Technical Subcommittee Report on Water Loss

August 12, 2020

To Protect and Enhance Kentucky’s Environment
Technical Subcommittee

• Subcommittee Members
  • Paul Miller, Director Division of Water
  • Kent Chandler, Vice-Chairman Public Service Commission
  • Craig Miller, General Manager Alliance Water Resources
  • Lindell Ormsbee; PE, PH, PhD, D.WRE University of Kentucky
  • Gary Larimore, Executive Director Kentucky Rural Water Association
  • Ben Hale, Executive Director Big Sandy Area Development District

• Support staff
  • DEP – Deputy Commissioner John Lyons
  • DOW – Asst. Director Carey Johnson, Tammi Hudson, Alicia Jacobs, and Jory Becker
  • KRWA – Joe Burns
Why Water Loss?

• Water loss and failing infrastructure are nationwide issues.
• The average water loss for a drinking water system in Kentucky is 24%*.
• Martin County Water District reports an average of 70% water loss.
• A water system in rural Kentucky produces a monthly average of 20M gallons for a population of approximately 9,000 people.
• MCWD produces an average of 52.5M gallons per month, and sells 14.6M gallons.
• Every gallon produced costs money to treat and pump.

*ASCE 2018 Report
Causes of Water Loss

• Water loss is a red flag of operational, managerial, and financial difficulties.

• Operational difficulties - line breaks; water theft; excessive or varying pipe pressures; inconsistency in daily tasks; insufficient maintenance; outdated operating procedures.

• Managerial concerns - faulty and failing infrastructure; inadequate planning for longevity; lack of properly trained staff.

• Financial struggles - poor billing system; excessive debt; disproportionate operating costs; shortage of funds.
Effects of Water Loss

Increased Production Cost
- Electricity
- Chemicals
- Personnel
- Maintenance and repair
- Replacement of equipment

Lost Revenue
- Inaccurate meters
- Misread meters
- Billing system errors
Immediate and Ongoing Actions

• Administrative improvements
  • Keeping and retaining reliable records.
  • Converting billing software and training employees on use.
  • Regularly and uniformly assessing fees.
  • Informing public of utility changes that impact them.
  • Update website to enhance customer relations.

• Operational improvements
  • Training and educating employees on proper maintenance and repair.
  • Locating and mapping lines, meters, and leaks.
  • Creating consistency in processes such as meter reading.
  • Using Standard Operating Procedures.
  • Conducting a vulnerability assessment and emergency plan.
  • Prosecuting for water theft.
What Does Water Theft Look Like?

- **Stolen Meter is Used**
- **Un-Metered Connection**
  - illegal by-pass with professional installation
  - Un-Metered Connection

Jumper Connections

- **Jumper installed after meter was removed**
- **Hose used as Jumper Connection**
- **Un-Metered Connection**
  - connections

- **Stolen Meter is Used**
  - Meter register was removed and radio transmitter wire was cut
Long Term Actions

• Improve revenue and available funds.
  • Reduce water loss which reduces excess treatment of unused water.
  • Require more training for operators.
  • Evaluate spending and operational costs.
  • Implement asset management plan.

• Understand distribution system.
  • Develop a 5-year construction improvement plan.
  • Replace and improve infrastructure.
  • Purchase more leak detection equipment and utilize appropriately.
  • Purchase equipment for distribution repair crew.
  • Implement paperless workflow tracking.
  • Install and use radio meter-read system for all customers.
Understanding a Distribution System and Line Breaks
Hydraulic Model

• Two Different Hydraulic Models
  • Bell Engineers
    • To be used for evaluating upgrades to the system
  • KWRRI
    • To be used for evaluating:
      • Operations (24 hour simulations)
      • Water quality
      • Pressure transients

• Model Status
  • Both models are unvalidated/uncalibrated
  • KWRRI model is running
    • 24 hour simulations ("reasonable" pressures)
    • Water quality
    • Pressure transients

• Future Work
  • Continue model validation
  • Continue model calibration
Next Steps for Distribution System

• Continue locating, mapping, and repairing leaks.
• Finalize hydraulic model.
• Review ongoing construction projects and their impact on the distribution system.
• Use hydraulic model to identify and prioritize future projects.
• Determine solutions based on cost and standard industry practices.
Questions?