

Lost Water, Lost Revenue:

A Guide to Effectively Reduce Non-Revenue Producing Water (NRPW) Loss



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Lost Water, Lost Revenue:

- **United States Estimated Daily Water Loss?**
6 Billion Gallons/Day *(Source: American City & County)*
- **Lost Revenue for U.S. Utility Systems?**
\$8.76 Billion Annually
- **Unnecessary Capital Expenses Related to NRPW?** **\$900 Million Annually**



Georgia Water Loss:

- Georgia Public Water Systems withdraw approximately 1.5 Billion gallons of water each day. (*surface & ground water*)
- Using an average water loss rate of 14%, Georgia Utilities lose:
 - **210 Million gallons of water each day**
 - **\$840,000 each day in potential revenue**
 - **\$307 Million annually**



What is NRPW?

- **Non-Revenue Producing Water (NRPW)**
- **Drinking water that has been produced (treated), but is “Lost” before it reaches the customer.**
- **Formerly referred to as “Unaccounted for Water (UAW)”**



What is NRPW?

- **Total Non-Revenue Producing Water Loss = Real Losses + Apparent Losses**
- **Real Losses:** Leaks, main breaks, tank overflows, flushing, fire fighting, etc...
- **Apparent Losses** (*"Paper Losses"*): Meter errors, billing system coding errors, water theft, and unauthorized uses



NRPW Effects on Local Utilities:

- **Water (PRODUCT) Losses of 10% to 35%**
- **Potential Revenue Losses of 5% to 25%**
- **Unnecessary Capital Costs for Additional Treatment and Transmission System Capacity**
- **Increased Water Rates to Offset Losses**
- **Difficulty in Acquiring Future Withdrawal Permits**



Calculating your NRPW?

- **Complete a Basic Water Audit**
 - A. System Input Volume = _____ MGD
 - B. Billed Consumption = _____ MGD
 - C. $\text{NRPW} = A - B$
 - D. $\% \text{ NRPW} = C/A$
- **Data must reflect same time period**
- **Use 3 month averages (off peak), if billing cycles prevent real time analysis.**



Developing an NRPW Action Plan:

- **Determine the Financial Impact to Utility System Revenues?**
- **Identify budgeted funds available to address NRPW issues.**
- **Develop an effective approach and NRPW action plan for your Utility System.**



NRPW Action Plan Tool Kit

- **Leak Detection Programs** (*Manual/Auto*)
- **Comprehensive Water Audits**
- **Meter Accuracy/Replacement Programs**
- **Account Coding/Billing Analysis**
- **Customer Classification Analysis**
- **Identification of Unmetered Connections**



Reducing Real Water Losses:



Water Leaks



Main Breaks



Flushing



Fire Fighting



Water Leaks/Main Breaks

- **Identify and Repair Leaks Promptly**
- **Maintain Repair Parts, Materials and Equipment in Stock.**
- **Establish and Track Response/Repair Times for Water Leaks, and Implement Programs for Improvement**



Leak Detection Programs:

- **Manual Leak Detection**
 - Personnel/Equipment Costs
- **Automated Leak Detection**
 - Zone Isolation/Flow Monitoring
 - Meter/Monitoring Costs
- **Public Outreach: Educate Customers on Leak Identification and Reporting**



Leak Detection Programs:

- **The Usual Suspects:**
 - Older parts of the distribution system
 - Poor installations
 - Areas of high pressure
 - Vacant lots/terminated services
 - Creek crossings/areas of poor soil
 - Check storm drains/ditches during dry weather conditions
 - Storage tank overflows



Authorized Losses:



- **Flushing program should be limited**
 - Performed only to protect water quality
 - Include Flushing Volumes/Costs in Base Rates
- **Request reports of hydrant usage from Fire Department staff.**
- **Fire Department budgets can include water usage, and reimbursement to Utility Fund.**



Addressing Apparent Water Losses:



Meter Errors



Billing System
Coding Errors



Unauthorized Usage/
Water Theft



Meter Errors:

- Test Source Meters Annually
- Residential Water Meters (65% of Total)
 - Test/replace on a ten (10) year cycle
 - Meter accuracy will decrease over time
- Commercial Water Meters (35% of Total)
 - Test every 2-4 years
 - Make sure appropriate meter in use
 - Compound vs Turbine, Size vs Usage



Meter Errors:

- **Adopt meter sizing and selection standards**
- **Standardize meter brand/type**
 - **Simplifies repair and replacement**
- **Verify register calibration upon delivery**
 - **Cubic feet, 1,000 gallons, 100 gallons**
- **Fund Annual Meter Replacement Program**



Meter Errors:

- **Field verify meter sizes/type**
 - **Oversized meters will not accurately meter low flows**
 - **Use compound meters in variable flow applications**
 - **Turbine meters for high, constant flow**



Billing System Errors:

- **Conduct in-house audit to verify accurate account coding**
 - Example, 1 ½” meter entered as 1”
 - Commercial vs Residential Rates
- **Establish Customer Classes for Analysis**
 - Residential, Restaurant, Office, etc...
 - Use billing software to compare/identify
 - Investigate irregular usage patterns



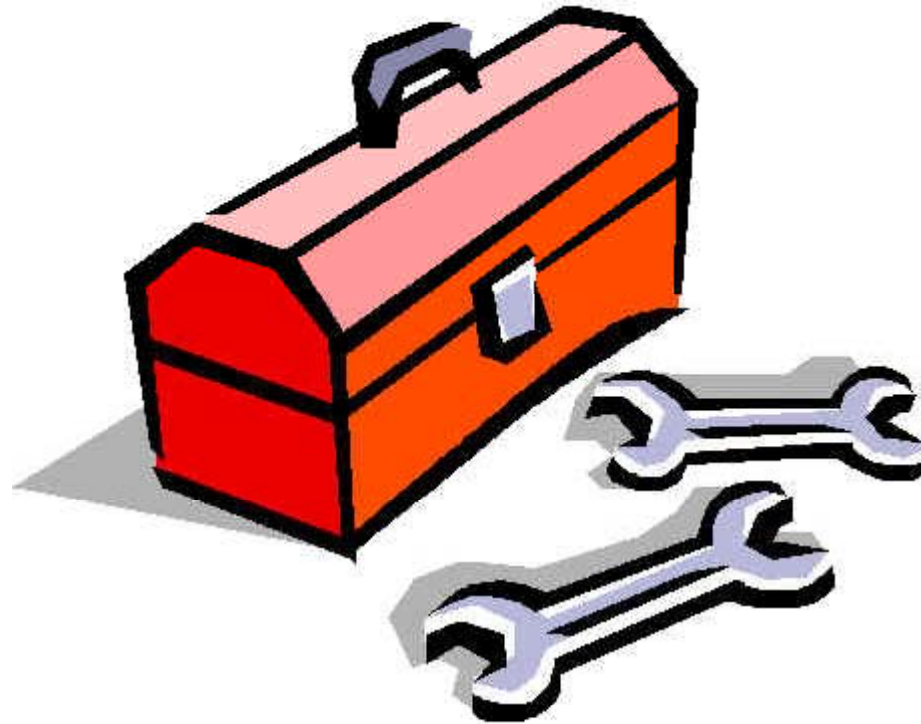
Water Theft:

- **Bulk Water Theft from Fire Hydrants**
 - More prevalent during construction boom
 - Water System Vulnerability
 - Involve Police, Fire, Inspections, etc...
- **Unmetered Connections**
 - Think you don't have any.....guess again
 - Windshield surveys/land use
 - Accidental Connections (City/County)



NRPW Program Implementation:

How to make these tools work for your Utility...



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Case Study No. 1

- **Prosperity County, Georgia**
- **Population: 83,000 (330 Sq Miles)**
- **Water Customers: 14,000**
- **System Age: 40 years (75% >15 years)**
- **Average Water Usage: 4.6 MGD**
- **NRPW: 1.2 MGD (26%)**
- **Revenue Impact: \$5,436/Day**



Prosperity County, Georgia

- **County's Initial Approach**
 - Find the BIG Leaks.....Few Found...
 - No Significant Impact to NRPW
 - Results: Unsuccessful
- **Adopted New Comprehensive Approach**
 - Effective Leak Detection Program
 - Meter Evaluation/Replacement Program
 - Evaluation of System Inter-Connections
 - Evaluate Billing System Coding Errors



Prosperity County, Georgia

- **Success/NRPW Reductions Achieved:**
 - **Improper Meter Size/Type – Schools/Comm.**
 - **Replaced ALL Residential Meters**
 - **Leak Detection/Public Outreach**
 - **Polybutylene Service Pipe**
 - **Identified/Abandoned Old Interconnections**
 - **Identified/Corrected Customer Coding Errors**



Prosperity County, Georgia

- **Revenue Recovery: (14 Months)**
 - To Date: NRPW Reductions of 6%
 - **Revenue Recovery: \$1,250/Day (\$460,000/Yr)**
- **Projected NRPW Program:**
 - Implement PB Service Replacement Program
 - Projected NRPW Reductions of 12%-14%
 - Projected Revenue Recovery: \$2,720/Day
 - **Projected Revenue: \$992,000/Year**



Case Study No. 2

- **City of Metropolis, Georgia**
- **Population: 18,000**
- **Water Customers: 17,000 (County service)**
- **System Age: 80 years**
- **Average Water Usage: 5.4 MGD**
- **NRPW: 1.3 MGD (24%)**
- **Revenue Impact: \$5,850/Day**



City of Metropolis, Georgia

- **City's Initial Approach**
 - Find the BIG Leaks.....**Sound Familiar?**
 - No Significant Impact to NRPW
 - Results: Unsuccessful
- **Adopted New Comprehensive Approach**
 - Effective Leak Detection Program
 - Systematic Replacement of Older Mains
 - Meter Evaluation/Replacement Program
 - Evaluate Billing System Coding Errors



City of Metropolis, Georgia

- **Success/NRPW Reductions Achieved:**
 - **Through Researching Historic Service Records, City Identified Old/Problematic Water Mains**
 - **Achieved Political Support for Capital Replacement Program**
 - **Incorrect Meter Registers (100's vs 1,000's)**
 - **Statistical Analysis of Customer Classifications, Average Water Use – Meter/Coding Errors**



City of Metropolis, Georgia

- **NRPW Program Underway 3 Months**
- **Projected NRPW Program Goals:**
 - **Projected NRPW Reductions of 8%-12%**
 - **Projected Revenue Recovery: \$2,440/Day**
 - **Projected Revenue: \$890,600/Year**



Common NRPW Program Mistakes:

- **Looking for the BIG Leak....**
 - Assumption is leaks are easier to find/fix
 - Reality: Harder to find, more expensive
- **Disregarding Apparent Losses.....**
 - Internal water audits are more economical
 - Immediate results, low Cost
 - Meter testing/replacement program



Common NRPW Program Mistakes:

- **Fail to Gain Political Support....**
 - **Insufficient Funding in the Budget**
 - **Must validate revenue losses and projected return on investment**
 - **Document and report successes**
- **Fail to Maintain Program....**
 - **NRPW Reduction is a continuous process**



Questions/Comments?

Thanks for your time, and please feel free to call,



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