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Pressure Monitoring and Management for Water Loss Control

Sue Mosburg
Sweetwater Authority

Importance of Maintaining Adequate Pressure

Fundamental to providing safe drinking water

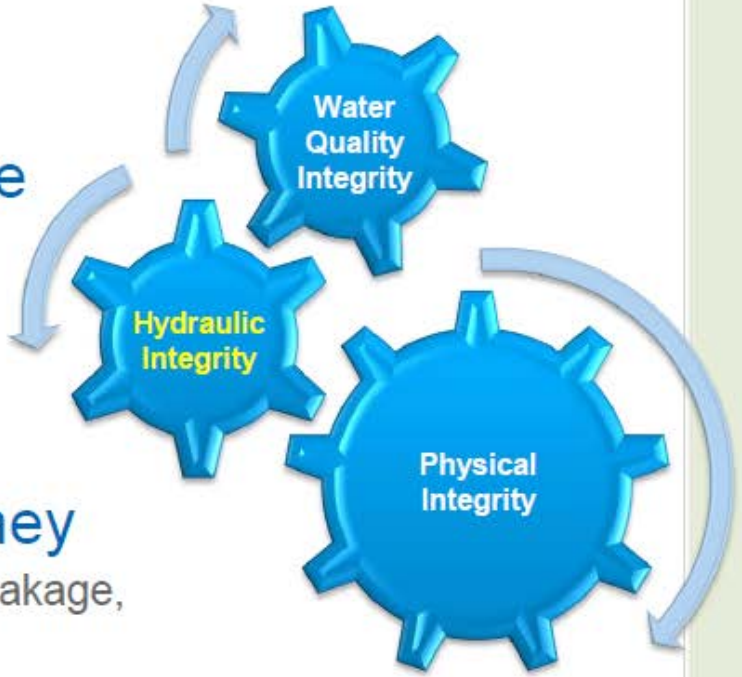
- Loss of pressure can allow intrusion of contaminants in to the distribution system

Fluctuations in pressure can affect the physical integrity of pipes

- Pressure spikes can result in leaks, main breaks, and premature failure

Pressure management can save money

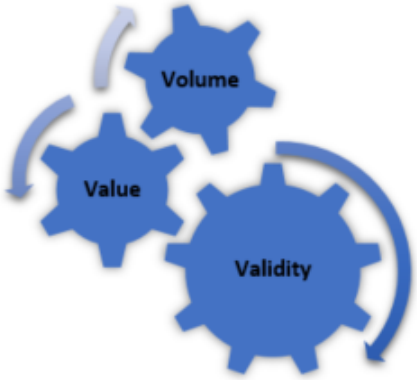
- Reduced energy costs, system maintenance, leakage, customer complaints, water quality problems



National Research Council. 2006. *Drinking Water Distribution Systems Assessing and Reducing Risks.* National Academy of Science.

Water Balance

- AWWA Annual Water Audit
- Real Losses v. Apparent Losses
- 3Vs



Validate & Disaggregate

- Validation
  - Level 1
  - Level 2
  - Level 3
- Real Loss
  - Background
  - Reported
  - Hidden
- Apparent Loss
  - Theft
  - Meter Inaccuracy
  - Data Handling

Cost-Benefit & Targets

- Value Lost Water/ Revenue
- Evaluate Cost of Intervention

Implement Interventions

- Real Losses:
  - Active Leak Detection
  - Pressure Optimization
  - Repair Time Reduction
- Apparent Losses:
  - Theft Reduction
  - Meter Replacement & Repair
  - Revenue Protection

Water Research Foundation

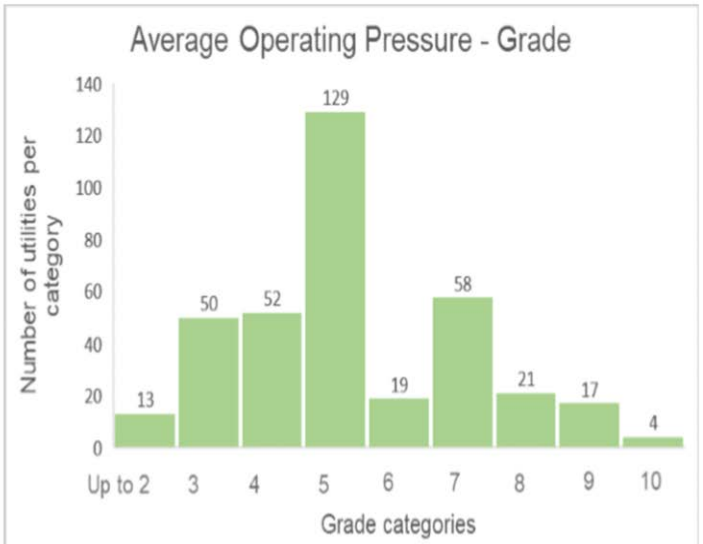
GUIDANCE ON IMPLEMENTING AN EFFECTIVE WATER LOSS CONTROL PLAN (RFP 4695)

Why the Regulators Care

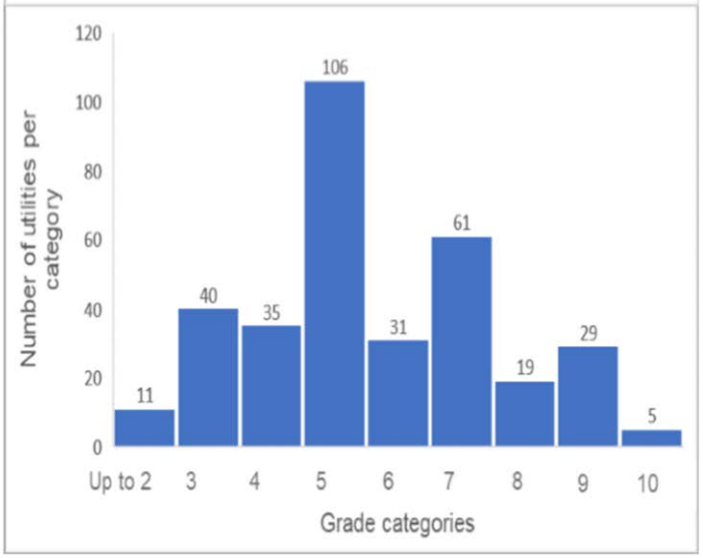
1. Small pressure reductions can result in large water loss reductions
2. Pressure management can reduce the potential for main breaks
3. District Metered Areas - Pressure monitoring can identify leaks when they occur
4. Optimized pressure to customers reduces water waste

Pressure Management Data Validity Grades

2016 - 17



2017 - 18



Effective pressure controls separate different pressure zones

Moderate pressure variation across the system

Occasional open boundary valves are discovered that breech pressure zones

Basic telemetry monitoring of the distribution system logs pressure data electronically

Pressure data gathered by gauges or dataloggers at fire hydrants or buildings when low pressure complaints arise, and during fire flow tests and system flushing

Reliable topographical data exists.

Average pressure is calculated using this mix of data

Average Operating Pressure Input Value & Data Validity Grade

Calculated as a weighted average where possible - pressure in areas with more infrastructure have greater weight.

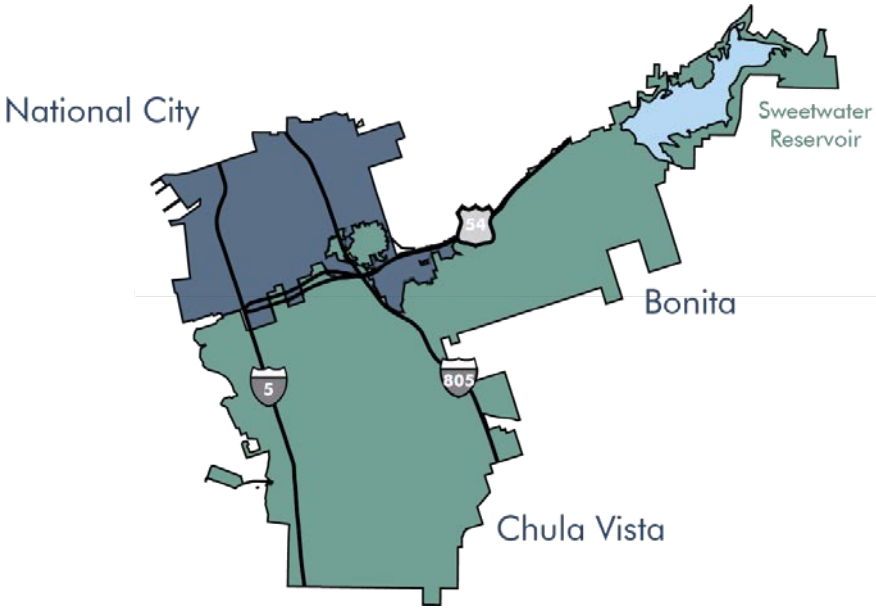
- How is system pressure managed?
- Are there pressure zones?
    - How are zones defined & separated?
    - Are they discrete?
- How does pressure vary throughout the system?
- How and where is pressure data collected?
- How was average system pressure determined?
- Does the system have a hydraulic model in place?
    - How is the hydraulic model calibrated?

2 Input is *estimated.*

4 "Basic coverage" - the system that has telemetry or pressure logging at boundary points (PRVs, booster pumps, supply locations).
Input is *inferred* from the data.

6 "Well-covered" telemetry or pressure logging beyond the boundary points, targeted in some portions of the system but not representing the full pressure profile.
Input is *calculated* from the data.

About Us



- Safe, reliable water since 1977
- 32 square mile service area
- Approx. 190,000 customers
- 2 dams, 2 reservoirs, 20 storage tanks and 17 pump stations
- Surface water treatment, groundwater desalination, freshwater wells and imported water
    - Distribution System:
        - 21 pressure zones
        - 400+ miles of pipeline
        - Average pipe age 44 years
        - 33,613 customer meters
        - 17,000 af annual production
        - 15.5 mgd average production

A History of Pipeline Investments

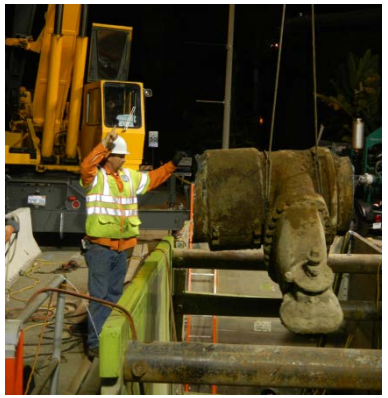
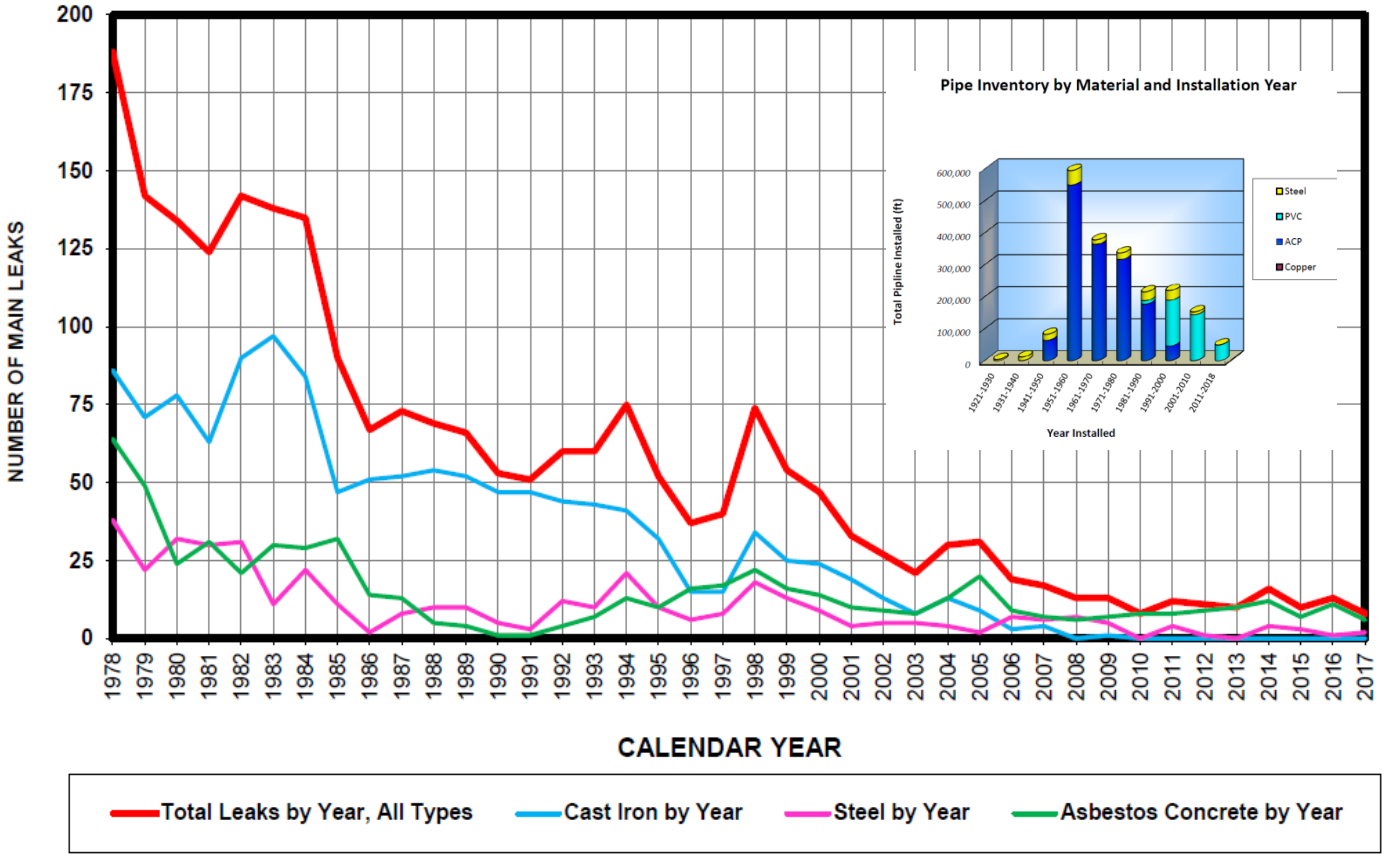
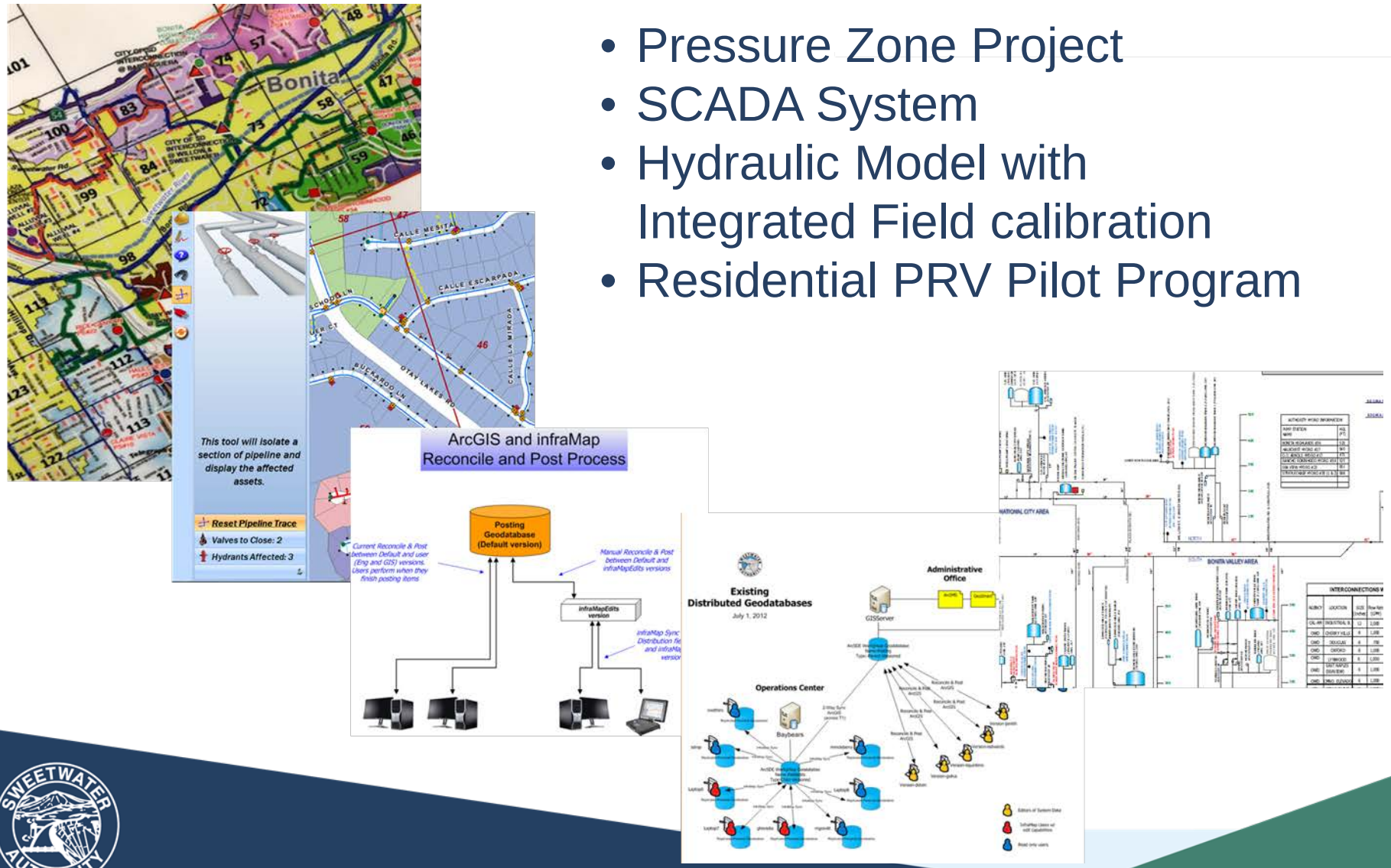


Figure 2-1
Sweetwater Authority Water Leaks (1978-2015)



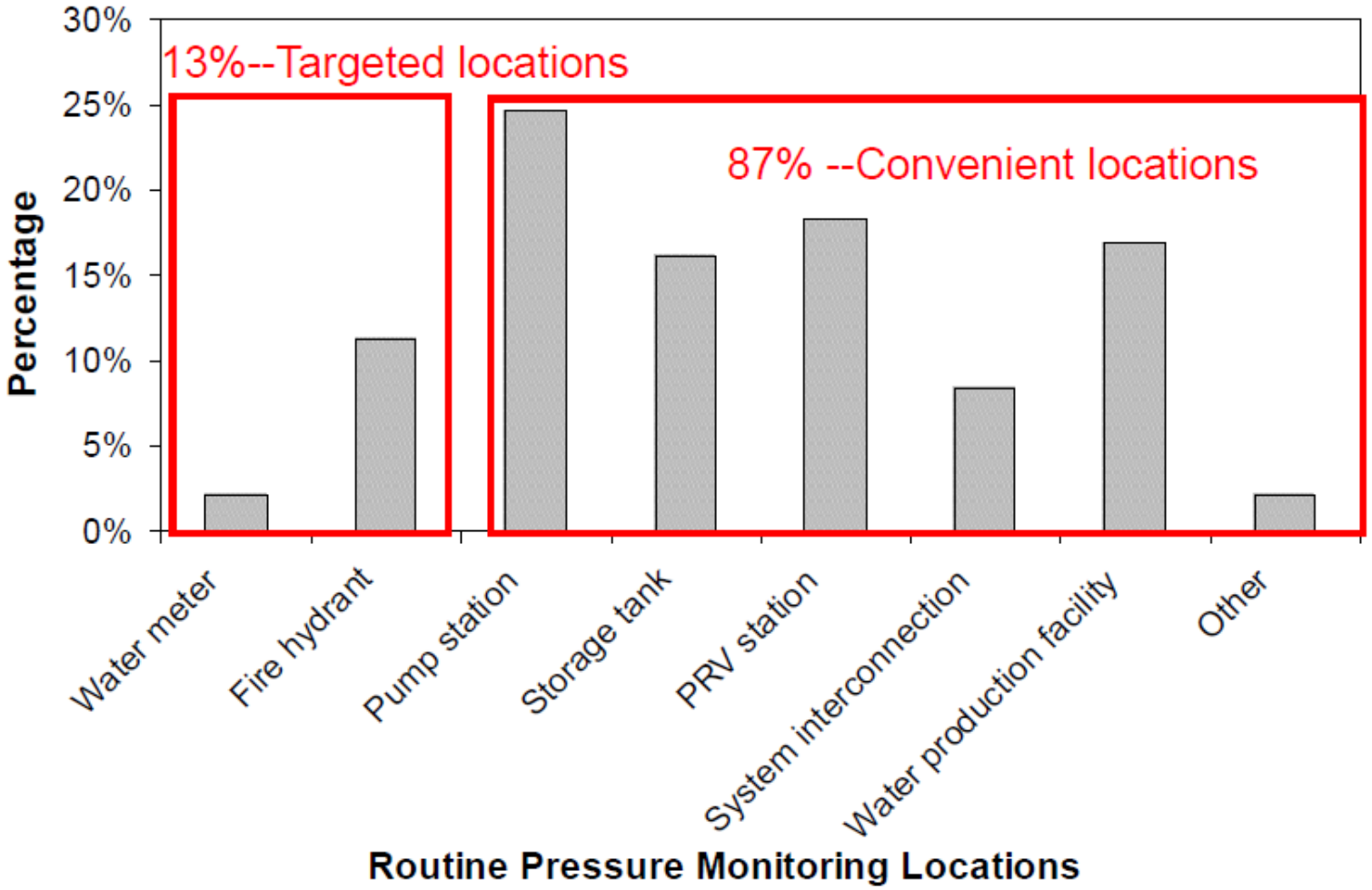
Pressure Management Activities



- Pressure Zone Project
- SCADA System
- Hydraulic Model with Integrated Field calibration
- Residential PRV Pilot Program

Survey – Pressure Monitoring

- **Pressure monitoring locations**



Pressure Management Options

1. Employ telemetry or pressure logging at all boundary points (PRVs, booster pumps, supply locations)
2. Install additional pressure monitors
3. Review pressure and fire flow requirements per zone
4. Review storage analysis & hydraulic analysis calculations
5. Examine break/leak trends in relationship to pressure
6. Consider a hydraulic model – integrate pressure measurement into routine work activities & continually recalibrate the model
7. Control pressure transients from pumps & valve operations
8. Consider proactive/automated pressure control in response to system demands and/or historical periods of reduced use

Every system is different from each other
and there is no single solution that will address the problems experienced by the particular water supplier.

While it must be acknowledged, that pressure management is not the answer in every case,
it is often one of the most cost effective measures to reduce leakage and wastage that can be considered.

IMPLEMENTATION OF PRESSURE MANAGEMENT IN MUNICIPAL WATER SUPPLY SYSTEMS
R S Mckenzie & W Wegelin (2009)

American Water Works Association

NORTH AMERICAN WATER LOSS 2019

NASHVILLE, TENNESSEE
DECEMBER 3 – 5

The North American Water Loss Conference (NAWL) will assemble policy and technical experts on non-revenue water management in North America.

Partnering Organization:

Alliance for Water Efficiency

EPA WaterSense

www.northamericanwaterloss.org

American Water Works Association
California-Nevada Section

Thank YOU

Sue Mosburg
Sweetwater Authority
smosburg@sweetwater.org
619-409-6882

California Water Loss Control Collaborative
californiawaterloss.org