

EWEB

Eugene Water & Electric Board

The Water Conservation/Water Quality Paradox



Eugene Water & Electric Board/Carollo Engineers

The Water Conservation/Water Quality Paradox

Jill Hoyenga, Water Resource & System Planner
Rachel Lanigan, Lead Engineer Carollo Engineers
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Introductions

- About Eugene Water & Electric Board
- About Carollo Engineers

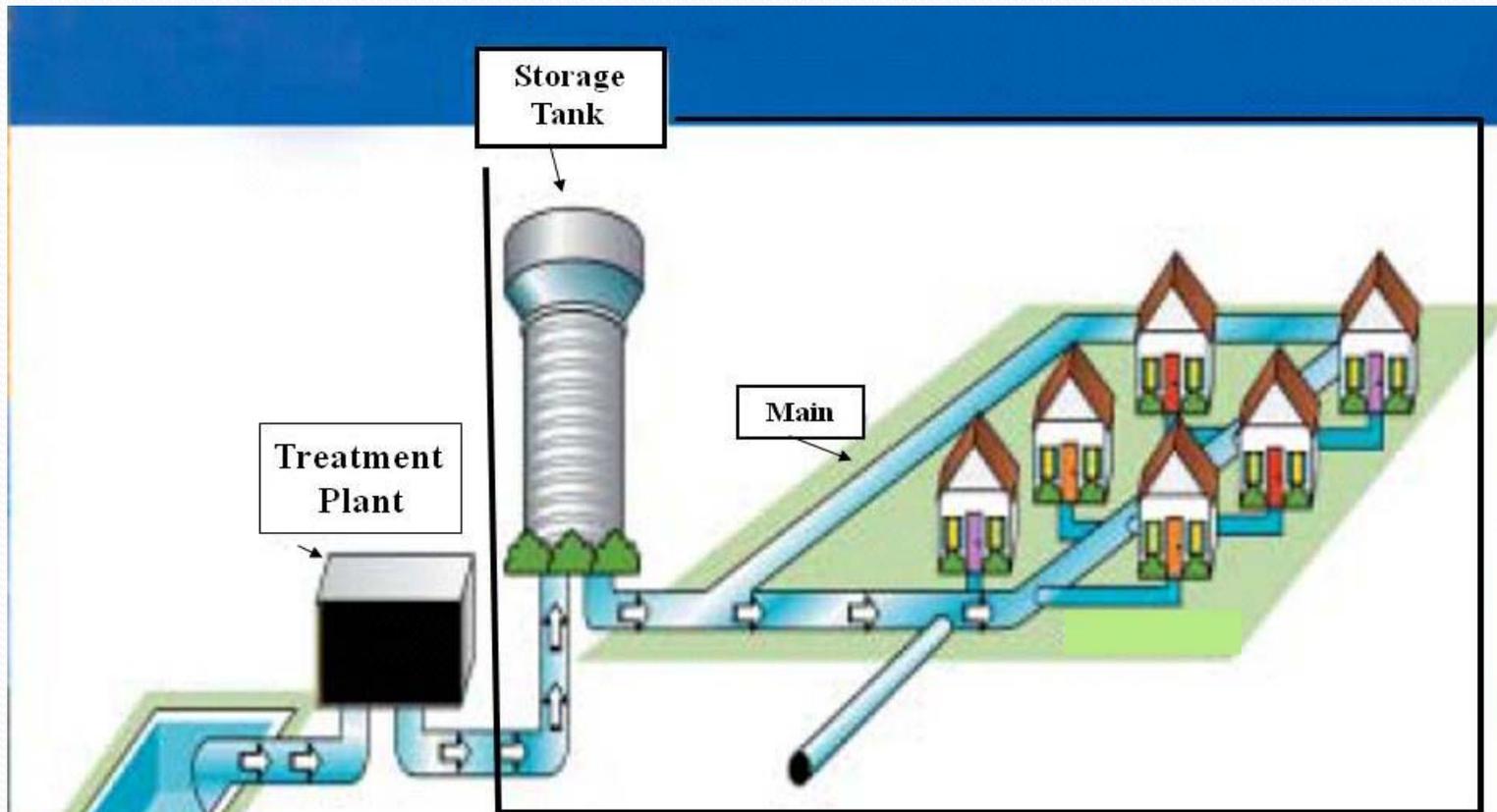


For the next 60 minutes...

- Water utility purpose and operational constraints
- Water conservation impacts on operations
- Rethinking the relationship between water conservation & water operations

**We've got questions!
Who's got answers?**

Modern Pressurized Water Distribution Systems



Note: Pumps and valves are located at a variety of locations throughout the distribution system.

Source: EPA.gov

Generic Water Distribution History

Fire!!!



Generic Water Distribution History

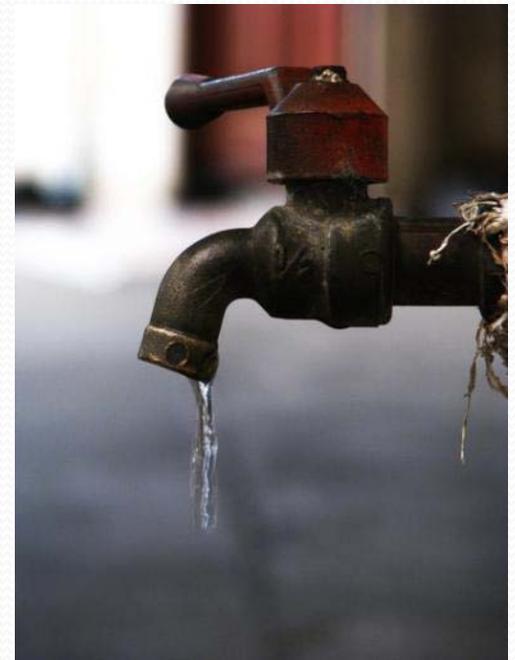
Fire!!!



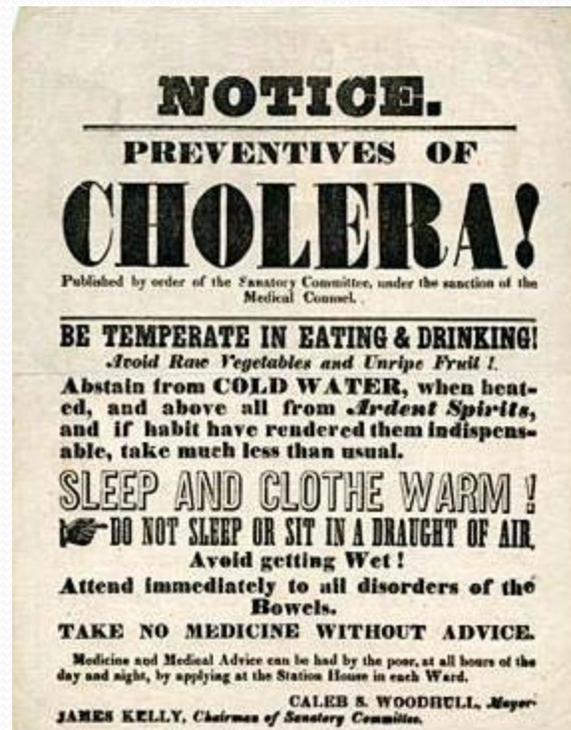
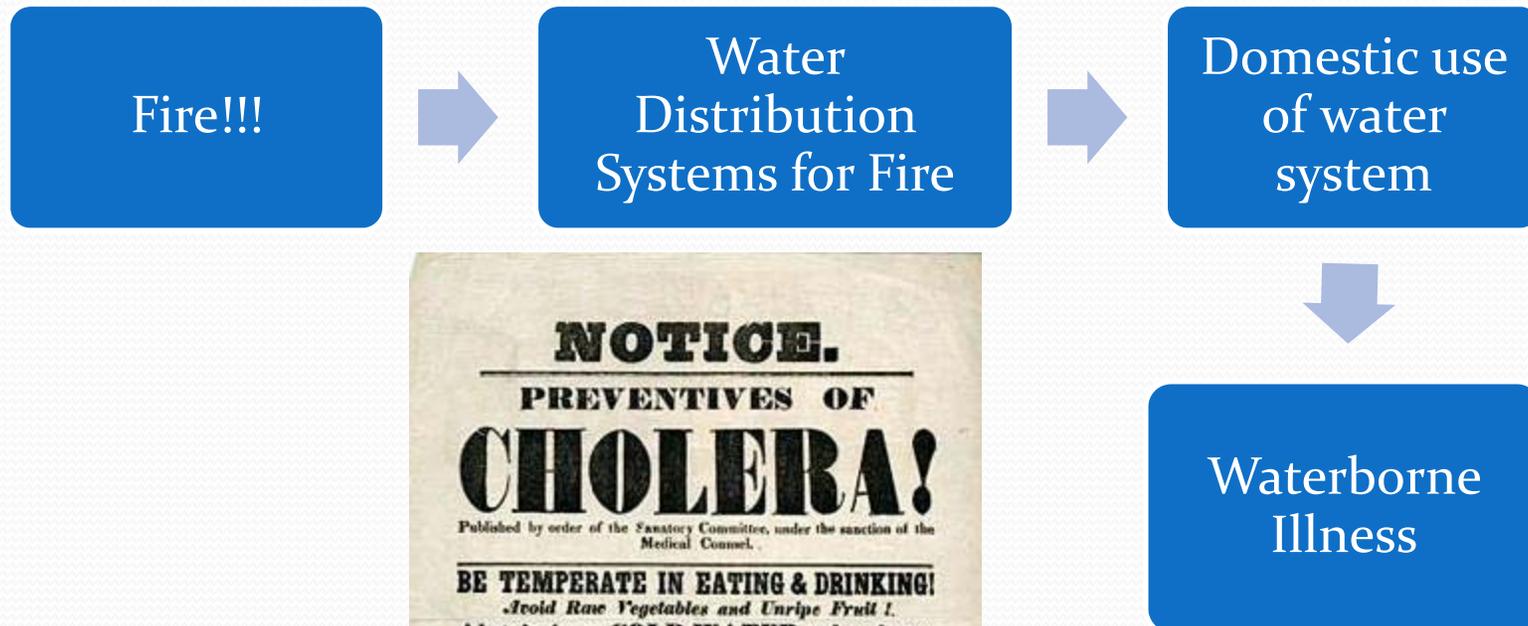
Water Distribution
Systems for Fire



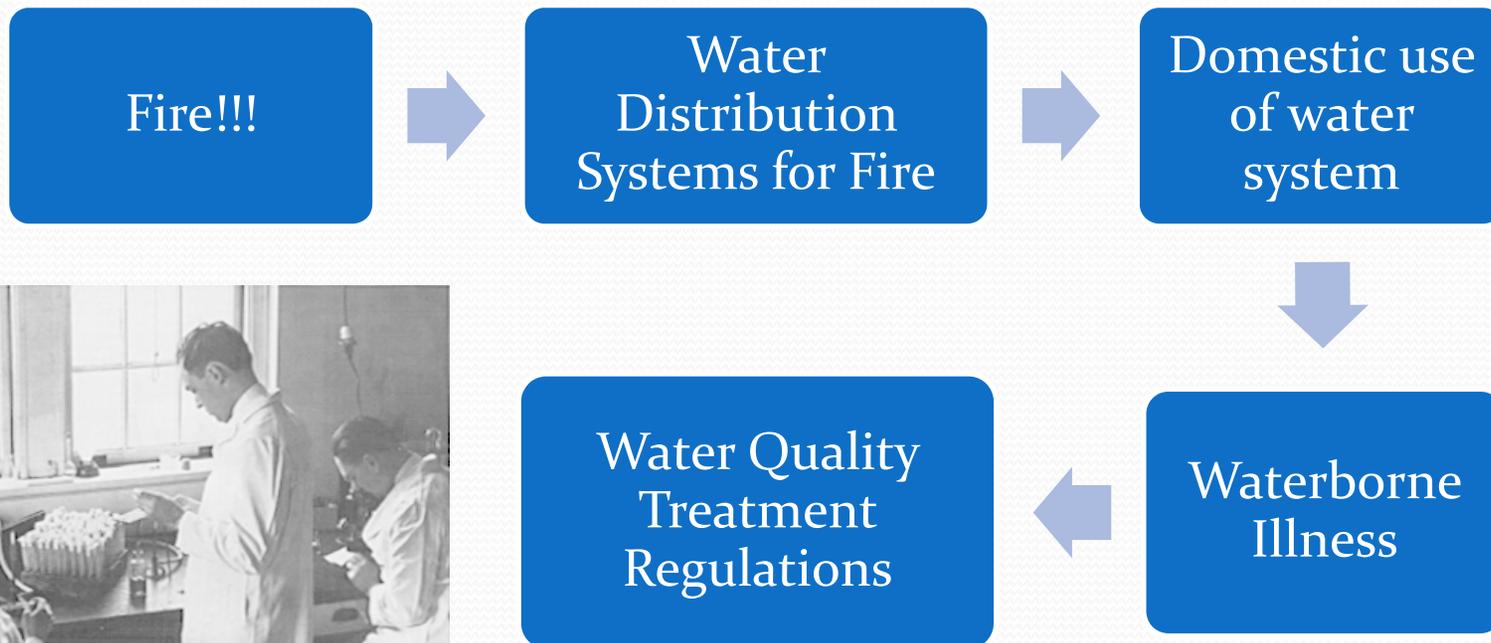
Generic Water Distribution History



Generic Water Distribution History

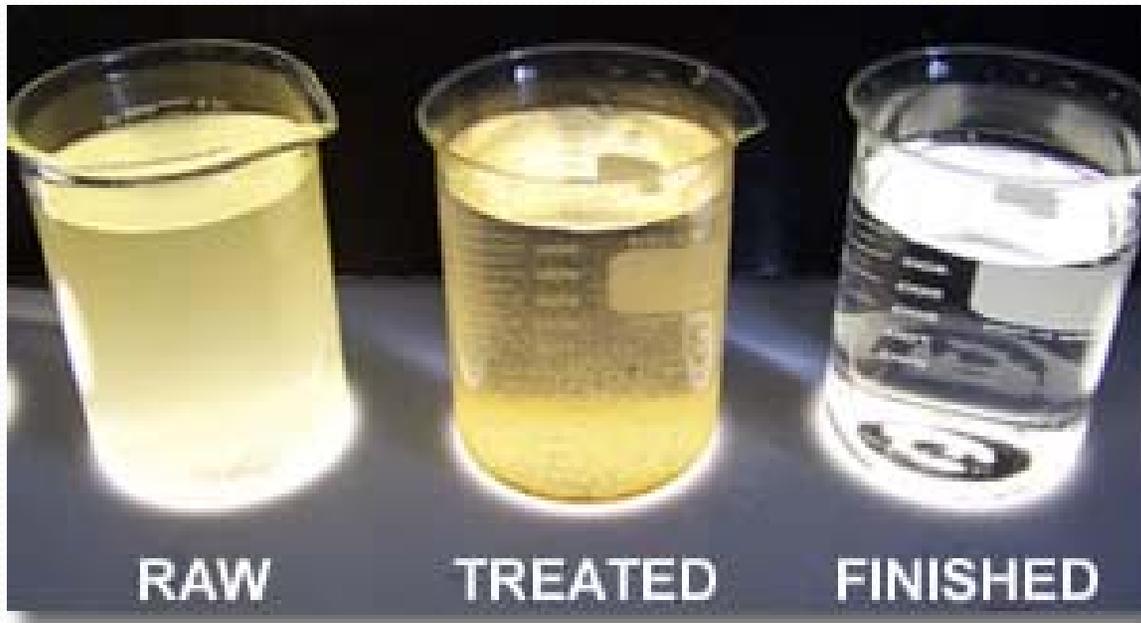


Generic Water Distribution History

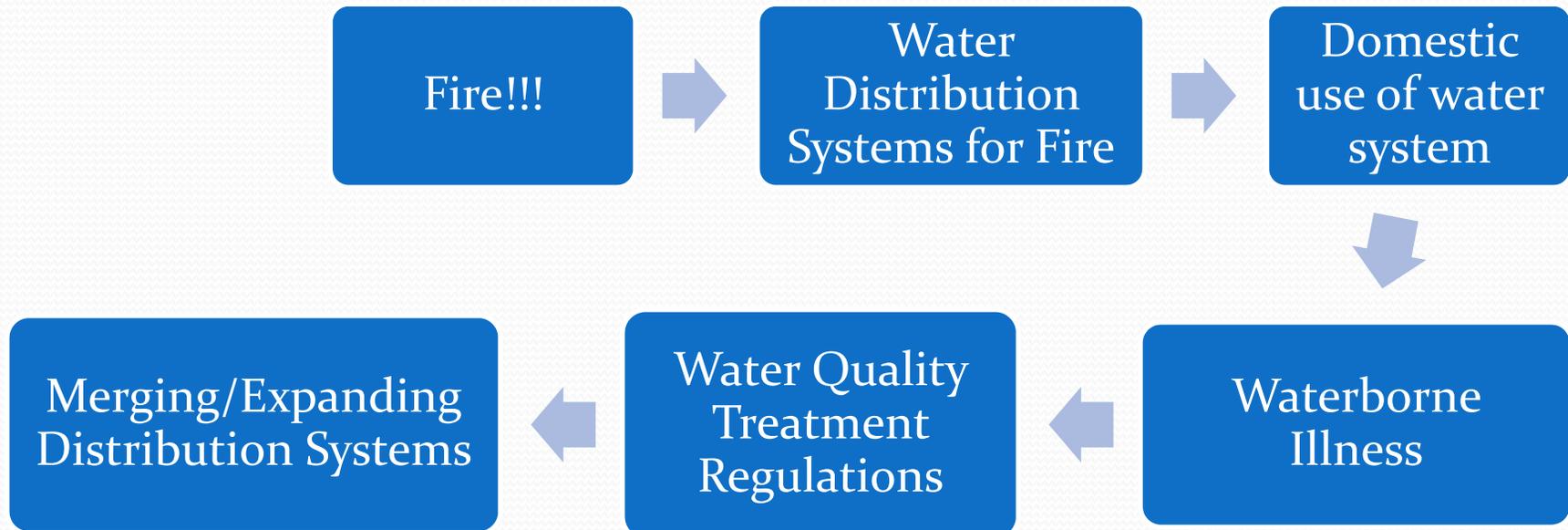


Water quality regulations established for source water

- Safe Drinking Water Act
 - Ever increasing water quality standards
 - High levels of treatment



Generic Water Distribution History



Generic Water Distribution History



Reservoir/Tank Water Quality requires maintenance

- Operate reservoirs to manage turnover
- Redesign reservoirs to enhance mixing
- Spill water to waste



Water System Bands



Daily operations

20 to 30%

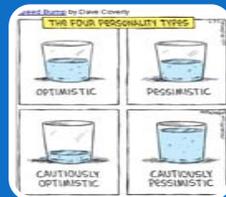


Fire flow

65 to 75%



Emergency storage



“Dead zone”

- Never deplete the tank, no dregs in the distribution system
- Never go to negative pressure

5%

Water quality regulations established for the distribution system

- Maintain chlorine residual throughout the distribution system
 - Re-chlorination stations
- Flushing to purge stale water
 - Automatic flushers
 - Unidirectional flushing



Modern U.S. Water Distribution



- The need for fire suppression was as important as drinking water in developing modern municipal water systems
- Reducing waterborne illness has led to ever increasing water quality requirements

**High volume requires high demand
for maintaining water quality**

High Volume for Fire Flow

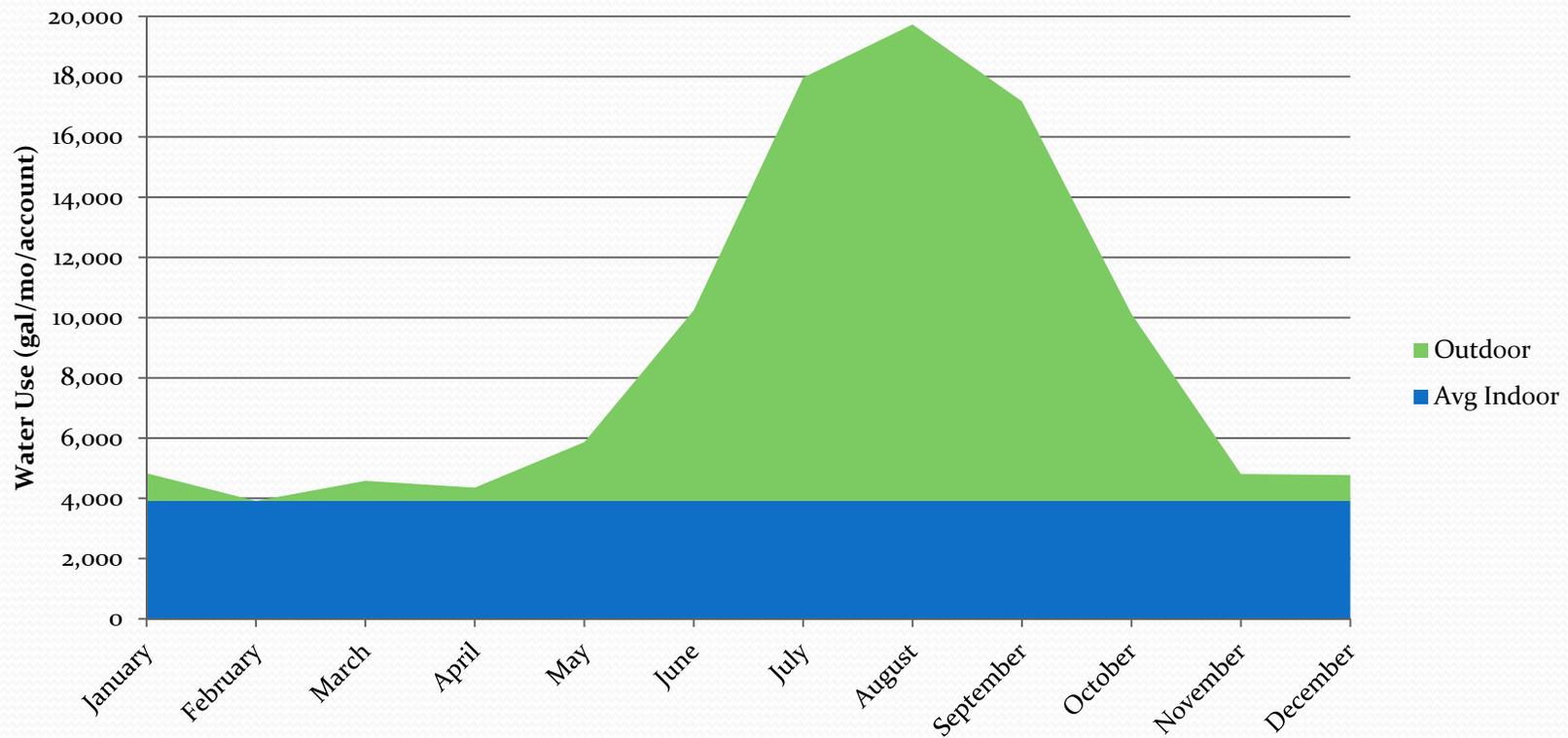
VS

Low Demand for Conservation

- **High Volume** - ISO Fire Flow Standards
 - Fire flow for 2500 sqft 2 story home is 1,250 gallons per minute (gpm)
- **Low Demand** - EPAct 1992 low flow fixture water conservation requirements
 - Max domestic flow for 2500 sqft 2 story home
 - With irrigation 15-50 gpm
 - Without irrigation less than 10 gpm

High water use helps maintain distribution water quality

SFR Monthly Indoor vs. Outdoor Water Use



High Volume for Fire Flow

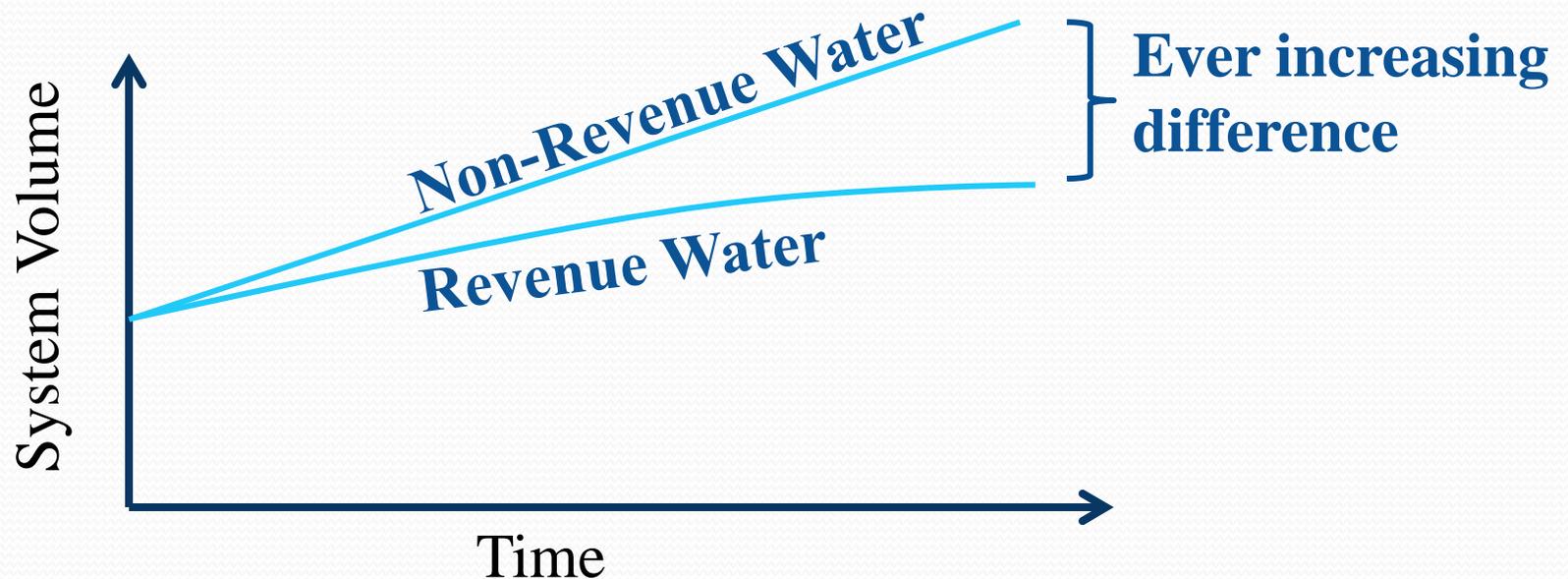
VS

No Demand for Conservation

- **High Volume** - ISO Fire Flow Standards
 - Fire flow for 2500 sqft 2 story home is 1,250 gallons per minute (gpm)
- **No Demand** - Green building or “Net Zero Water”
 - Max domestic flow for 2500 sqft 2 story home
 - Alternate source for irrigation less than 10 gpm
 - Alternate source for everything 0.0 gpm

Water Conservation/Water Quality Paradox

- Maintaining water quality requires water turnover in distribution systems designed for high fire flow requirements
- Water conservation continues to reduce water use
- The result is an ever increasing volume of non-revenue demand



Are we really saving water?

- Is the success of water conservation programs increasing distribution maintenance water use?
- No known studies
- Our preliminary investigation for answers are in no way statistically valid but meant to be food for thought



Water Quality Maintenance

- Maintain chlorine residual throughout the distribution system
 - Re-chlorination stations
- Purging stale water
 - Unidirectional flushing program
 - Automatic flushers



Revenue Impacts

- Water conservation programs have two impacts – both result in lower revenue:
 - Reduce revenue water use
 - Increase non-revenue water use
- Customers are paying for water wasted to maintain quality ... would they rather have used this water they purchased?



Rate Impacts

- How much of the “Basic Charge” is used to maintain fire suppression readiness?
 - Customers think they are paying for water they use when actually paying for fire protection
 - Willingness to pay issues



Reclaimed Water Impacts

- Reduced domestic flows will reduce the availability of reclaimed water
- Fulfilling existing contracts could become an issue





Reuse Opportunities

- Flushing of drinking water system also used for flushing maintenance of **wastewater system**
- Automatic flushers redirected from waste to alternate source uses such as irrigation
- Reclaimed water systems for fire protection?

Rethink Distribution Design

- Aging infrastructure replacement creates a huge opportunity to rethink water distribution system design
- At what point does it make sense to create a dual system?
 - Potable
 - Non potable: fire, irrigation, etc.





Food & Drink For Thought

- The luxury of working in “silos” is over
- Holistic water utility management requires cooperation between:
 - Supply-side and demand-side departments
 - Water, wastewater, reuse services
- Community conversation to reimagine/redesign basic municipal water system
- Information flow about water flow



Questions?

Contact information

Jill Hoyenga 541-685-7157

jill (dot) hoyenga (at) eweb (dot) org

Rachel Lanigan 503-227-1885

rланigan (at) carollo (dot) com