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Eugene Water & Electric Board

The Water Conservation/Water Quality Paradox

Eugene Water & Electric Board/Carollo Engineers

The Water Conservation/Water Quality Paradox

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Water Smart Innovations 2013



Introductions

- About Eugene Water & Electric Board
- About Carollo Engineers

For the next 30 minutes...

- Water utility purpose and operational constraints
- Water conservation impacts on operations
- Water utility operational opportunities for water conservation
- We've got questions! Who's got answers?

Water System Bands



Daily operations

20 to 30%



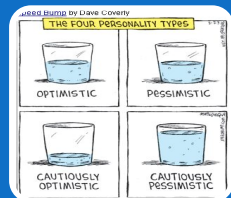
Fire flow

65 to 75%



Emergency storage

5%



“Dead zone”

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

Modern U.S. Water Distribution



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

The paradox – large supplies are needed for fire suppression with ever declining demands from conservation ... the result is ever an increasing volume of wasted water to maintain quality.

High Volume for Fire Flow VS Low Flow for Conservation

- **High Volume** - ISO Fire Flow Standards
 - Fire flow for 2500 sqft 2 story home is 1,250 gallons per minute (gpm)
- **Low Flow** - 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 Volume for Fire Flow

VS

No Flow for Conservation

- **High Volume** - ISO Fire Flow Standards
 - Fire flow for 2500 sqft 2 story home is 1,250 gallons per minute (gpm)
- **No Flow** - 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 Quality

- Safe Drinking Water Act
 - Ever increasing water quality standards
 - High levels of treatment
 - Reservoirs managed to maintain water quality
 - Testing throughout the distribution system to assure water quality to customers



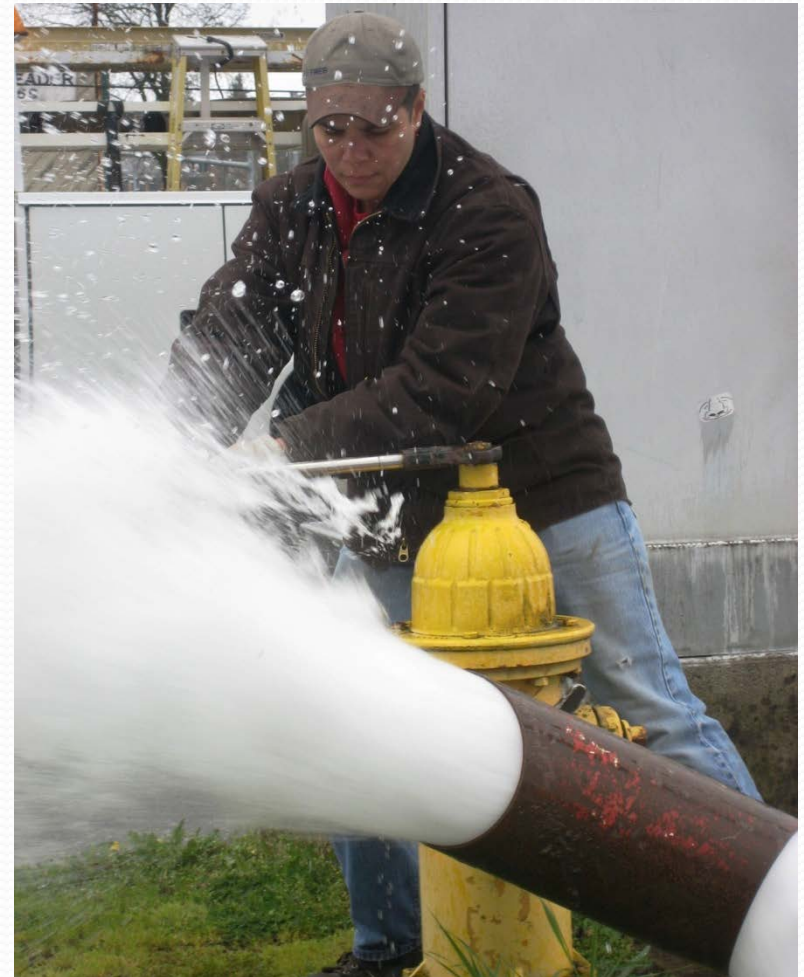
Water Quality Management

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



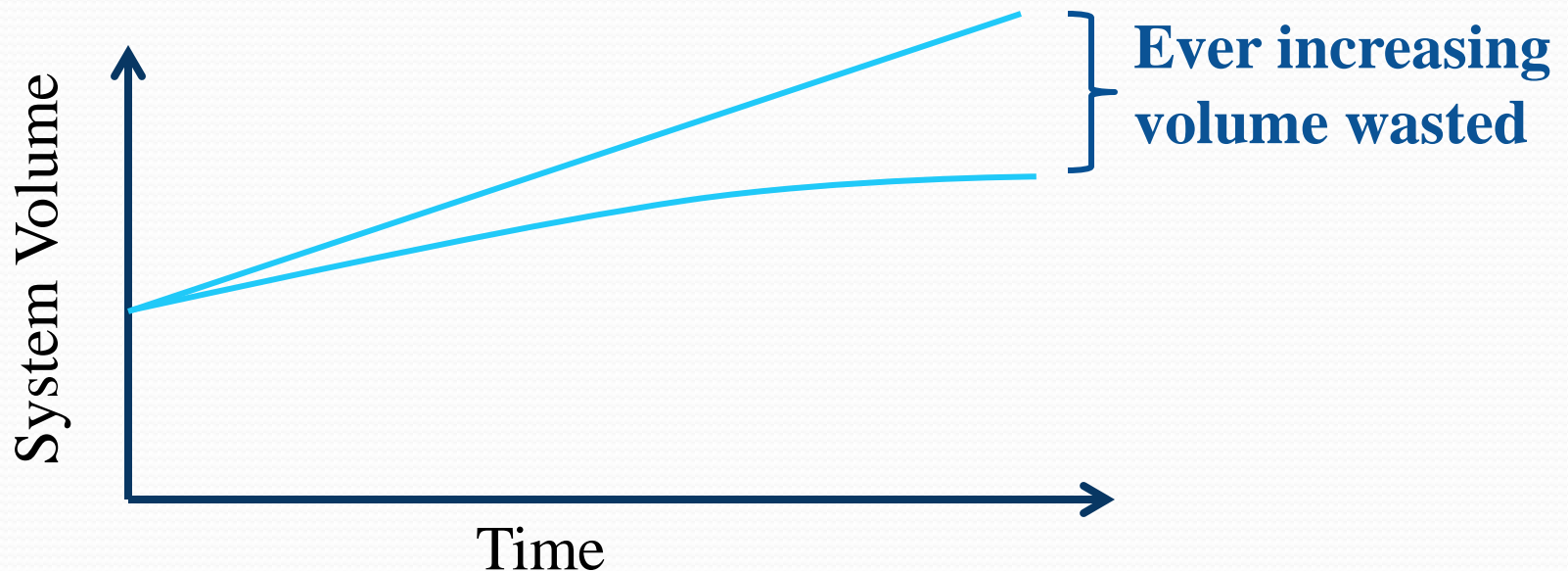
Water Quality Management

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



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 wasted



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

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



Reuse Opportunities

- Unidirectional 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:
 - Non potable uses
 - Potable use



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?

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