering, meter reading, billing, leakage management and infrastructure rehabilitation.</td>
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Added Benefits for Attending the Workshop

- Connectivity with your peers – others who are working on the same thing you are
- Lunch!

Pilot Training Program Overview

- Kickoff Webcast - Large Group: Today
- Big group training workshop: 10/13/16
- Post-Program Survey to participants: Nov 2016
- Program report: Dec 2016

Thursday October 13, 2016 – 8:00am to 5:00pm
Conservation Garden Park Education Center, 8275 South 1300 West
West Jordan, UT 84088

Register at www.ims-awwa.org/event/WaterAuditWorkout
Who Should Attend?

Representation from these key areas:
- Operations
- Finance
- Management
- Conservation
- Consultant
- For smaller utilities – one person may cover multiple areas

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 to make your game plan.
Non-Revenue Water

1. Water put into the system that does NOT return revenue to the Utility.

2. All Water Loss plus Unbilled Consumption.

3. “Unaccounted-for water” has been abandoned as an obsolete practice (2003).
Physical loss - leakage
Cost impacts at 'wholesale' rate
Tools for control include leakage and pressure management

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

AWWA Standard Water Balance

- Real Losses
- Apparent Losses
- Unbilled Authorized Consumption
- Non-Revenue Water

- Billed Water Exported
- Billed Metered Consumption
- Billed Unrecovered Consumption

- Unbilled Metered Consumption
- Unbilled Unmetered Consumption

- Leakage on Mains (before the meter)
- Leakage & Overflows at Storage

- Leakage on Service Lines
- Unauthorized Consumption
- Unbilled Unmetered Consumption
- Billed Unmetered Consumption

- Water Imported
- Own Sources

Total System Input (allow for known errors)

Water Losses
Authorized Consumption
Billed Water Exported

- Real Losses
- Apparent Losses
- Non-Revenue Water

- Billed Metered Consumption
- Billed Unrecovered Consumption

- Unbilled Metered Consumption
- Unbilled Unmetered Consumption

- Leakage on Mains
- Leakage on Service Lines (before the meter)
- Leakage & Overflows at Storage

- Unauthorized Consumption
- Unbilled Unmetered Consumption
- Billed Unmetered Consumption

- Water Supplied
- Water Exported

- Total System Input
- Water Exported
Non-Revenue Water

1. Water put into the system that does NOT return revenue to the Utility.

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3. “Unaccounted-for water” has been abandoned as an obsolete practice (2003).

AWWA Free Water Audit Software

Industry Standard (M36)
Free
Defaults provided
~20 Potential Inputs
~10 Inputs for Typical
awwa.org/waterlosscontrol

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)

Guidance on Use of Water Audit Data, based on Level of Data Validity

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<td>Level I (0-25)</td>
<td>Level II (26-50)</td>
<td>Level III (51-70)</td>
<td>Level IV (71-90)</td>
<td>Level V (91-100)</td>
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<td>Water Audit Activities</td>
<td>Establish continuous monitoring and data collection, gather data on records and incident reports</td>
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Finished Water Meter Testing

Georgia Statewide Water Loss Technical Assistance — Finished Water Meter Testing

Finished Water Meter Flow Verification
Georgia Statewide Water Loss Technical Assistance – Customer Meter Testing (CMT)

Customer Meter Testing

- **FAIL**: 6%
- **UNTESTABLE**: 40%
- **PASS**: 54%

3-V

- **Volume**: MG per Year
- **Value**: $ per Year
- **Validity**: Economic Loss Index

Water Audit Data Validity Score
95% Confidence Limits
Key Data Input Grades

2003

- Unaccounted For Water
  - Inconsistent use and interpretation
  - Unreliable indicator of performance
  - Fails to segregate loss into its components for effective management

Unaccounted For Water Percentage

- Water Loss Control Terms Defined
  - Why the terms 'Unaccounted for water' and 'unaccounted for percentage' just don't work.
Water Loss or NRW as % of Supply

Water Loss as a Percentage of Supply is not an Indicator of Performance

- Water Supplied (MGD)
- Authorized Consumption (MGD)
- Water Loss (MGD)

Development Boom
Great Recession, Rate Increases, Conservation
New Normal

Water Loss as a Percentage of Supply is not an Indicator of Performance

- Water Supplied (MGD)
- Authorized Consumption (MGD)
- Water Loss (MGD)
- Water Loss (Percent of Supply)
Historical losses

Total Water Loss - CBCWA Members

Year

Percent Unaccounted For Water

Total Water Loss - CBCWA Members

30%

25%

Allouez  Bellevue  De Pere  Howard  Ledgeview

20%

15%

10%

5%

0%


C:\Users\SBEDUHN\Dropbox\Howard\[UFW Comparison CBCWA Members.xlsx]Sheet2
9/21/2016

Water Audit Data Validity Score: 74 out of 100 (Validated)

Economic Metrics Volume:

95% Confidence Limits (+/-)

Value - Water Only

Non-Revenue Water 24,744 gal/conn/yr 14.2% 22$ 35$ /conn/yr 16.6%

Non-Revenue Water 8,235 MG/yr 14.1% 7,166,110$ 11,568,137$ /yr 16.6%

Target NRW Recovery (prel) 4,037 MG/yr 25.0% 4,707,445$ 7,985,285$ /yr 25.0%

NRW Economic Index (ratio of current vs optimum NRW cost) 2.9 3.2

NRW Components - By Volume (MG) - Level 2

<table>
<thead>
<tr>
<th>Loss Type</th>
<th>Volume</th>
<th>Real Loss</th>
<th>Apparent Loss</th>
<th>Unbilled Consumption</th>
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NRW Components - By Value Level 2

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Homework
Homework

Register for the Workshop!

Register at

www.ims-awwa.org/event/WaterAuditWorkout

*then we won’t call and bug you*


Homework

If you have already had experience with the AWWA M36 Water Audit Methodology:

• Bring Your Questions

Homework

If this will be your first experience with the AWWA M36 Water Audit Methodology:

• Download the AWWA Free Water Audit Software

www.awwa.org/waterlosscontrol

...or google “free water audit software”, follow the links – it will email you the download link
Homework

What to Bring?

1. People (don’t forget to register)
2. Laptop (one per group is fine)
3. Your Questions
4. Readiness to Participate

Questions?

Utah – Pilot Training Program
AWWA M36 Water Audits & Loss Control