Accounting for Total Water Use: A Water Loss Optimization Program

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Background on US Water Systems

- 54,064 Community Water Systems served 264 million people in 2000
- 15% of systems serve over 3,300 people: medium, large & very large systems
- 90% of people are served by medium or larger systems [1]

Water Use and Loss

- Community Water Systems withdrew more than 43 billion gallons of water per day in 2000[2]
- An estimated 6 billion gallons of water per day occurred as public “uses and losses” in 1995 - approximately 14% of total production[3]
- 6 billion gallons per day will satisfy the delivery needs of the ten largest cities in the US

What is “Unaccounted-For Water”?

- Difference between the amount of water produced and the amount of water sold to all consumers
- UAW should be minimized as a standard business practice
- UAW results in real costs to the system but produces no revenue

“Accepted” Levels of UAW

- A 1996 overview of 469 US water utilities showed metered water use averaging 84%
- This implies an average UAW of 16%
- The range of UAW was very high – from 50% down to 1%, with a 13% modal value

New Mexico Water Systems

- 650 Community Water Systems
- 1,560,638 persons served – 83% of the state population
- 592 CWS are small systems – 91%
- Public water systems withdrew more than 108 billion gallons of water in 2000
- Water loss unknown – 15 to 17 billion gallons per year, or *greater*

Industry Terminology

- *Water Conservation* generally refers to programs promoting wise use by consumers, including finding and fixing plumbing leaks
- *Water Accountability* generally refers to water loss management programs by utilities
- *Water Loss Optimization* refers to a complete program for water loss control

Benefits of Water Loss Optimization

Small Rural System	Optimized
100 gpd per person	85↓ gpd per person
150 people	150 people
15,000 gpd sold	12,750 gpd sold
18,750 gpd produced	14,490 gpd produced
20% UAW	12%↓ UAW
4.2 acre-ft per year	1.95 acre-ft per year

Problems with UAW

- No rational accepted definition exists in the US or elsewhere for Unaccounted-for Water[4]
- Utilities compile and report UAW in different ways – no standard reporting methodology
- No reliable estimates exist in the US for annual water loss
- Current performance measures may understate the problem

International Standard Water Balance

<table>
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Categories of Water Loss

Real losses are the physical escape of water from the distribution system, and include leakage and overflows prior to the point of end use (customer meter)

Apparent losses are “paper” losses and consist of customer use which is not recorded due to metering error, incorrect assumptions of unmeasured use, or unauthorized consumption

Real Losses

- Real losses typically account for the greatest volume of water lost by utilities
- The marginal cost of real water loss occurs at the cost of production – treatment, operations & maintenance costs

Real Losses

- Real water loss depends on rate of flow and time permitted to run
- High real losses require the utility to extract, treat and transport greater volumes of water
- Leakage may find its way back into a storm or sewer system, requiring further costly treatment

Apparent Losses

Apparent water loss is water that is delivered to the customer but not recorded

Apparent losses of water occur as:

1. Errors in water flow measurement
2. Errors in water accounting
3. Unauthorized usage

Apparent Losses

- The economic impact of apparent losses is greater than real losses, since the marginal cost occurs at the retail rate charged to consumers

- Poor assessment of apparent loss may result in an overstatement of real loss in a water balance

Water Auditing is Important

Accurate water use statistics provide critical information for decision making:

- unauthorized use detection
- leak detection
- repair and maintenance programs
- infrastructure replacement
- rate setting
- demand management
- conservation programs
- water rights acquisition

Benefits to of a Water Accountability Program

- Greater water system efficiency leads to less development and protects NM's limited supply
- Systems are increasing their investment in water treatment to meet federal SDWA requirements
- A comprehensive technical assistance program would result in measurable gains in efficiency
- Potential to save billions of gallons of water, extending state water supply

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