Real Loss Real Money

Full Cost Accounting for Water System Leakage

CAVANAUGH
Stewardship Through Innovation

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INTRODUCTION:

In performing water audits for most water utilities, real loss (or leakage) is by far the greatest portion of water loss, by volume.

The cost impact of leakage, however is typically stated as only a fraction of the costs impacts of apparent (non-physical losses).

This is because current practice in the AWWA M36 Manual (M36) Limit valuation of real loss to those direct costs which incrementally increase with each additional unit of finished water that is delivered.

▪The M36 describe REAL LOSSES as those costs that include water extracted from the source, treated, energized and transported a distance, before being lost in the distribution system. To determine the impact real loss has on a utility, it is valued at the variable production cost, which is the cost to produce and supply the next unit of water.

Typically for simplicity, the factors accounted for in the variable production cost calculation are limited to the unit costs for treatment (chemicals, power) and delivery (pumping power costs). While these are the direct costs that contribute to total variable production cost, it is also important to consider other long-term costs that are indirect, but still applicable to real losses. Criteria for the applicability of indirect costs is whether said costs indirectly increase/decrease on basis of total water produced.

A Case Study- The Macon Water Authority

- Produces on average 9.5 billion gallons/year
- 7 elevated storage tanks
- 10 ground storage tanks
- A new elevated storage tank (Hartley) has been recently constructed
- 5 hydraulically-independent pressure zones
- A sixth one to be constructed
- Average pressures within zones currently range from 83 psi to 112 psi
- Average pressure for the entire system is approx. 93 psi

- Service area - 1,664 miles of distribution lines consisting of ductile iron pipe and cast iron pipe ranging from 1.5” to 64” in diameter.
- Customer base – 55,000 active Water connections
  Meter sizes ranging from 5/8” to 10”
- AS400, custom-built software for billing and financial management
- Some seasonal variation in consumption, highest in Mid-summer (900 mg/month), minimum consumption in late winter (500 mg/month).

WATER AUDITING – IMPROVED METHODOLOGY

▪True cost impacts of real losses In a water system go beyond direct costs

▪Presents basis for allocating indirect costs of Operation & Maintenance, equipment replacement, supply capacity and drought resistance.

▪Full cost accounting and proactive leakage management efforts are necessary to properly budget and evaluate the true, long term impacts of real loss.

DIRECT

Operational Cost:
Chemicals, Power and Residuals Management
Direct costs for treatment, pumping and handling biosolids.

INDIRECT

Operations & Maintenance Cost:
Treatment and Distribution Equipment (Dynamic Assets)
Cost to operate and maintain all moving equipment in the treatment and distribution systems.

Depreciation Cost – Dynamic Assets:
Treatment and Distribution Equipment (Dynamic Assets)
Cost of wear and tear on dynamic assets within the treatment and distribution system, can also be described as depletion of useful life.

Risk Cost – Constrained Demand
Future risk of demand restrictions and reduced revenue due to drought. In times of demand restrictions, Real Loss should be valued at the retail rate.

Risk Cost – Constrained Supply
Annual cost of reservoir space required to support current annual demand. Unmanaged leakage accelerates timeframe for capacity expansion.

Valuation

Item	FY10 Costs	Source	Notes	Calculation
1. Chemicals	$ 538,862	budget 1000-40-9999	Direct: material cost of chemicals for treatment	n/a
2. Utilities	$ 1,368,607	budget 0500-30/35/40-2200	Direct: power to treat and distribute	n/a
3. Biosolids Disposal	$ 23,501	budget 1000-40-7126	Direct: residuals management disposal fees	n/a
4. MSI - Motorized Operation	$ 62,183	budget 0900-60-9999	Indirect: residuals management O&M for equipment	n/a
5. Equipment Maintenance	$ 1,130,282	budget 0900-30/35/40-9999; 1200-30-9999; 1100-40-9999	Indirect: DIST, MAINT, WTP departments - O&M for equipment	n/a
6. Dynamic Asset Depreciation	$ 781,381	dynamic assets from depreciation schedule 3600	Indirect: depreciation on treatment and distribution equipment (moving parts). Producing extra water due to leakage depletes useful life of these assets.	n/a
7. Constrained Demand (During Drought) Risk Factor	$ 628,440	calculation	Indirect: future risk of demand restrictions and reduced revenue due to drought. In times of demand restrictions, Real Loss should be valued at the retail rate.	21 $M water revenue x 15% revenue reduction (primarily outdoor uses) x 20% drought probability
8. Constrained Supply (Capacity Expansion) Factor	$ 300,000	calculation	Indirect: annual cost of reservoir space required to support current annual demand. Unmanaged leakage accelerates timeframe for capacity expansion.	15 $M reservoir cost, annualized with i=0%, n=50 yr
Total Direct and Indirect Costs to Produce	$ 4,833,256			
Total Volume Produced	9,072,840,000	gallons		
Variable Production Cost	$ 0.53	per 1,000 gal		
Annual Cost of Real Losses (FY10)	$ 672,822