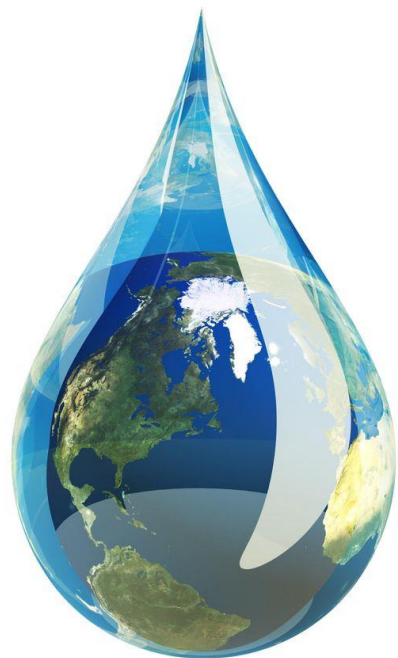


# Water Loss Management to Reduce Non-Revenue Water



Presented by:

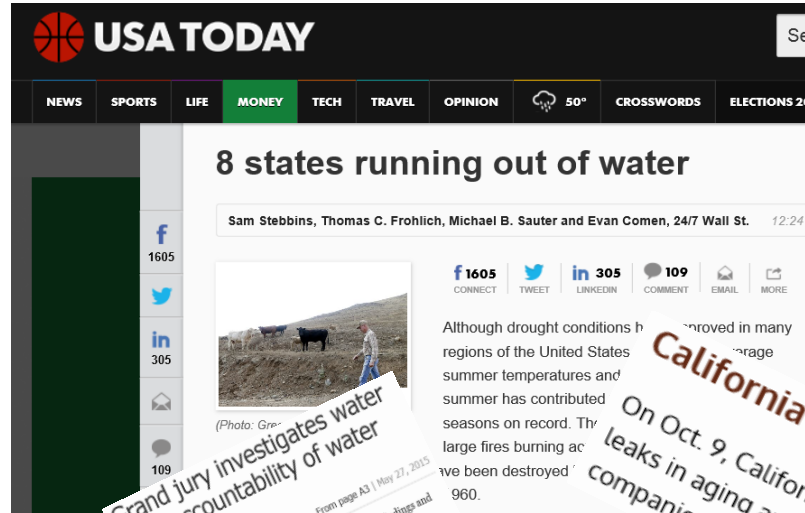
**Jesse Morris**  
**540 Technologies**  
Technical Sales  
Consultant



[www.540Technologies.com](http://www.540Technologies.com)

# "When the well is dry, we learn the worth of water"

-- Benjamin Franklin --



Grand jury investigates water loss, accountability of water systems

By Kevin W. Green

FAIRFIELD — The Solano County grand jury released its findings and recommendations Tuesday in its investigation of water loss and accountability of municipal water systems in the county.

Annual water loss in the seven cities within the county ranged from 9 percent to 25 percent, according to the grand jury report.

Water loss was defined as the difference in the amount of water that is treated by each municipality and the amount of water used that is billed to the consumer. The current industry goal for North American water systems is to limit losses to 10 percent, the report indicated.

Distribution pipeline leaks and inaccurate water meters were found to be the two main causes of water loss in all the cities, according to the report.

California law requires utilities to report water loss

On Oct. 9, California Gov. Jerry Brown signed into law a measure aimed at reducing leaks in aging and cracked water pipes in hundreds of city water systems. The bill requires companies to audit their systems and report their annual water loss to the state.



Environmental Issues > Water Main Page > All Water Documents

## Cutting Our Losses

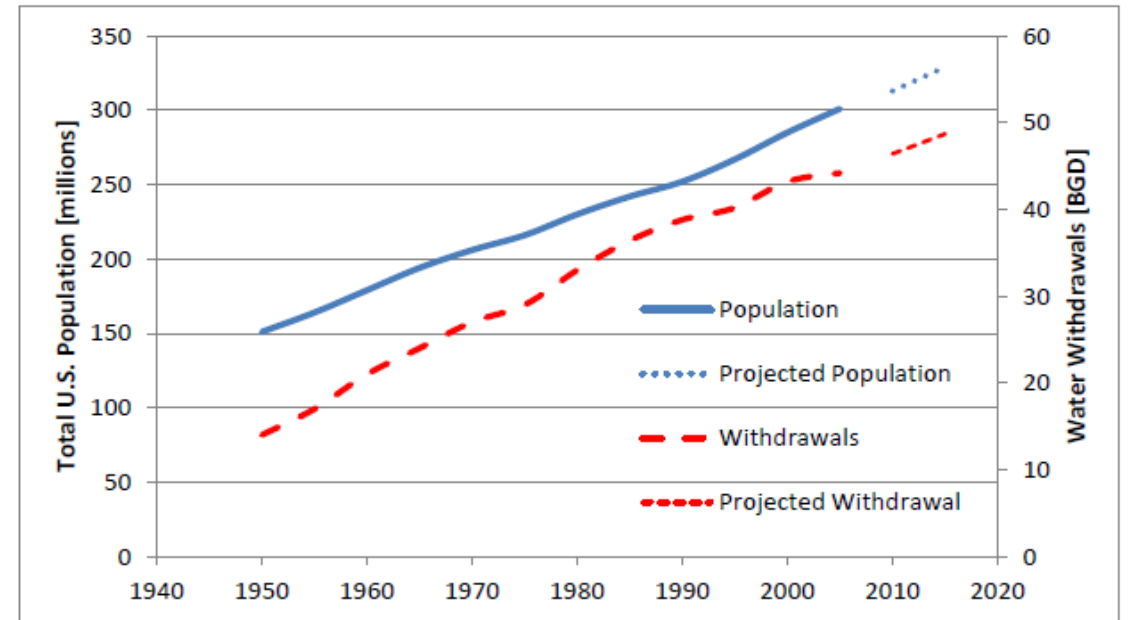
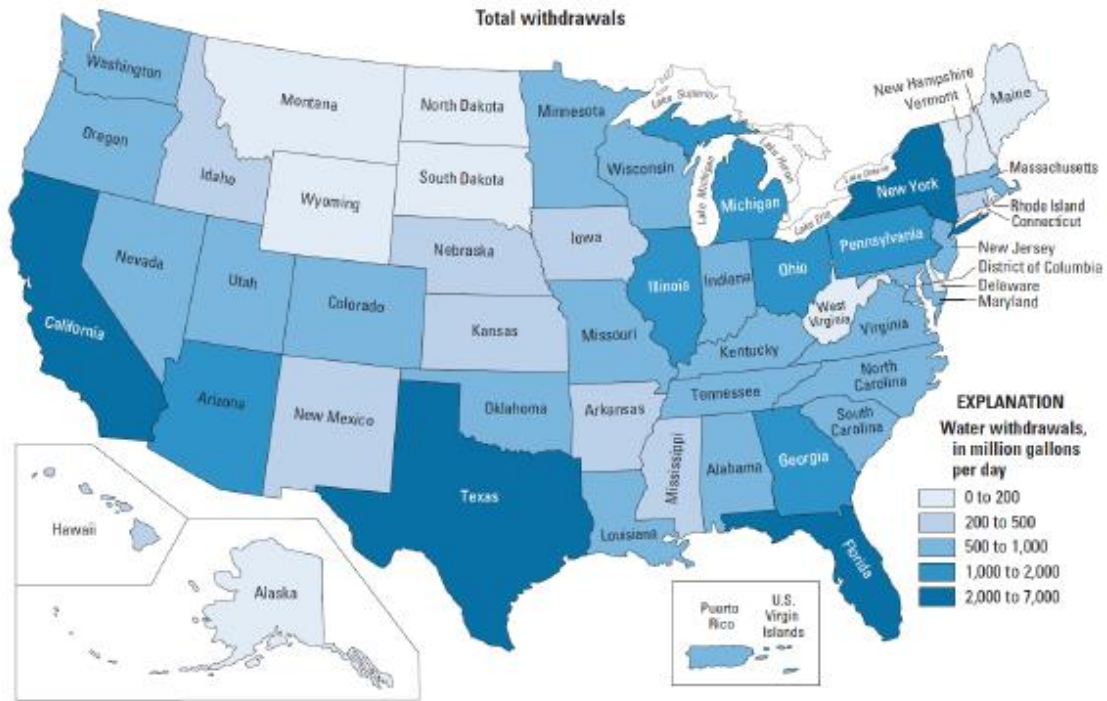
State Policies to Track and Reduce Leakage from Public Water Systems

Water system leaks. Altogether, billions of gallons of water are lost each day. States and communities contend with the twin threats of aging infrastructure and leaky water systems threaten the future of our water supply.



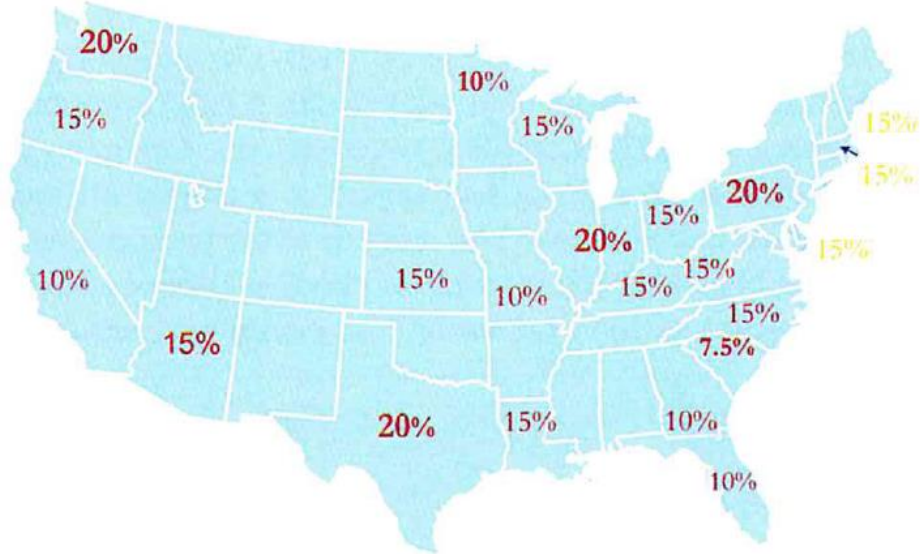


# Usage

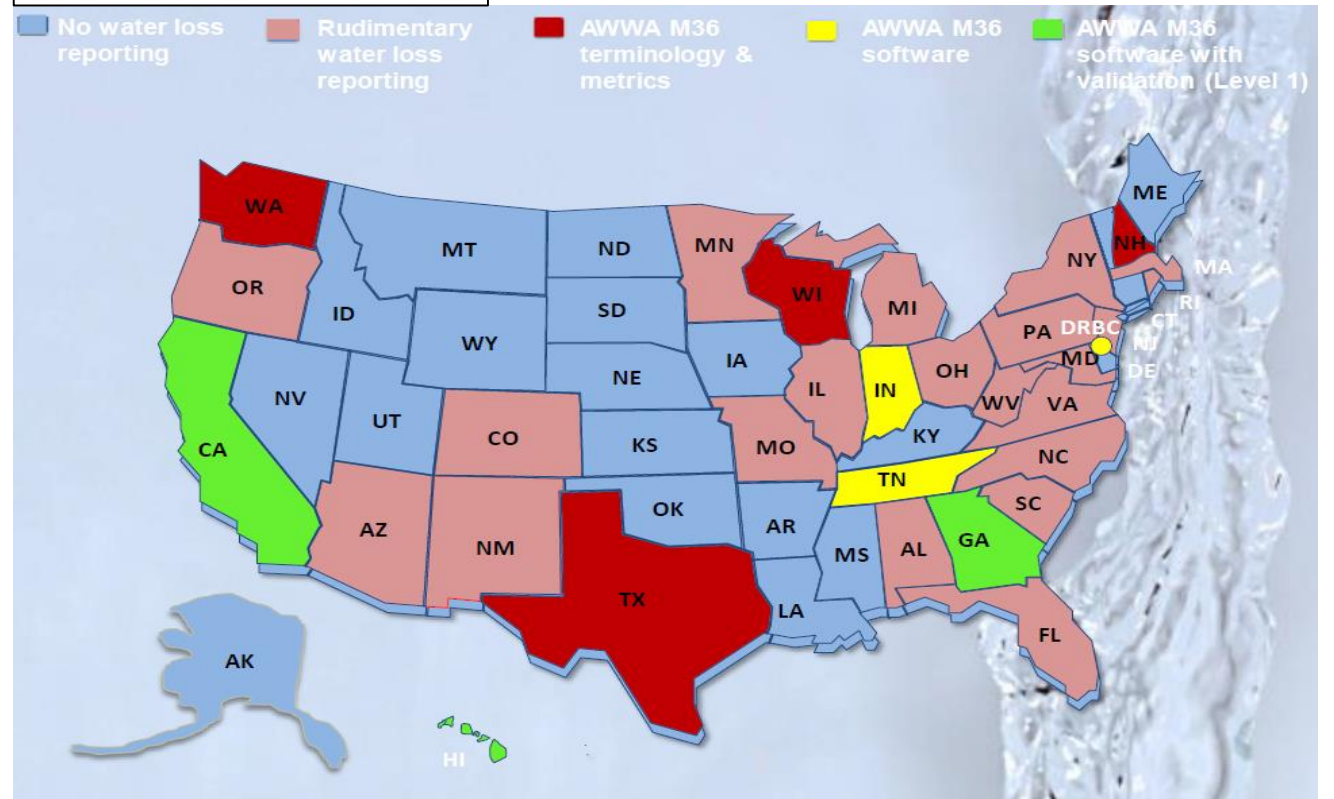


# Policy

**Figure 2: 2002 states survey of “unaccounted-for water” standards**



## Water Loss Reporting

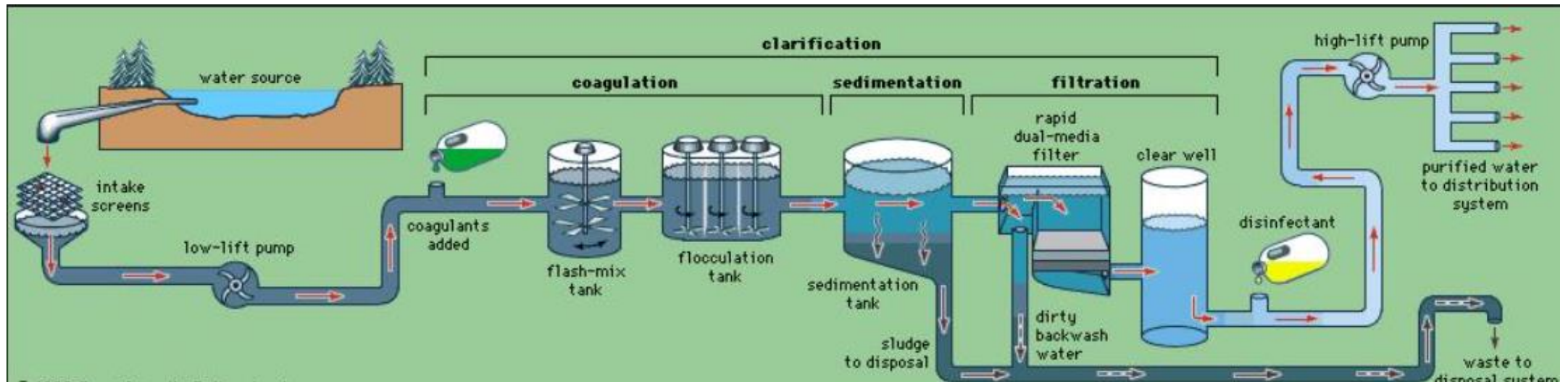


Source : Will Jernigan, AWWA  
National Water Loss Committee



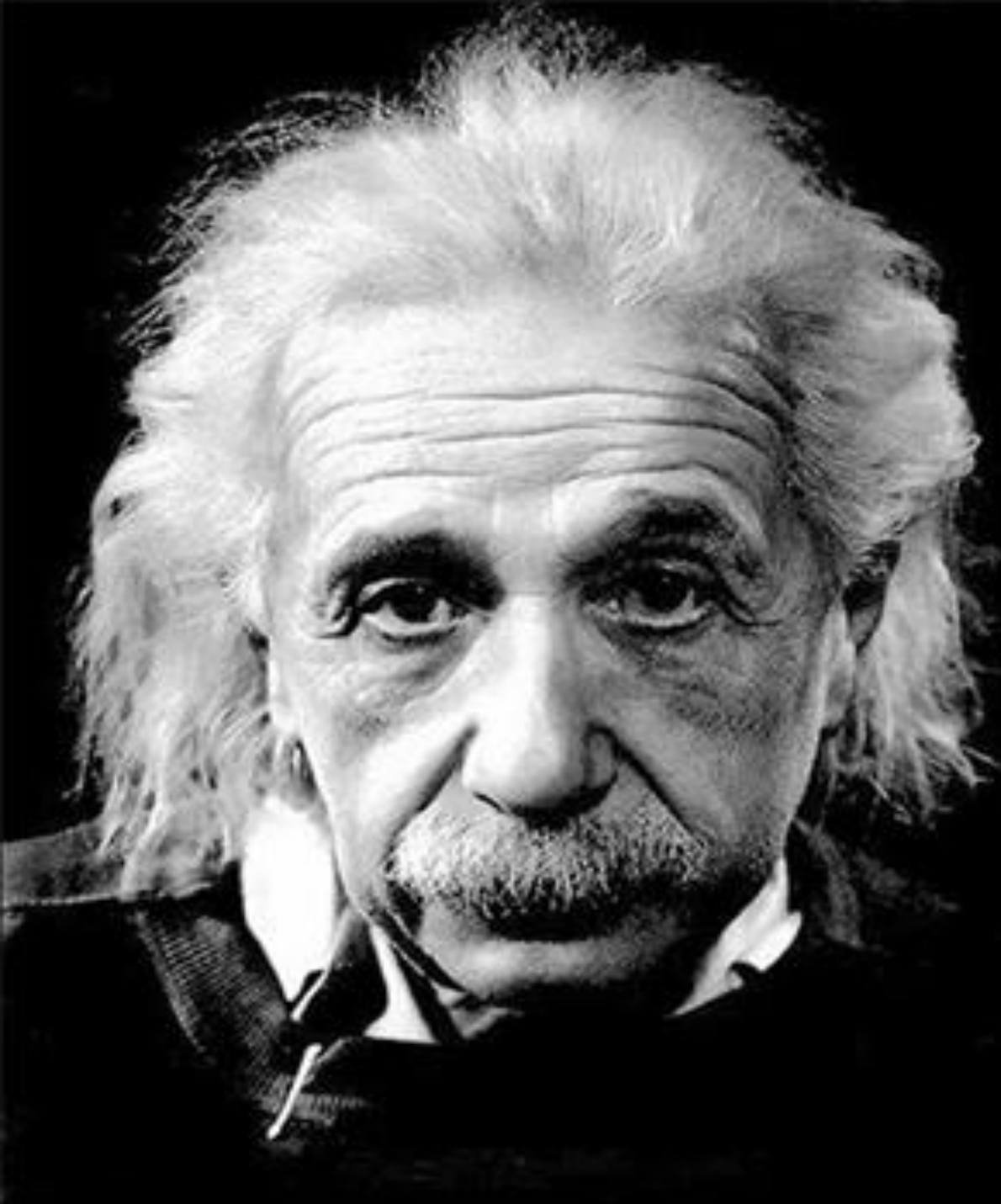
# Treatment & Distribution Cost

Surveys of utilities have revealed treatment and distribution costs ranging from \$1.00 - \$4.00 / 1,000 gallons (higher for consecutive systems)



# Treatment & Distribution Cost

	Treatment & Distribution Cost							
MGD Treated and Distributed	<u>Daily</u> Loss at 20%				<u>Yearly</u> Loss at 20%			
	\$1.00	\$2.00	\$3.00	\$4.00	\$1.00	\$2.00	\$3.00	\$4.00
0.1	\$20.00	\$40.00	\$60.00	\$80.00	\$7,300.00	\$14,600.00	\$21,900.00	\$29,200.00
0.5	\$100.00	\$200.00	\$300.00	\$400.00	\$36,500.00	\$73,000.00	\$109,500.00	\$146,000.00
1	\$200.00	\$400.00	\$600.00	\$800.00	\$73,000.00	\$146,000.00	\$219,000.00	\$292,000.00
5	\$1,000.00	\$2,000.00	\$3,000.00	\$4,000.00	\$365,000.00	\$730,000.00	\$1,095,000.00	\$1,460,000.00
10	\$2,000.00	\$4,000.00	\$6,000.00	\$8,000.00	\$730,000.00	\$1,460,000.00	\$2,190,000.00	\$2,920,000.00
50	\$10,000.00	\$20,000.00	\$30,000.00	\$40,000.00	\$3,650,000.00	\$7,300,000.00	\$10,950,000.00	\$14,600,000.00
100	\$20,000.00	\$40,000.00	\$60,000.00	\$80,000.00	\$7,300,000.00	\$14,600,000.00	\$21,900,000.00	\$29,200,000.00



# Insanity:

Doing the same  
thing over and over  
again and expecting  
different results.

Albert Einstein



# How Do We Eliminate The Loss ?

- Identify Water Loss (Water Audit)
- Implementation of Leak Detection Program
- Pressure Management



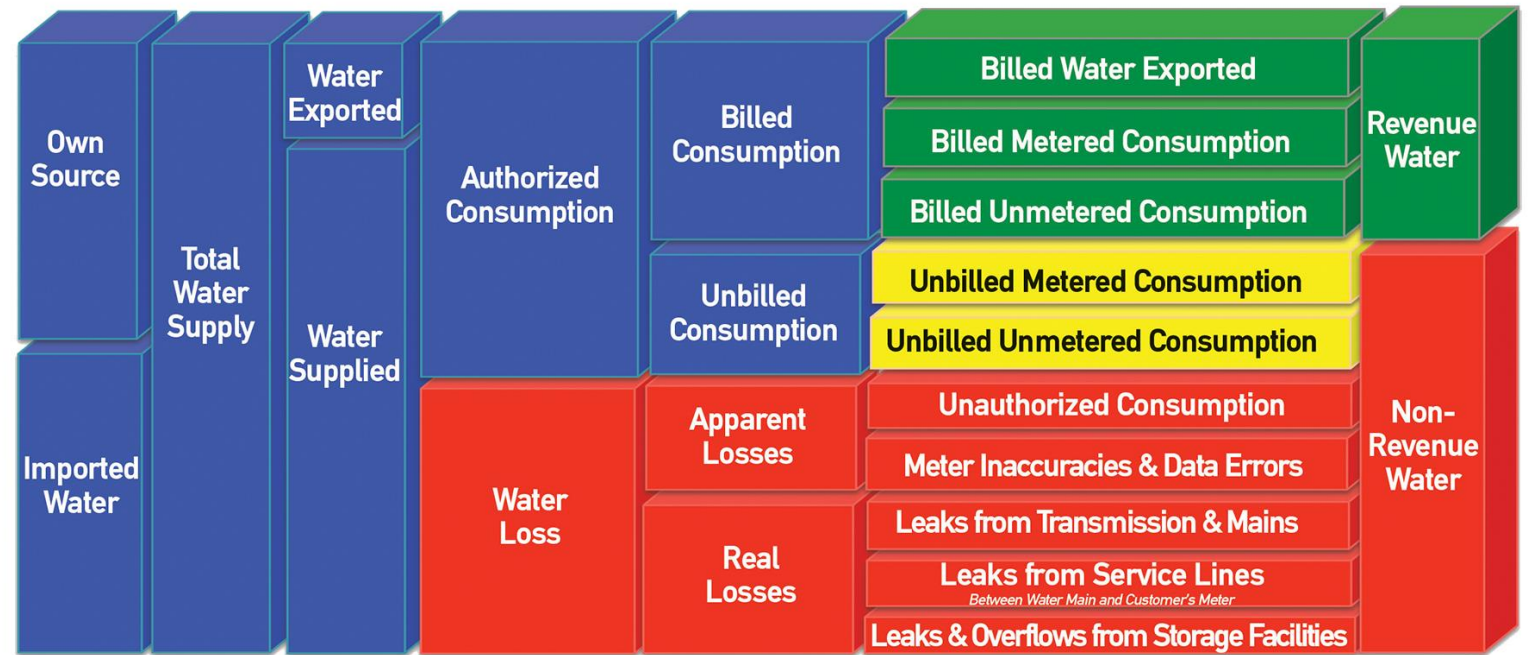
# Water Audit

- System owner must quantify water loss

AWWA M36

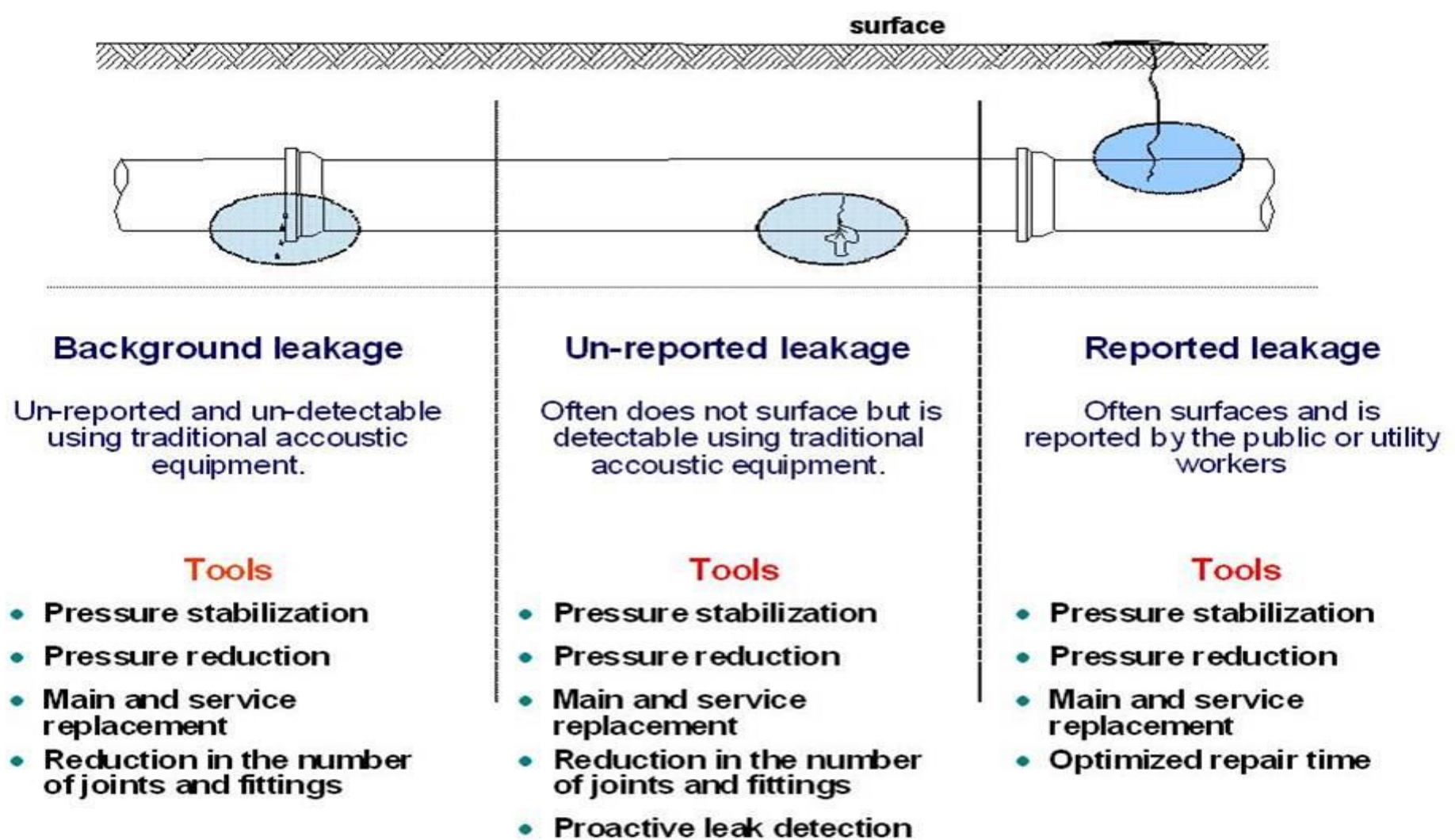
*Water Audits and  
Loss Control Programs*

4th Ed. (2016)



# Water Audit

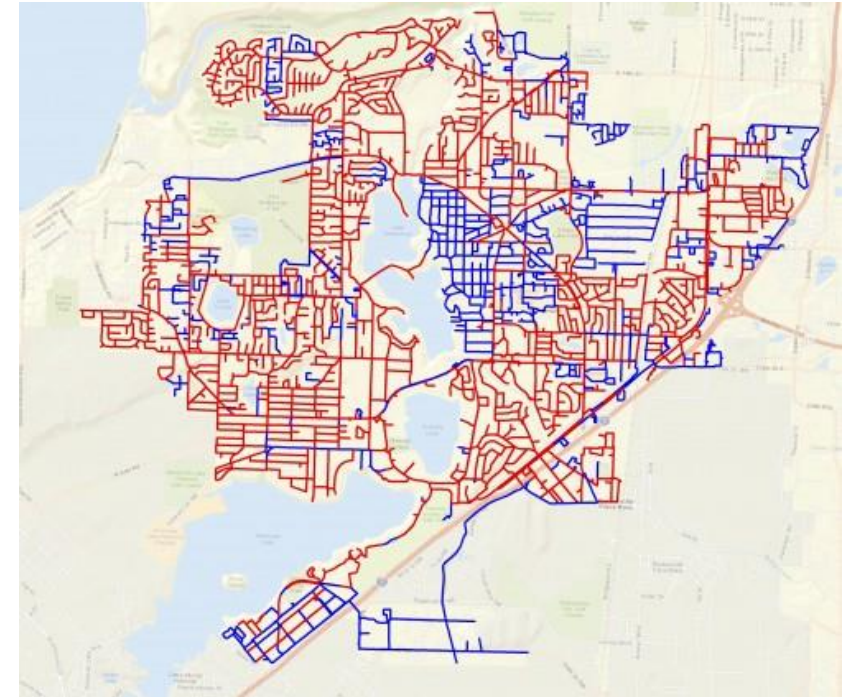
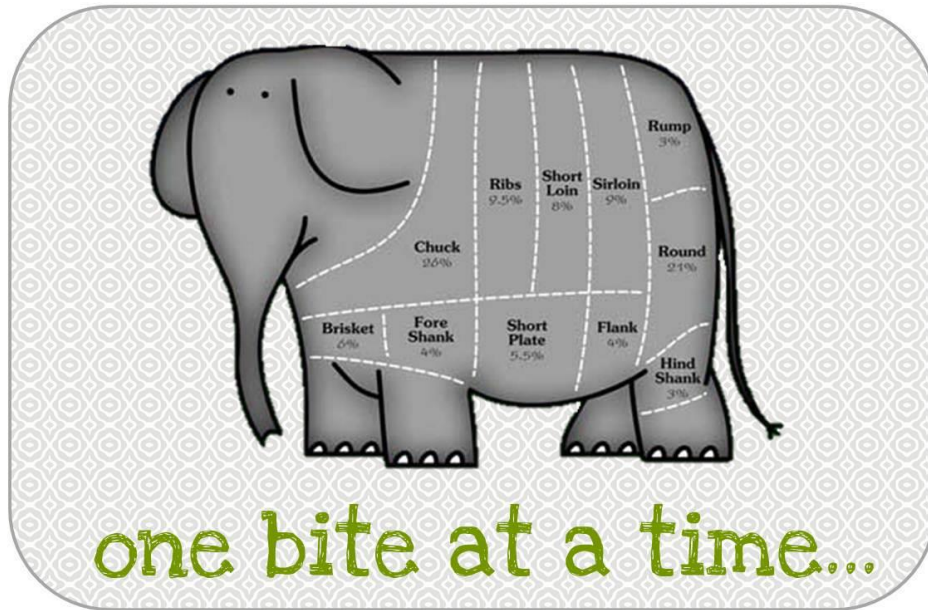
- Real losses





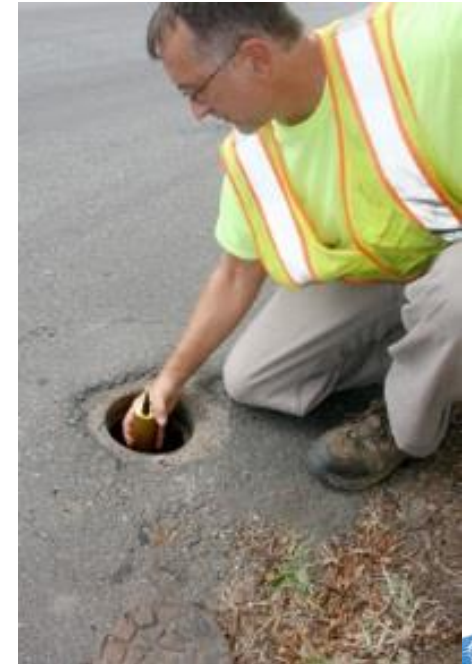
# Leak Localization

- The process of breaking the system into small parts to find leaks will never change; but how we do it, DID !!



# Leak Localization

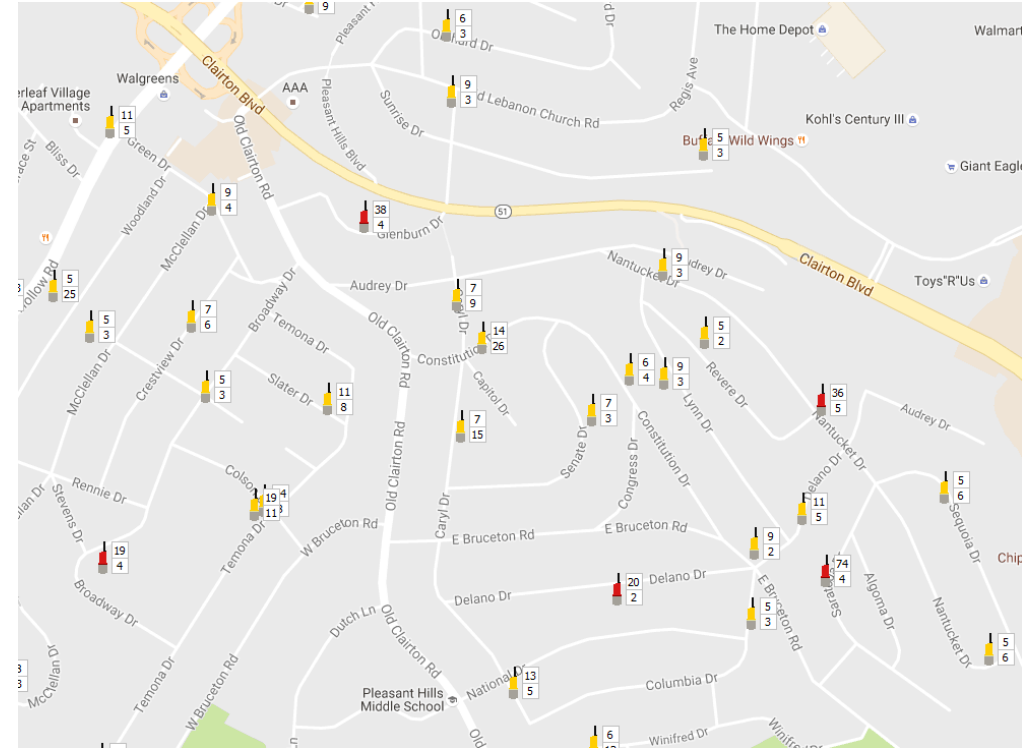
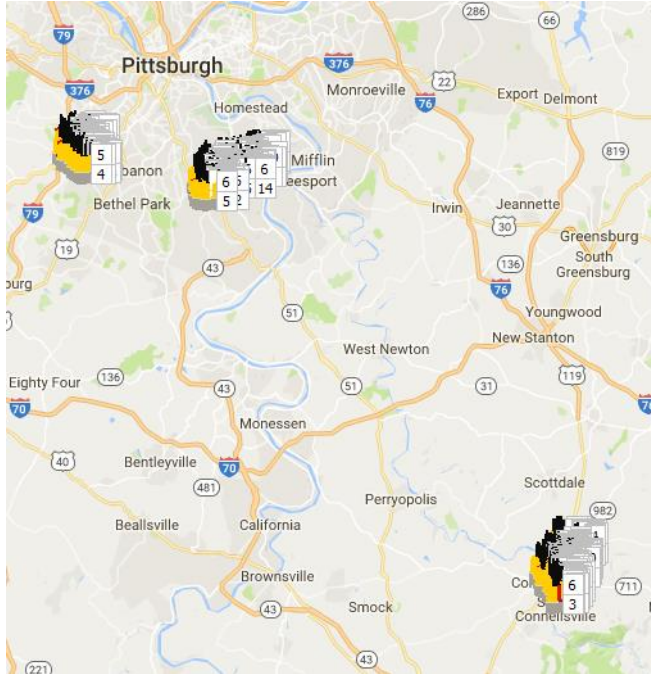
- Acoustic monitoring through leak loggers
  - Capable of checking the entire distribution network multiple times per year or even daily
  - No leak detection experience required
  - No technical skills required – loggers are magnetically attached to valves





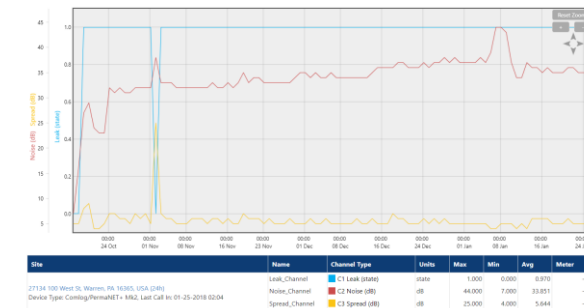
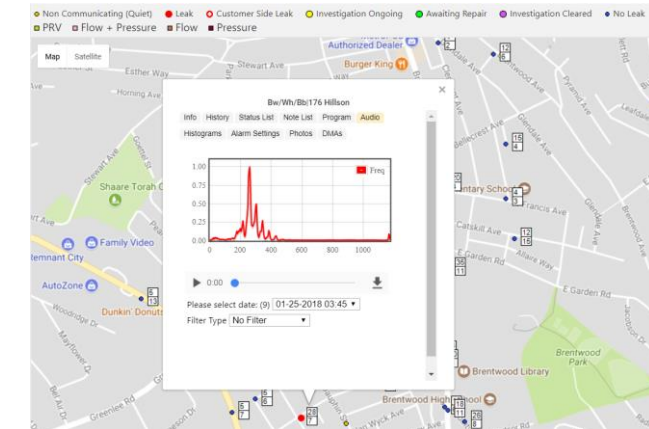
# Leak Localization

- Loggers can be permanently deployed or “Lifted and Shifted”



# Leak Localization

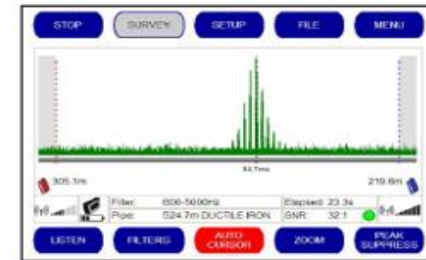
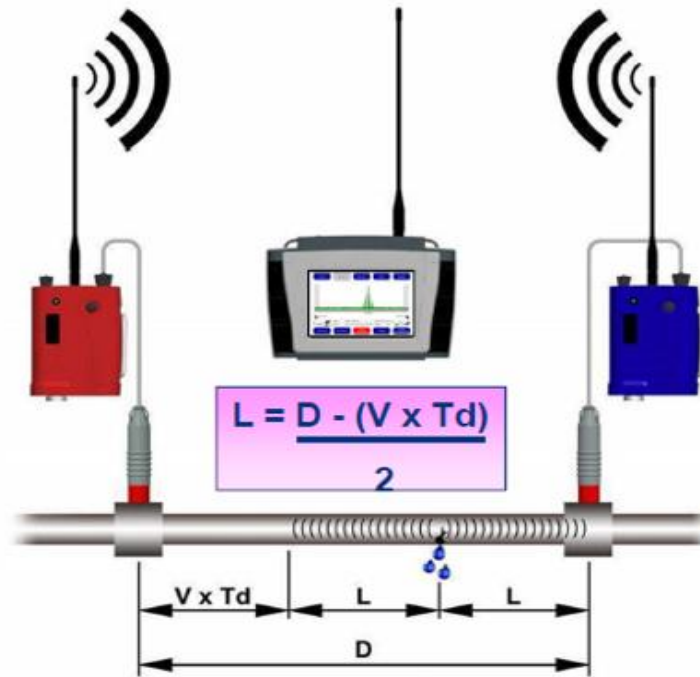
- Data can now be viewed (and heard) and analyzed via cloud or local software





# Leak Pinpointing : Correlation

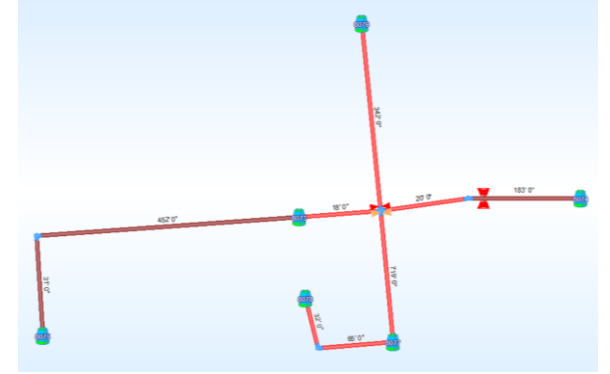
- Traditional correlation methods can be used



# Leak Pinpointing : Correlation

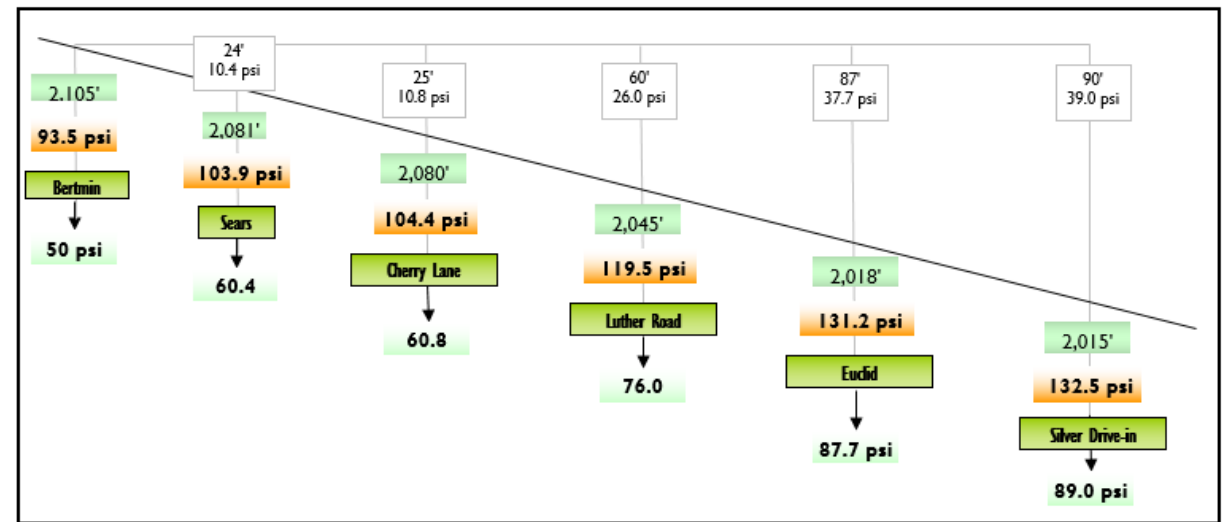
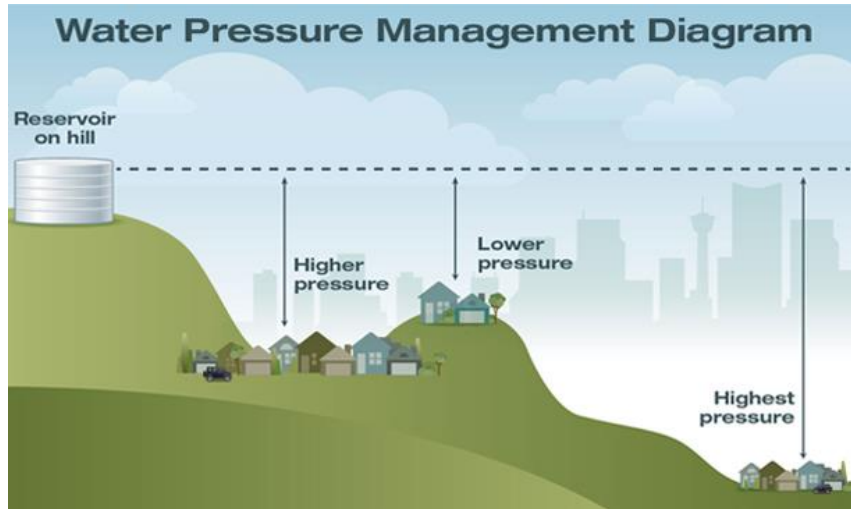
- Cloud based remote validate/correlate can be utilized

Show results for		Last Month	Show All	Filter		
Site IDs	Site Addresses	Site Map	Correlation Results: Relative Amplitude vs Distance	Time of Recording	Confidence	
2552110	ML/CS/DR/Pitt 71 Longuevue Dr			01-18-2018 03:45	98%	
2550419	ML/CS/DR/Pitt 145 Longuevue Dr					
7894812	Ward/19/29/30/32  37 Belplan St			01-11-2018 03:45	97%	
7894797	Ward/19/29/30/32  207 Maytide St					
2550744	Ward/20/28/CF/2961 Sacramento @ Minton			01-12-2018 03:45	97%	
7894518	Ward/20/28/CF/IN  2700 Sacramento Ave					
2550338	ML/CS/DR/Pitt 1317 Clara @ Lyndell			01-12-2018 03:45	96%	
2551998	ML/CS/DR/Pitt 717 Rockwood Av					



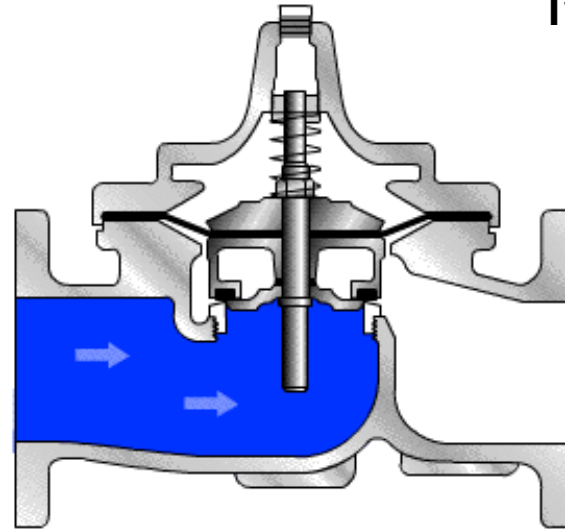


# Pressure Management



# Pressure Management

- When adjusting the pilot, screw in and the PRV increases pressure on the outlet, by venting water from the PRV top chamber
  - Water in the top chamber then pushes the PRV seat down and releases the seat upwards when water is vented



Typical pilot adjusting screw



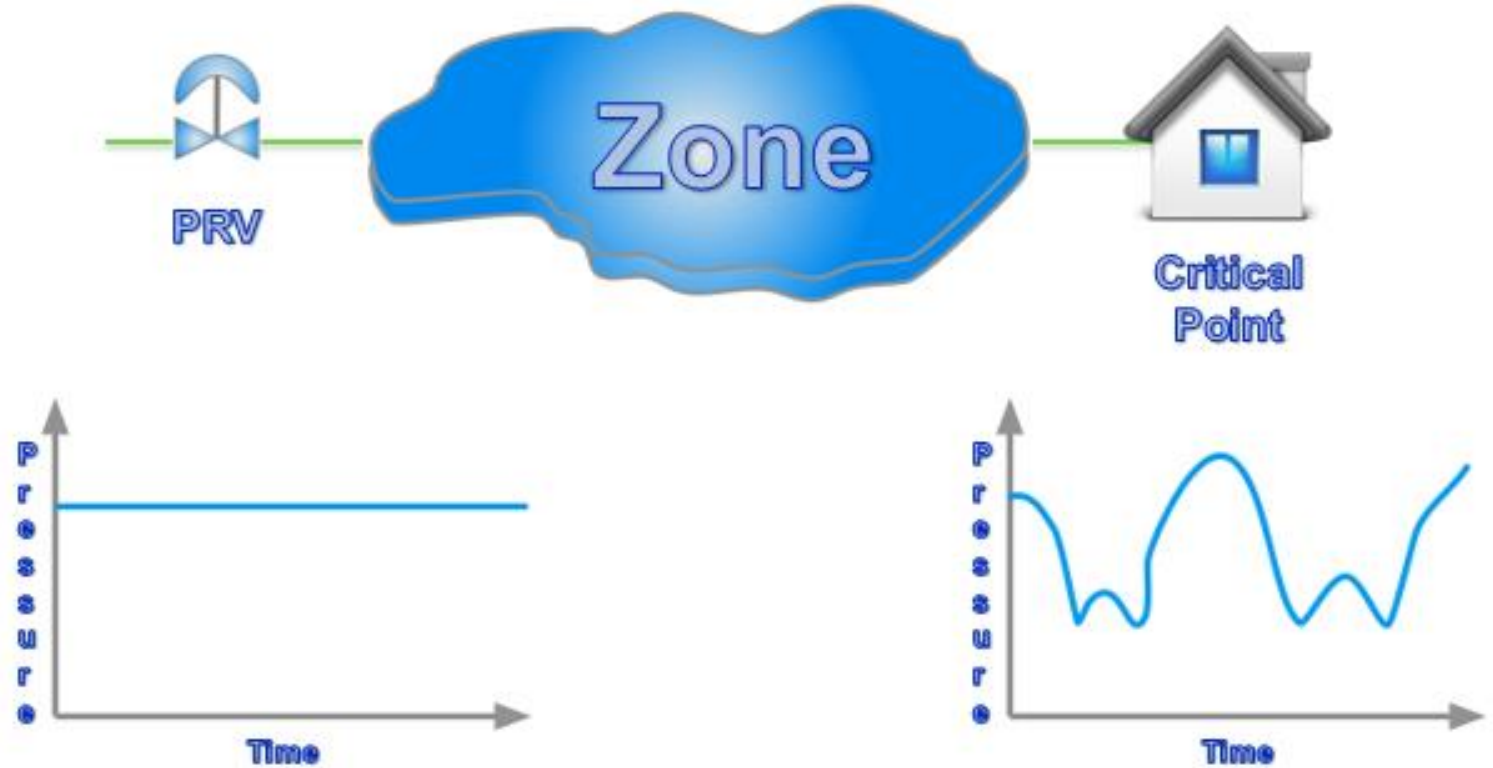


# Pressure Management

- Methods of PRV Control
  - Fixed Outlet
    - Delivers constant outlet pressure.
    - Designed to give target pressure at Critical Point (CP) at peak flow.
    - Therefore also gives excess pressure at other times.
  - Time Switched Control
    - Stepped variation in PRV outlet pressure at specific times.
    - Removes excess pressure at specific time.
    - Simple and low cost.
    - Can cause pressure surges when reopening.
  - Flow Modulation
    - PRV outlet pressure varied according to through flow.
    - The Aim is to achieve flat pressure at Critical Point (CP).
    - More complex, higher cost of construction.
    - If PRV sized correctly will deal with fire demands and create a calm network.

# Pressure Management

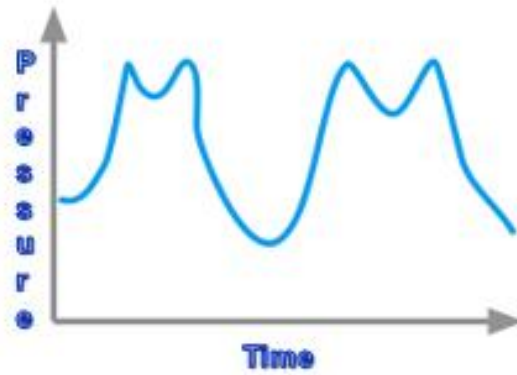
Fixed Outlet PRV



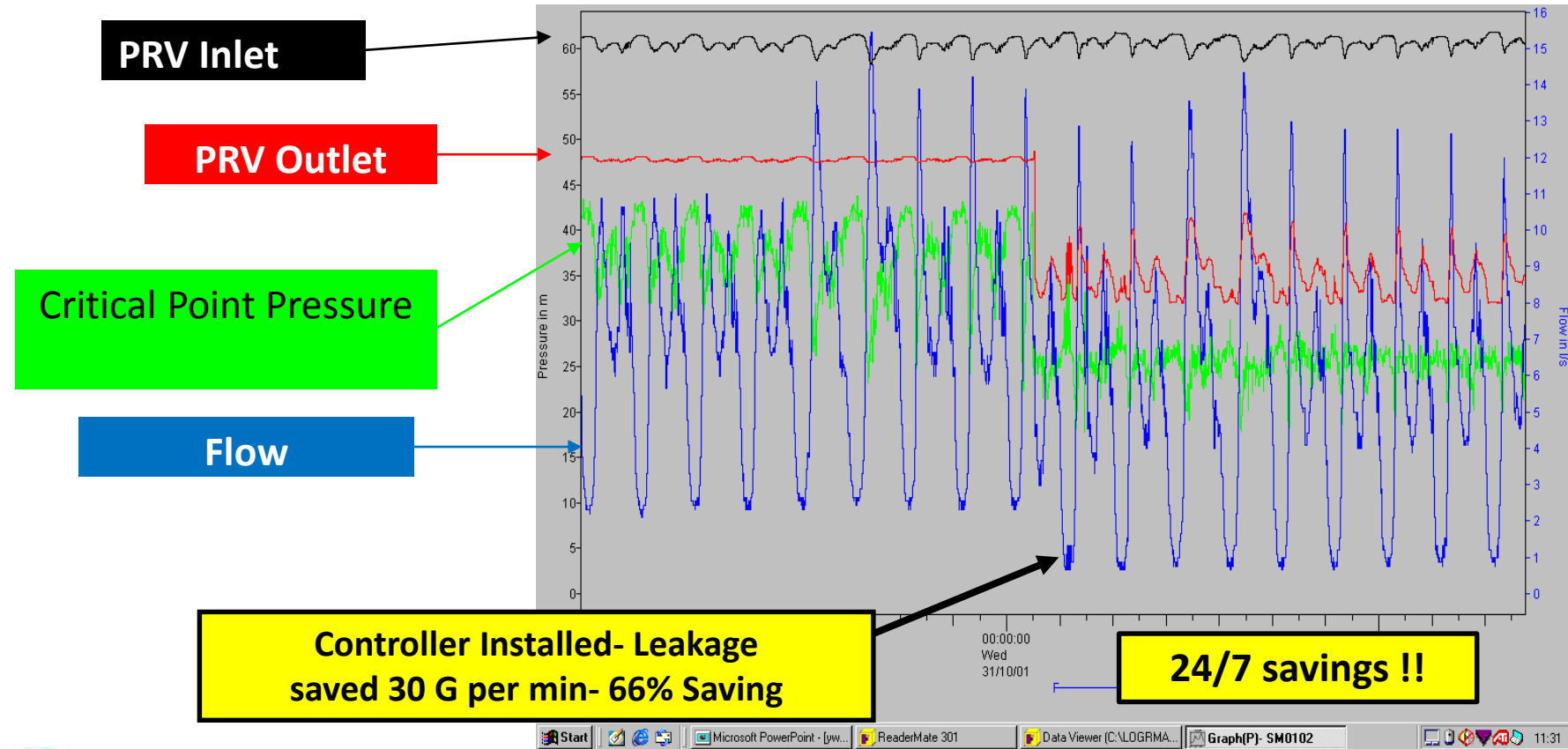


# Pressure Management

Modulated



# Pressure Management





# Pressure Management

- Dramatic and Instant Leakage and Distribution Input Saving
- Increase in initial savings due to decrease in CP target settings
- Significant stabilization of network pressure
- Stable Pressure means reduced:
  - **Bursts**
  - **Leakage Recurrence**
  - **Detect and Repair Activity**
  - **Cost to maintain stable leakage level**
  - **A calm network for Operations and the Customer**
  - **Number of unscheduled network events**

***"Waste not, want not"***  
***-- Benjamin Franklin --***

