AWWA Distribution System Seminar

Welcome!


06/29/2007 01:24 PM


10/19/2007 11:23 AM

Valve Criticality

AWWA July 2009

Columbus, Ohio

Wayne Pratt

What are Critical Valves?

Outline

- Definitions
- Dimensions
- Risk Factors
- Risk
- Summary

Definitions

Function

STOP water flow when needed and ALLOW water flow when not

Criticality

IMPORTANCE that a valve perform its function

Valve Criticality

IMPORTANCE that a valve STOP water flow when needed and ALLOW water flow when not

Dimensions

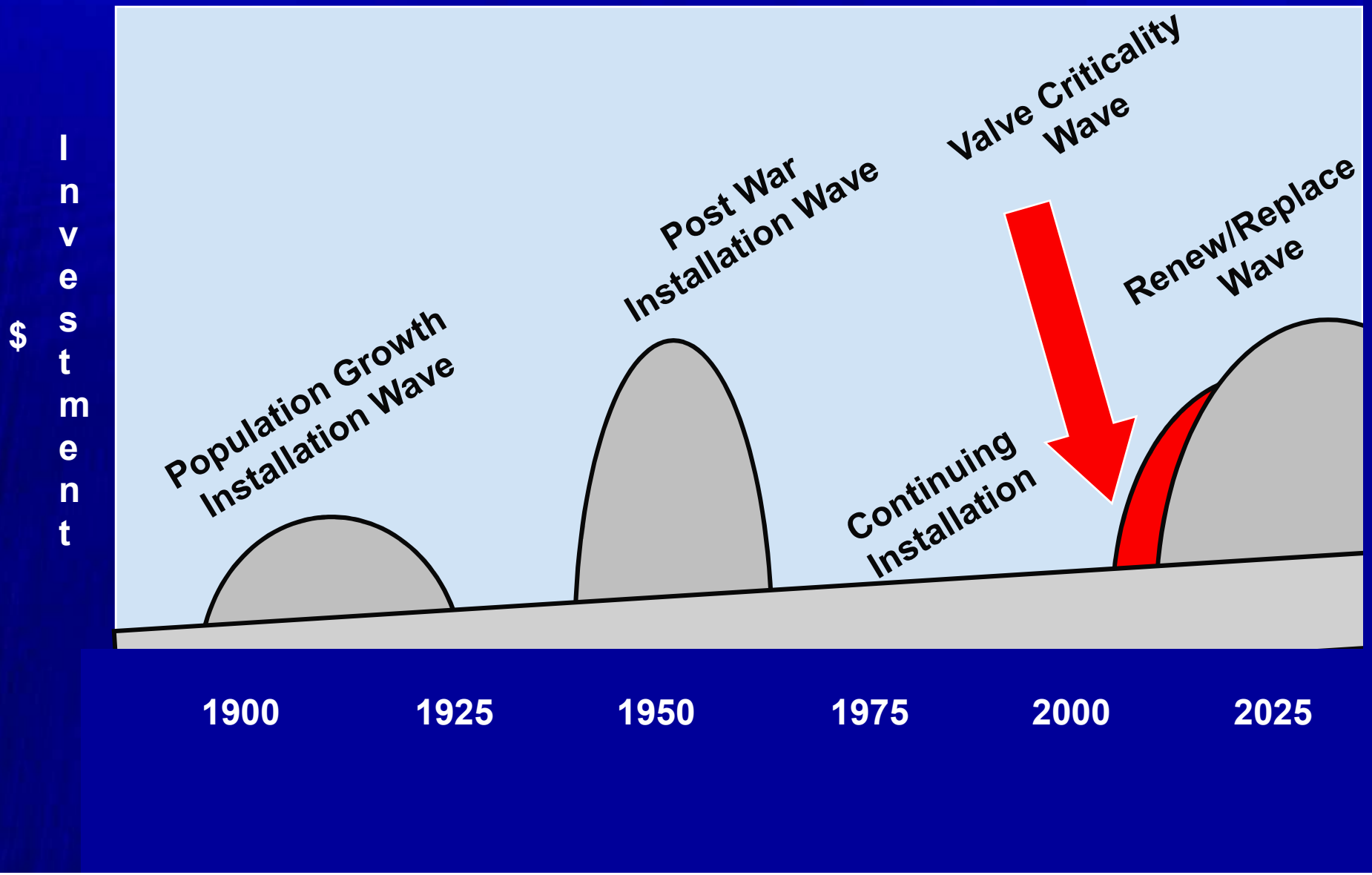
- Industry
- Quantity
- Quality
- Security
- Customer

Industry

Industry view of valve criticality – the “the wave”

STOP water flow when needed and ALLOW water flow when not

Industry


$ Investment
Population Growth Installation Wave
Post War Installation Wave
Valve Criticality Wave
Continuing Installation
Renew/Replace Wave
1900
1925
1950
1975
2000
2025

Industry

Valve criticality

NOW > THEN

We NEED valves to execute the renewal / replacement wave

(unlike previous waves)

Status Quo

What is the Status Quo?

- Operability
- System Information Gaps
  - Asset Inventory
  - Asset Locations
  - Accuracy of Asset Info
- Continued Status Quo?

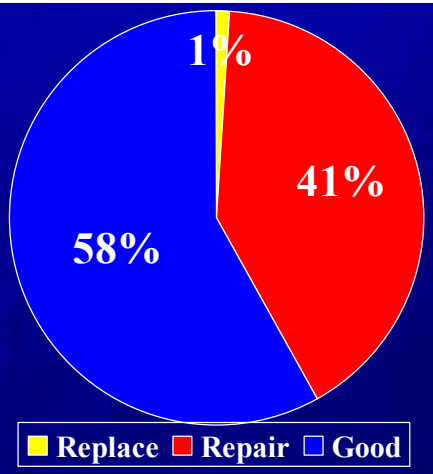
Operability: Status-Quo

Nationwide

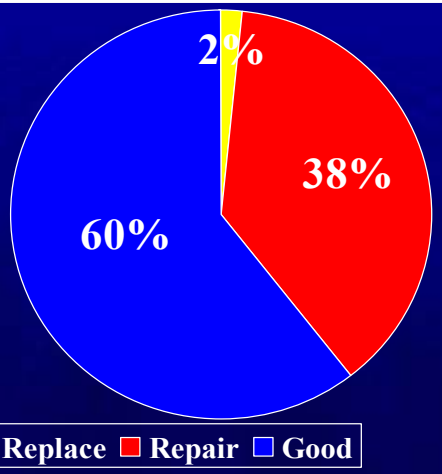
- 40% of all water valves are inoperable
- 20% require High Torque to turn
- 12% of all hydrants are inoperable; including inadequate flow
- 11% of all valves are paved over
- 7% of all distribution valves are found in the wrong position: shut & open
- Transmission valves found shut
- Many are incorrectly mapped or can’t be found

Operability: Status-Quo

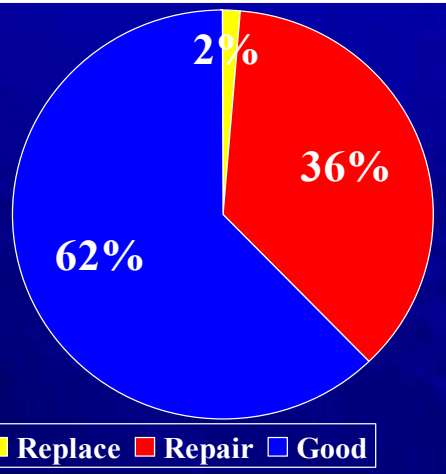
Henrico County



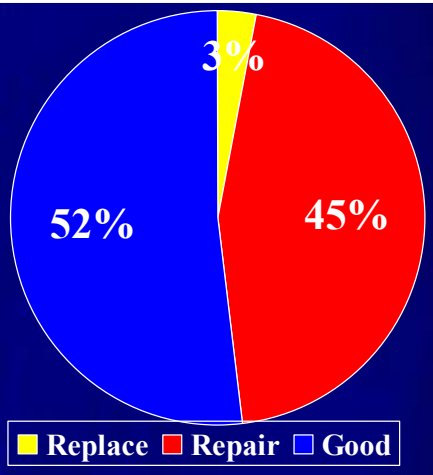
Oklahoma City



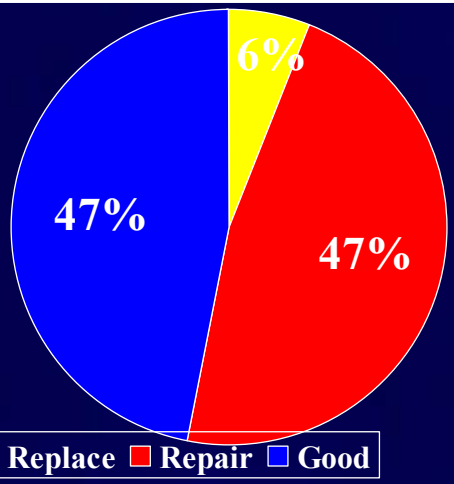
Baltimore



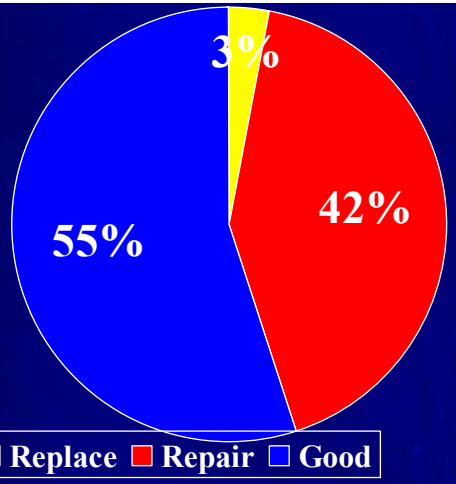
Columbus



Wilmington



Charlotte



Information: Status-Quo

Asset Inventory

- City of Baltimore, MD
- Valve and Hydrant Assessment and Rehabilitation Program
- How Many Assets (valves)?
  - 160,000 vs. 68,000
- Asset Inventory Executed - Reveals the True Quantity

Information: Status-Quo

Asset Locations

- City of Charlotte, NC
- Large Valve Assessment Program
- Where Are Your Assets?
  - 21% of valves cannot be located

Information: Status-Quo

Information Accuracy

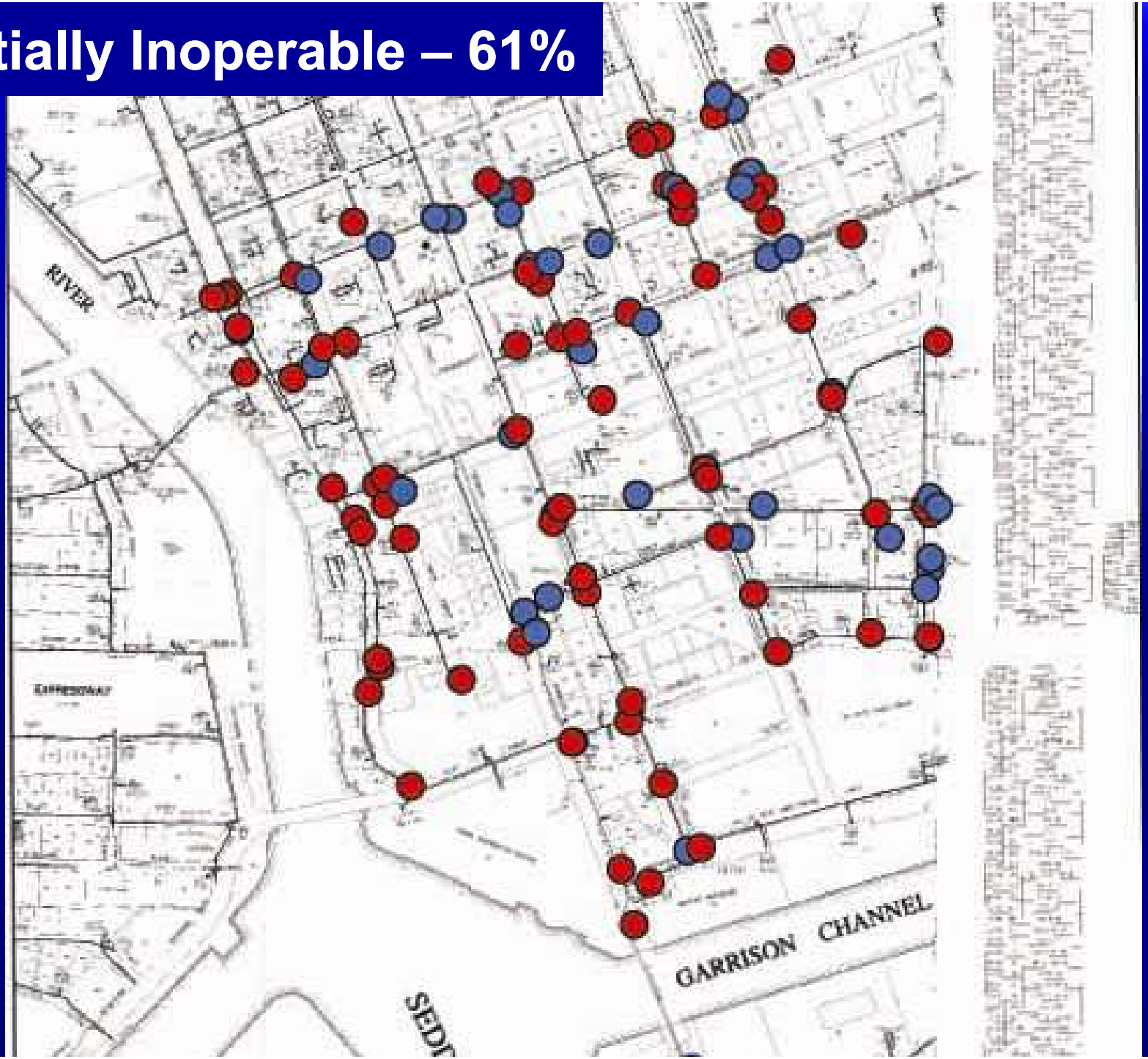
- City of Houston, TX
- Large & Critical Valve Program
- How Accurate Is Your Mapping and Hydraulic Model?
  - Model indicates a 16” main, we determined it was a 10” main

Information: Status-Quo

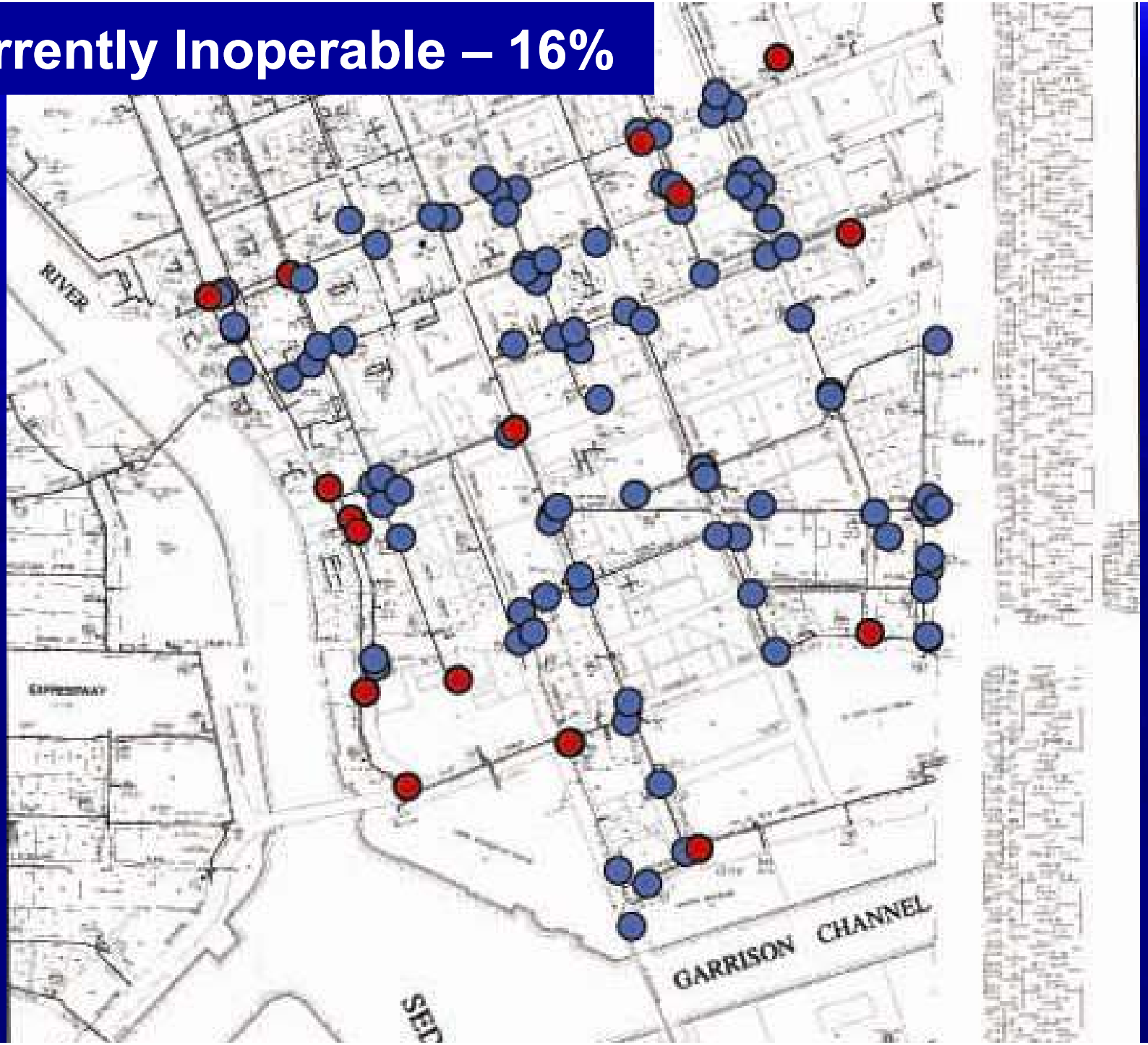
More Accuracy

- City of Dallas, TX
- RE-Inventory EVERY Valve & Hydrant
- Determined that 70% of their Asset information was inaccurate
  - Surveyor GPS'ing Water Lids
  - No Idea what was Underground
  - No information on Operability

Initially Inoperable – 61%



Currently Inoperable – 16%



Status-Quo

Continued Status Quo

- Is not *SUSTAINABLE*
- *INCREASES* the already high RISKS and COSTS in our industry
- Keeps a utility in reactive mode, chasing emergencies, trying to keep up

Quantity

Quantity view of valve criticality – flow and pressure (hydraulics)

STOP water flow when needed and ALLOW water flow when not

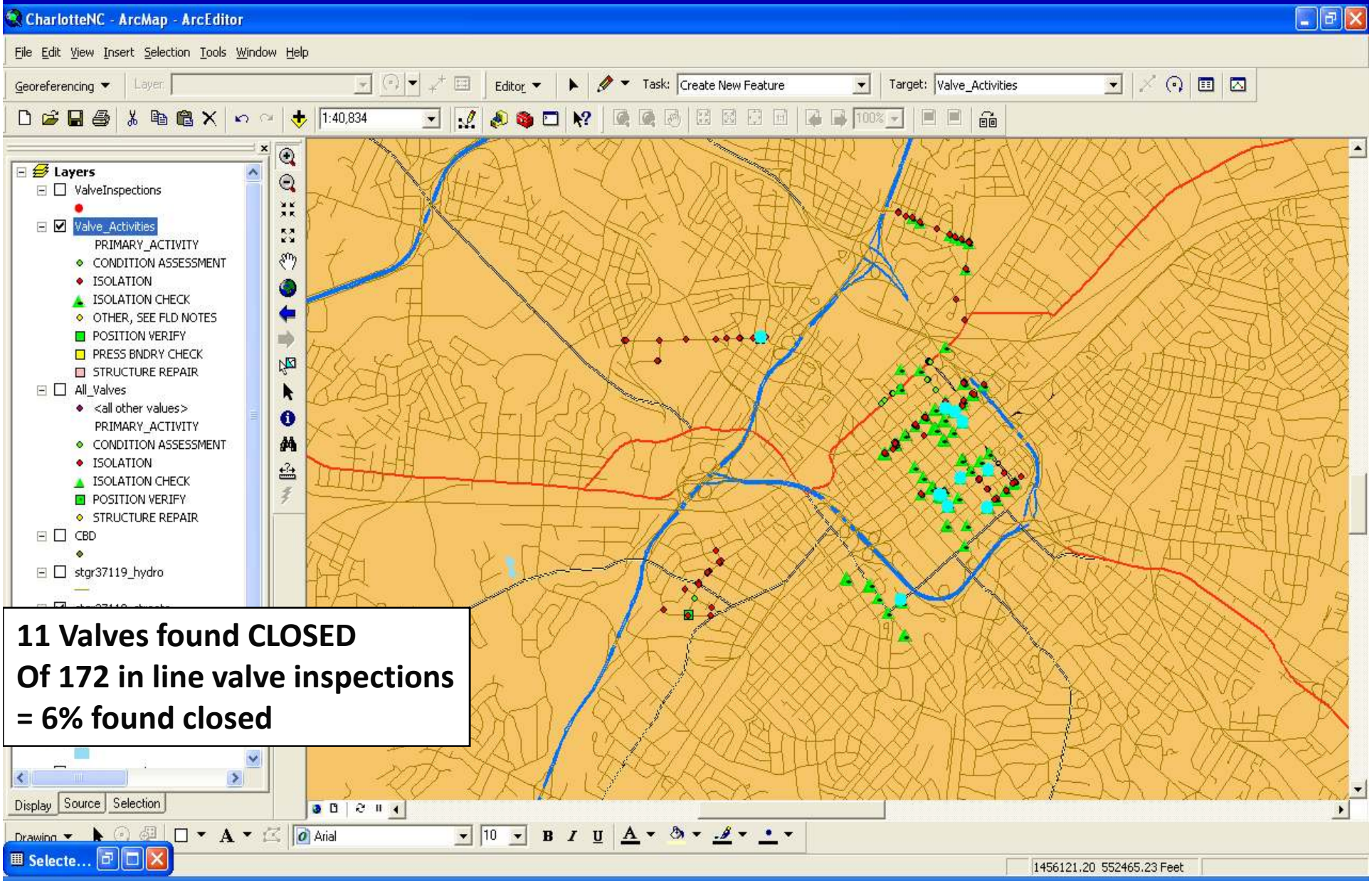
Quantity

STOP water flow when needed and

ALLOW water flow when not

- **Fire protection**
- **Pressure management**
- **Accurate Hydraulic Modeling**
- **Energy efficiency**
- **CIP focus**
- **Low pressure**
- **5 – 9%**

Found Closed



11 Valves found CLOSED
Of 172 in line valve inspections
= 6% found closed

Quality

Quality view of valve criticality – water quality

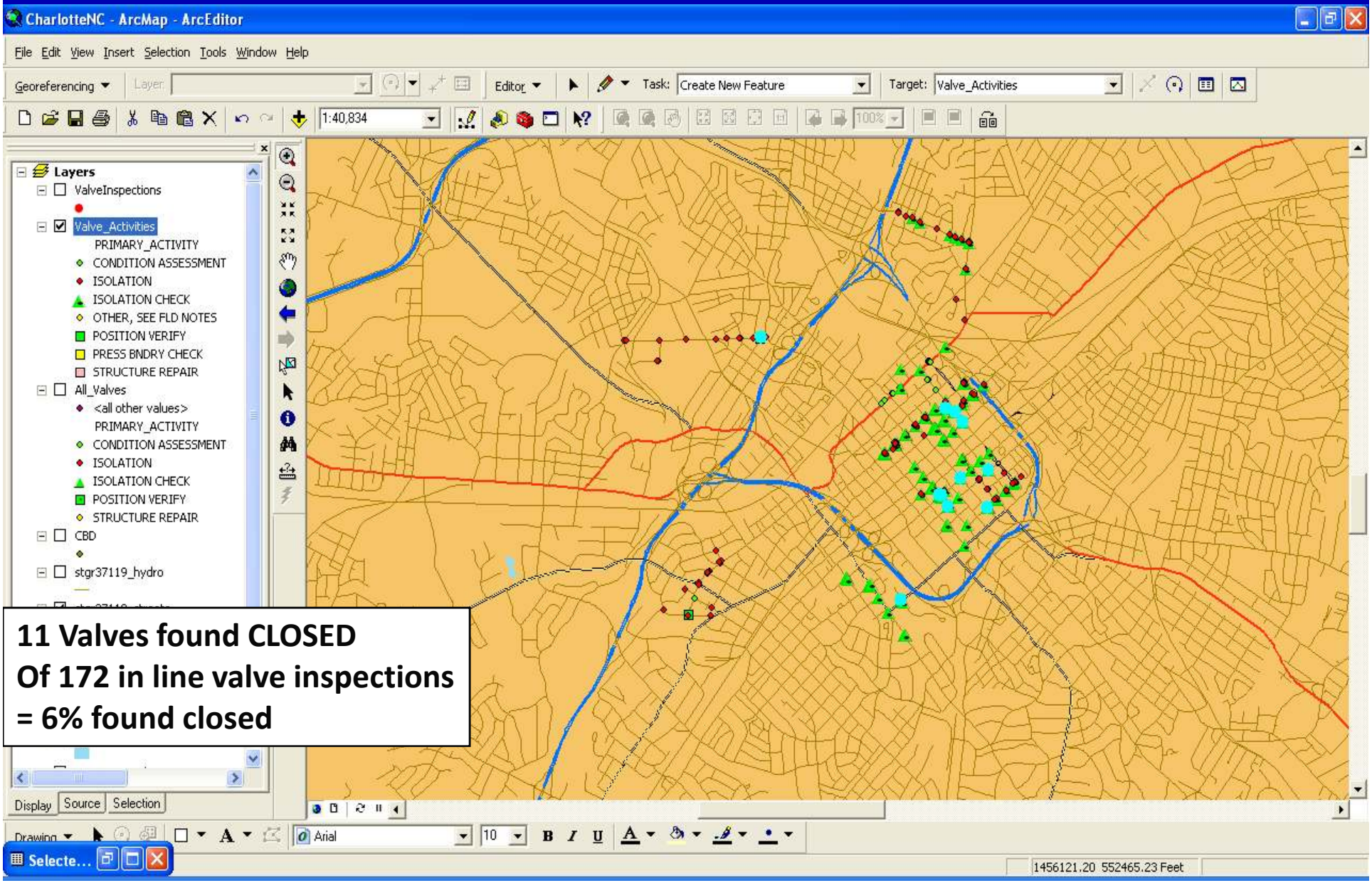
STOP water flow when needed and ALLOW water flow when not

Quality

STOP water flow when needed and ALLOW water flow when not

- Disinfection By Products
- Dead ends
- Water age
- Residuals
- UDF

Found Closed



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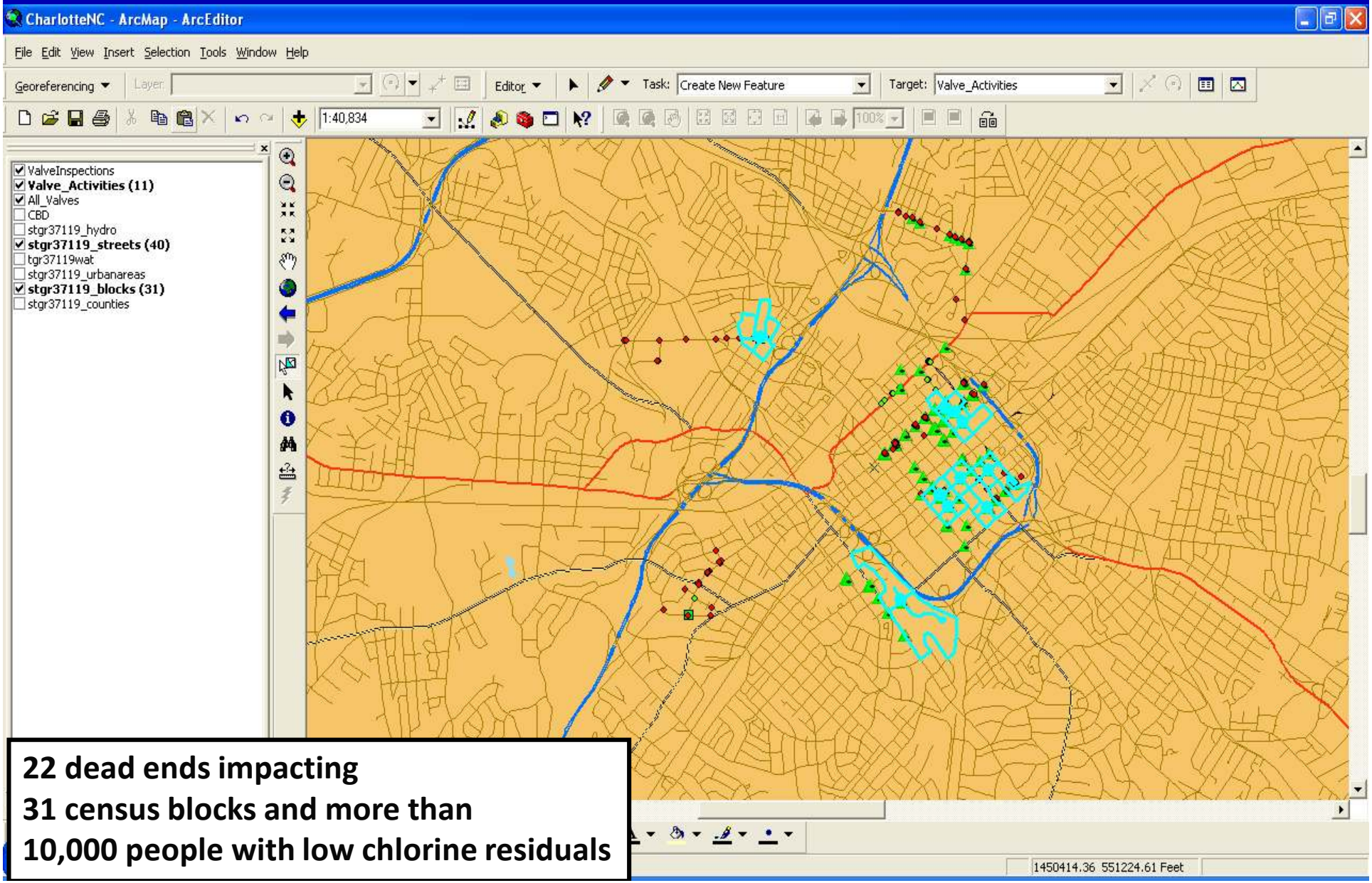


22 dead ends impacting
31 census blocks and more than
10,000 people with low chlorine residuals

Security

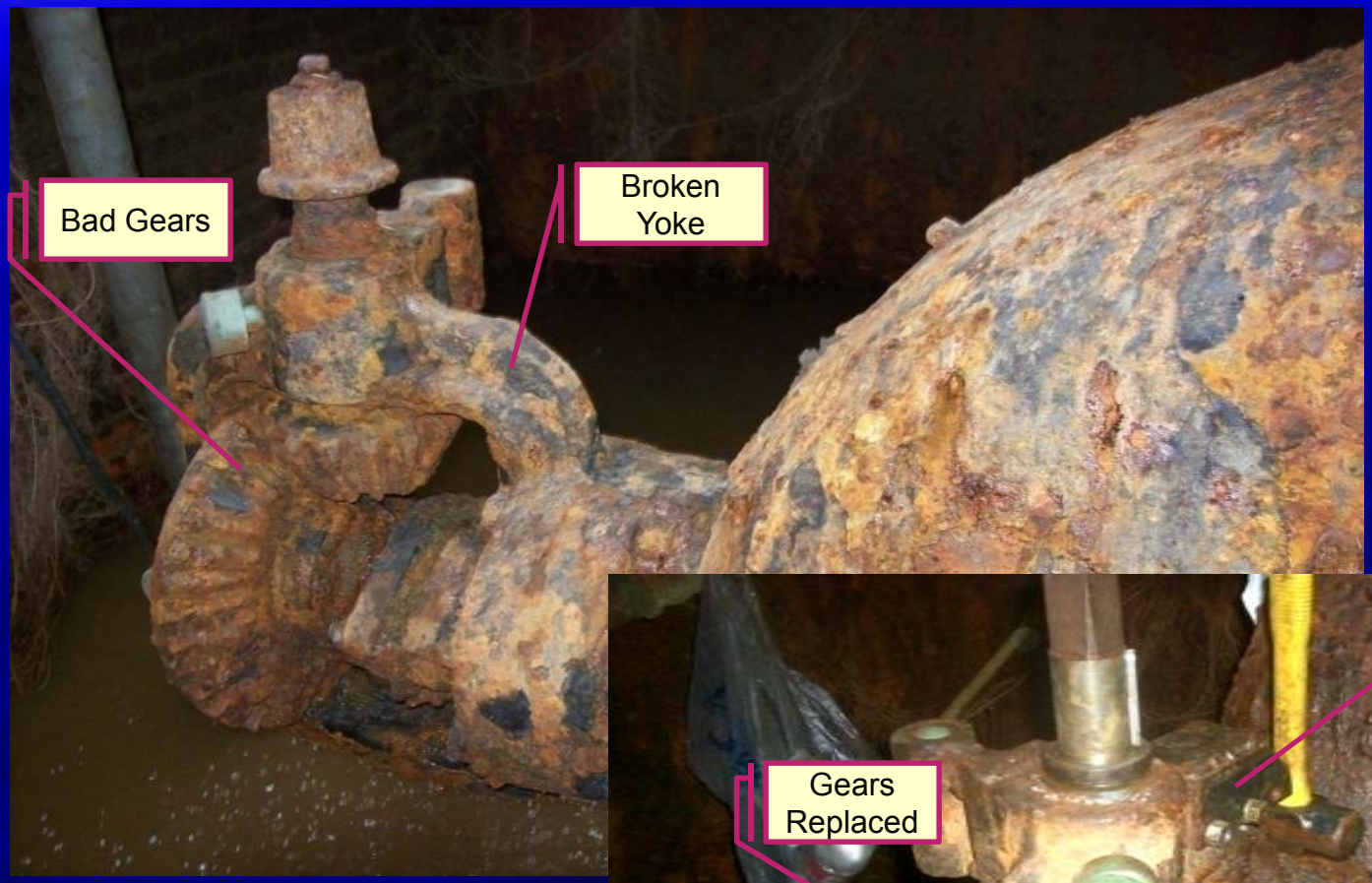
Security view of valve criticality – preventing or containing a security/contamination event

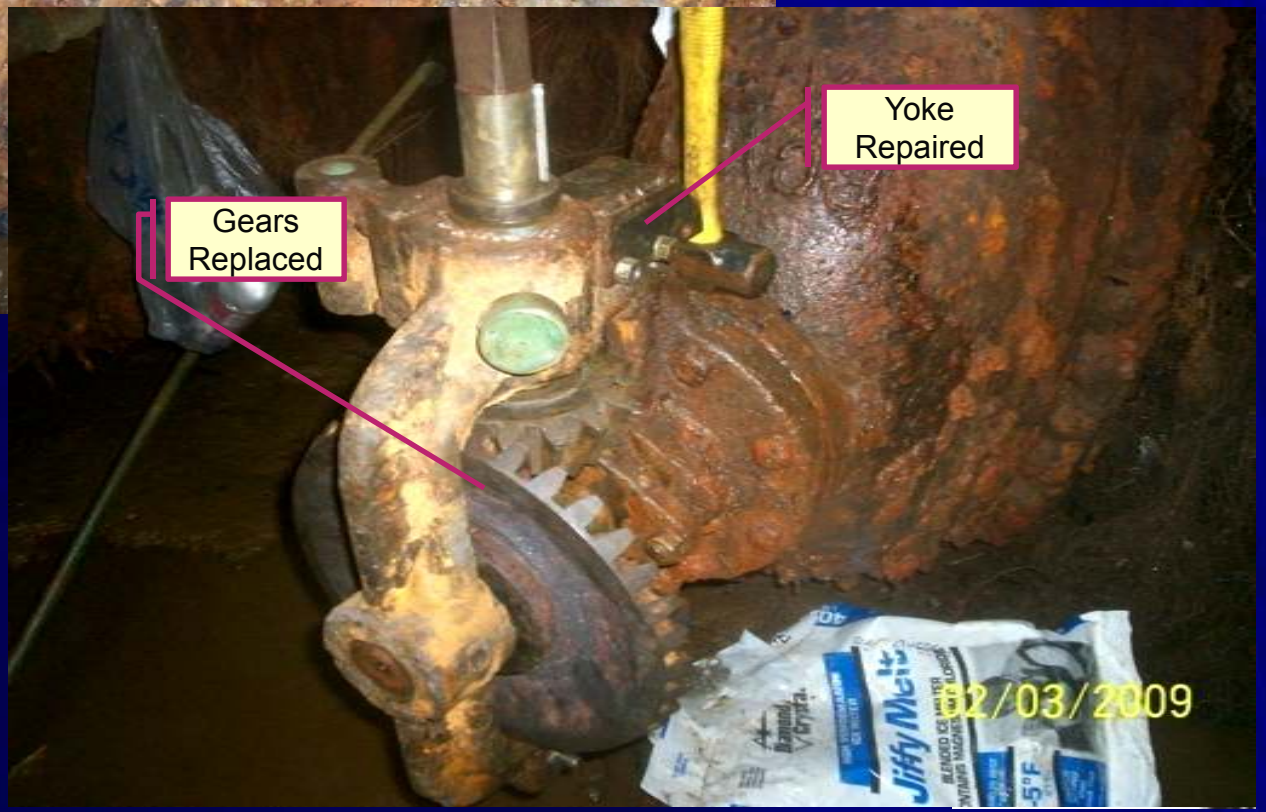
STOP water flow when needed and ALLOW water flow when not

Security

STOP water flow when needed and ALLOW water flow when not

- **Ability to isolate “reservoirs”**
- **Control contamination events**
- **Ability to redirect sources**





Druid Lake Reservoir Valves

Customer

Customer view of valve criticality – customer consequence of a valve not performing its function

STOP water flow when needed and ALLOW water flow when not – both functions

Customer Impacts

- Number of customers
- Type of customers
- Loss of life
- Physical damage
- Restoration $
- Transportation disruption
- Business disruption
- Restitution $
- Contractor delay costs
- Customer goodwill
- Political disruption

Weighting

Numbers
Dollars
“Factors”

Customer Impacts

Valve Criticality =

Disruption x Probability

You set the risk tolerance level

Risks

Low *Operability* =

Loss of System Control

Risks and Costs

What are the RISKS and COSTS

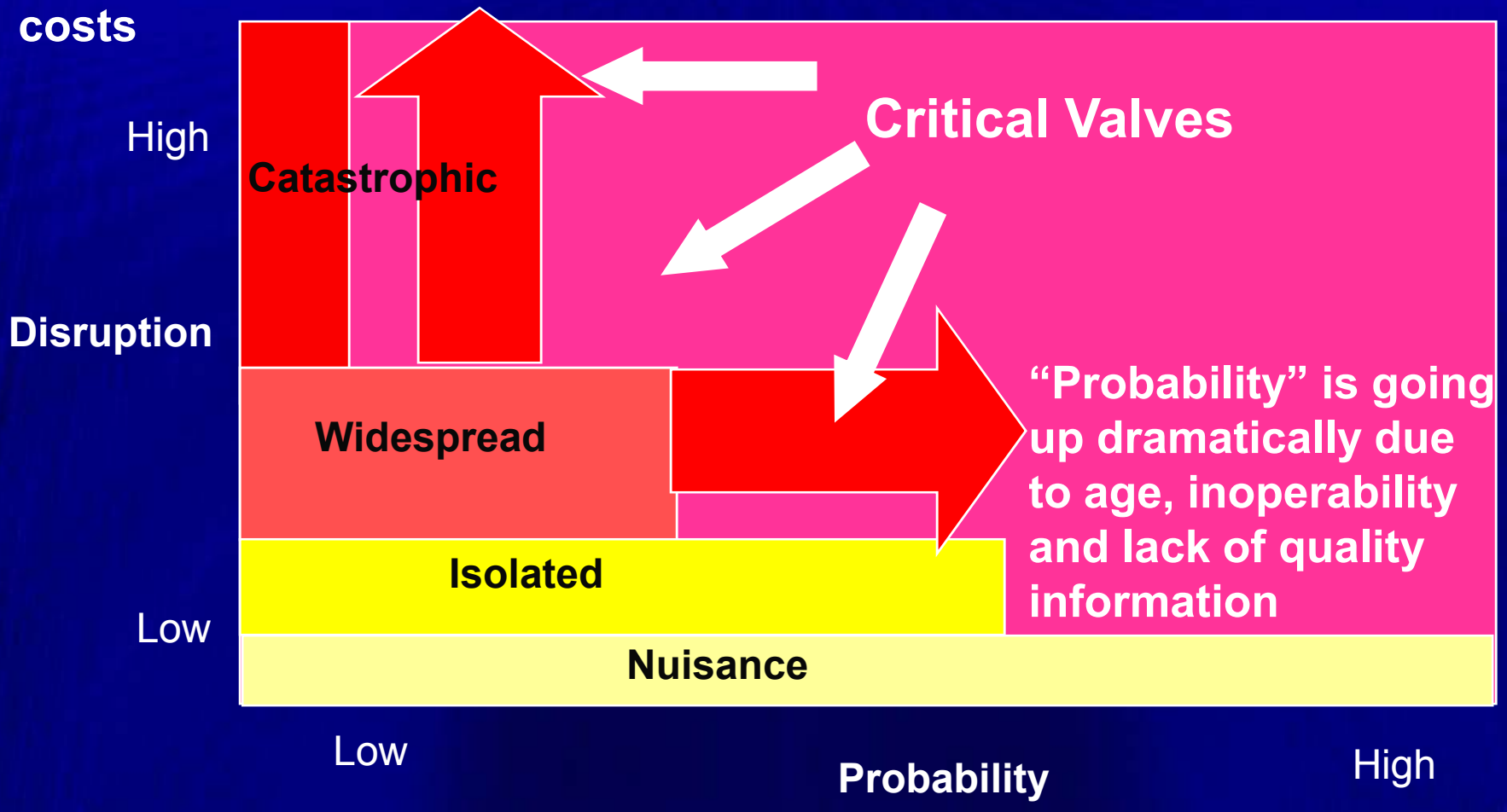
of maintaining the status quo?

Risk Factors

- Age
- Complexity (system)
- Size (valve)
- Configuration
- Maintenance history
- Asset information
- Operability information
- Accessibility of information
- Operability
- Understanding

Risk

"Disruption" is going up dramatically due to expectations and costs



Valve Criticality

Reduce risk by either:

REDUCE Disruption

Or

REDUCE Probability

Critical Valves

Ask…

80 – 20 Rule

- Critical “places”
- Critical “transportation”
- Critical “sources”
- Critical “transmission”
- If, then: sideline valves
- Single line feed valves
- Pressure boundary valves
- Rehabilitation area valves
- Data Driven

Where are Your Critical Valves?

Valve Criticality

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