Water Audit for Small Systems in North Carolina
Here is what the spreadsheet looks like. Can be adapted to be a yearly process
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The Keystone of the BMPs for Water Systems

- Tailored for smaller systems
- Less detail needed than AWWA
- Still necessary to have cooperation of the town staff
Water Delivered (gal/year)
Total water supply RAW Water

From Surface Water
Total Water Supply RAW Water

From Ground Water
Adjustments to Water Delivery

Backwash Water
Adjustments to Water Delivery

Other: Tank maintenance, wash water etc.
Water Produced

As read from finished water meter
Purchased Water Sources
Water Used (Gallons/Year)
May include: Boarding houses, Family care homes, Guest houses, Home occupations, Home professional offices, Manufactured Homes, Manufactured Home Parks, Multi-family dwellings, Planned unit developments, Residential accessory uses, Single-family dwellings, Vacation homes, Two-family dwellings (duplex), Three-family dwellings (triplex), etc
Water Sold

Residential
May include: Animal hospitals, Automobile repairs, Automobile sales, Automobile service stations, Banks, Barber/beauty shops, Business offices, Bus Stations, Butcher shops, Cab stands, Convenience stores, Dental clinics, Exterminators, Farms, Farm machinery showrooms, Fish markets, Funeral homes, Golf courses, Hardware stores, Hotels, Kennels, Laundry/dry cleaning storefronts, Medical clinics, Mobile home showrooms, Motorcycle showrooms, Nurseries, Paint/wallpaper showrooms, Parking lots, Pet shops, Print shops, Professional service agencies, Radio/TV repair shops, Recreational vehicle sales and service, Restaurants, Retail stores, Seed/feed stores, Shoe repair shops, Specialized service agencies, Studios (art, photo, design, etc.), Television or radio broadcast stations, Theaters, Train stations, etc.
Water Sold

Manufacturing Facilities, Processing Facilities, Utilities, etc.
Hospitals, Assisted living facilities, Correctional facilities, Schools, Colleges, Churches, Government buildings, Police stations, etc.
Water Sold

To Other Water Systems
Water Not Sold

Metered and Unmetered
Water Not Sold

Residential
Water Not Sold

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Water Not Sold

Institutional

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Water Not Sold

Water Main Flushing
Water Not Sold

Sewer Storm
Drain
Flushing

DWR
Division of Water Resources

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Water Not Sold

Parks
Water Not Sold

Playgrounds

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Water Not Sold

Swimming Pools

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Road Medians
Water Not Sold

Schools

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Training Fire Fighting
Water Not Sold

Storage Tank
Drainage

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Water Not Sold

Sewer Plant Uses
Water Not Sold

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Water Not Sold

Golf Courses
Water Not Sold

Cemeteries

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Water Not Sold

Construction Use

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Apparent and real losses are listed separately and totaled as non-revenue H2O.
Apparent Water Losses
Apparent Water Losses

Meter Misread

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Apparent Water Losses

residential meter inaccuracy
Real Water Losses

Leaking Pipes

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Real Water Losses

Storage Overflow
Annual Cost of Apparent Loss

- Water delivered but not paid for
- Retail charge for each user type
- Affected by rate adjustments
- Affected by level of system oversight
  - Water accountability
  - Water security
Annual Cost of Real Loss

- Water produced and lost in distribution
- Inclusive production cost to system
- Affected by fluctuating costs
- Affected by operational efficiency
  - Water loss abatement program
  - Asset Management Plan
System Cost to Produce Water

- Personnel Cost
- Non-personnel Cost
- Capital Reserve Set-Aside
- Asset Management Plan
  - Looks at system assets
  - Comprehensive
  - Integrates nicely into capital planning
Retail Charge for Water

- Average charge applied for each use type
  - Residential
  - Commercial
  - Industrial
  - Institutional
- Weighted average calculated in spreadsheet
Apparent and real losses are listed separately and totaled as non-revenue H2O.
Case Study Mars Hill

- Water Audit performed 2008
- Recommendations
  - Troubleshoot billing software
  - Replace Mars Hills College turbine meters with compound meters
  - Active leak detection for the cross-country transmission line
  - Replace MHC two 6" meters and 2" Madison Manor meter with compound auto-read meters
Case Study Mars Hill

- Active leak detection workshops for Mars Hill’s staff.
  - Develop Unidirectional Flushing Strategy and Valve Inventory/Exercise Program.
  - Maintain Standardized Leak Detection/Repair Flushing Records.
  - Add distribution system personnel to support development of leak detection program.
  - Develop meter inventory and systematic replacement of meters 7 years or older with automatic read meters, target (minimum) 5-10% replacement each year.
  - Perform water rate study.
Case Study Mars Hill—
Actions Taken

- Successful efforts have been made to reconcile outliers and glitches in the software of the billing system.
- Missing accounts were restored and all metered, but unbilled accounts are now in consumption records.
- The Town is setting aside funds (approx. $16,000) to replace the Mars Hill College turbine meters with compound meters (4 – 2", & 1 – 6").
- Town staff are now keeping records on leak detection, repairs, and flushing.
- Town Staff regularly evaluate unauthorized consumption.
- A radio-read meter replacement program has begun; 107 out of 800 meters have been replaced thus far with the oldest meters being replaced first.
- The Town did a water rate study and now has an increasing block rate. (The town formerly had a fixed flat-rate for water rate structure.)
Process leak finding and repairing. Making it less random.
Water Loss Abatement Program

- Leak Detection Methods
  - Records Review
  - Appearance
  - Flow Monitoring
  - Leak Detection Equipment
    - Acoustic Devices
    - Thermal Devices
    - Electromagnetic Devices
    - Chemical Detection Devices
Water Loss Abatement Program

- Fixing System Leaks
  - Repair
  - Rehabilitation
  - Replacement
- Operation and Maintenance
  - Asset Management Plan
  - Design and Material Standards
  - Modeling
WATER = MONEY
DON’T WASTE IT

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