

# Innovative Methods for Drinking Water Sustainability

Patty S. Thompson, P.E.

Ensuring Sustainable Water  
Sources in the Beaver-Cache  
Watershed Conference  
May 18, 2016



# Innovative Methods

- Water Reuse and Regulatory Process in Oklahoma
- Regionalization Program – DWSRF Subsidy
- Water Loss Audit Pilot – DWSRF Set-aside

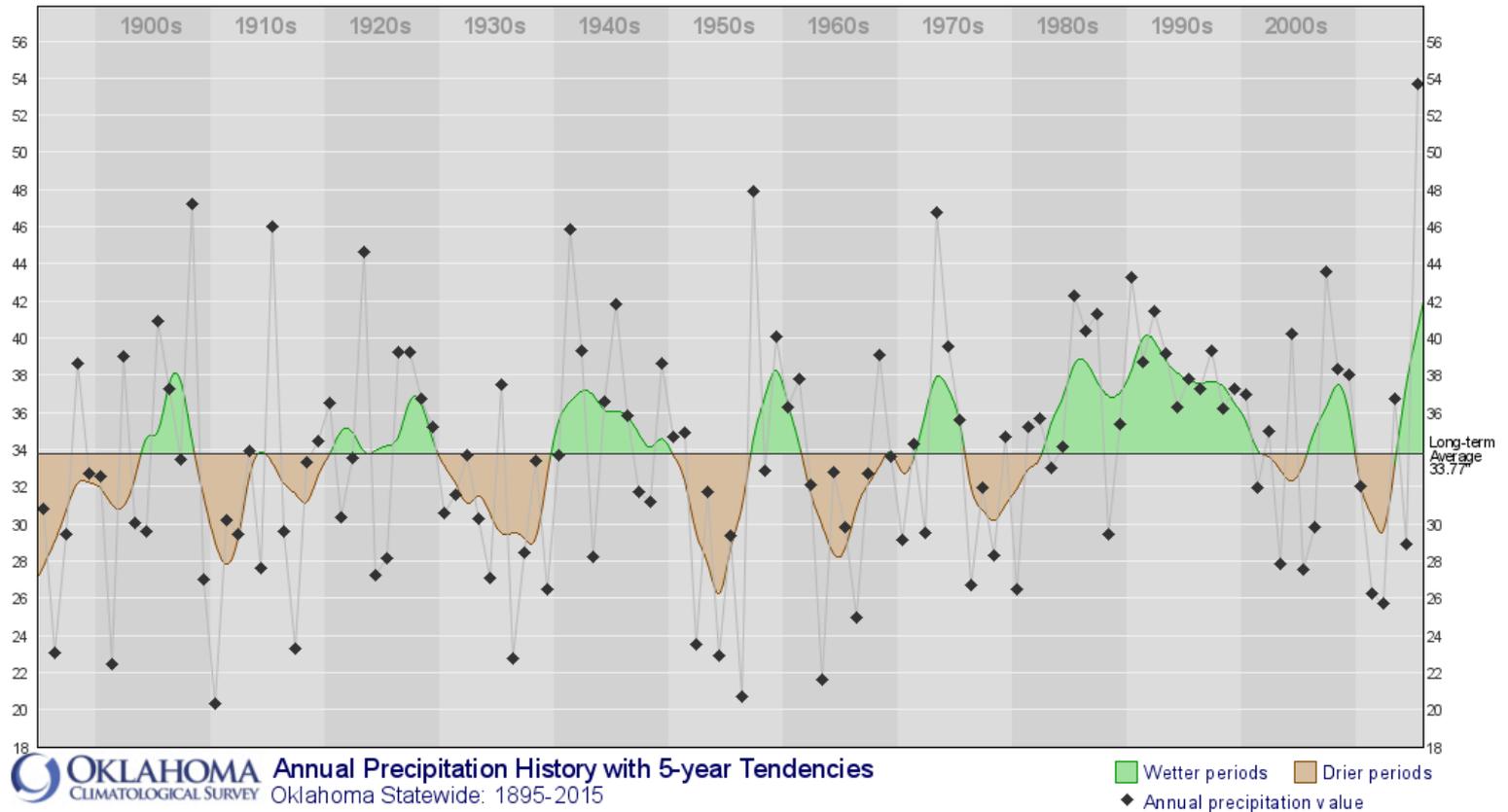
# Water Reuse

In 2010, several things happened in Oklahoma to bring about an interest in developing regulations for water reuse:

- Drought
- Water Plan for 2060
- Municipalities



# Drought



# Water for 2060 Act

- Oklahoma Water Resources Board (OWRB) developed the 2060 Water Plan
- HB 3055 Water for 2060 Act passed in 2012
- **Water for 2060 Act sets a statewide goal of “consuming no more fresh water in 2060 than we consume today”**
- Water efficiency, conservation, recycling, and reuse will need to be implemented to meet that goal



# Water Reuse

## History of Water Reuse Standards

- In 2010, representatives from a number of Oklahoma municipalities, through the Oklahoma Municipal League, expressed interest in using reclaimed water as a way to help conserve water due to the extreme drought that Oklahoma was experiencing
- These representatives met with the Oklahoma Department of Environmental Quality (DEQ) and a workgroup was formed with members from DEQ, various municipalities, technical experts from engineering firms, and members of the public

# Water Reuse

## History of Water Reuse Standards

- A review of other states' water reuse regulations and implementation methods along with input from our workgroup and technical experts helped DEQ create water reuse regulations that fit the State of Oklahoma.
- Water reuse regulations became effective July 1, 2012 and can be found online at

[www.deq.state.ok.us/mainlinks/degrules.htm](http://www.deq.state.ok.us/mainlinks/degrules.htm)

OAC 252:656-27 Wastewater Reuse (Construction Standards)

Also updated 656-3-4 for Engineer's Reports for Water Reuse

OAC 252:627 Water Reuse (Operations Standards)

# Water Reuse

## A Regulatory Perspective

- Wastewater to be reclaimed was divided into five categories (2, 3, 4, 5, & 6) for non-potable use, with each category having specific treatment, reuses, testing frequencies, limits, and monthly reporting requirements.
- Category 1 was reserved for Direct and Indirect potable reuse.

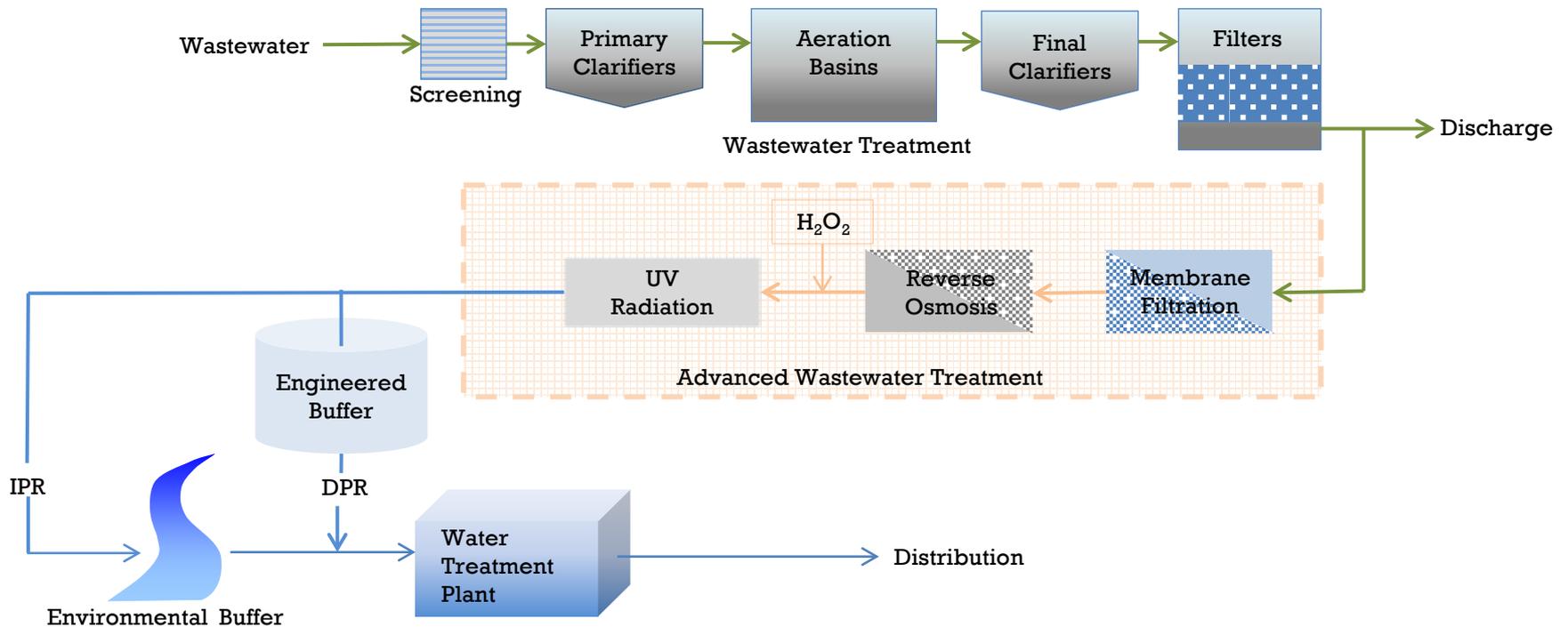
# Water Reuse

## Categories of Reclaimed Water

Category	Treatment	Reuses
1	Reserved (for direct and indirect potable reuse)	
2	Secondary Treatment (nutrient removal, coagulation, filtration and disinfection)	Drip irrigation on orchards & vineyards; spray or drip on sod farms, public landscapes, golf courses, and toilets, fire protection, vehicle washing, and range cattle watering
3	Secondary Treatment (nutrient removal and disinfection)	Subsurface irrigation of orchards or vineyards; restricted access landscapes; livestock pasture, concrete mixing, dust control, restricted golf course irrigation
4	Primary Lagoon Treatment (disinfection and storage detention)	Soil compaction, similar construction activities, and restricted access golf course irrigation
5	Primary Lagoon Treatment and Lagoon Storage	Restricted access pasture irrigation for range cattle, fiber, seed, forage, silviculture
6		Wastewater treatment plant use only

# Water Reuse Flow Diagram

## Potable Reuse



# Water Reuse

## Regulatory Priorities for FY 2015

### Added Regulations in FY 2015

- **Disinfection Technologies**
  - Onsite hypochlorite generation
  - Ozonation
- **Filtration technologies**
  - Membrane Filters (Micro, Ultra, Nano, and Reverse Osmosis)
- **Oil and Gas**
  - Category 3 for hydraulic fracturing
  - Category 2 for makeup water for oil and gas production

# Guidance Documents for New Wastewater Treatment Technologies for FY 2016

- Membrane Bioreactors (MBR)
- Peracetic Acid Disinfection (PAA)
- Advanced Oxidation Processes (AOP)
- CT for Chlorine for Category 2 Reuse
- Ozone/Biologically Active Filtration (BAF)
- RO brine disposal options
- Non-potable water uses onsite of Wastewater Treatment Plant

# Proposed Indirect Potable Reuse (IPR) Rules

- OWRB developed a Water Quality Standards (WQS) change to allow for SWS-R use with DEQ and Water Reuse Workgroup
- SWS-R WQS Change approved by OWRB Board - February 2016
- OWRB and DEQ Drafting Indirect Potable Reuse Implementation regulations for FY 2017 Rulemaking

# IPR for Surface Water Rule Overview and Issues

- Lack of existing Federal and State Regulations for IPR Augmentation of Surface Water
- Hybrid of CWA and SDWA
- All Sections in our Division are potentially involved:
  - Watershed Planning (modeling)
  - Wastewater Permitting
  - Public Water Supply
  - Construction Permitting

# IPR for Surface Water Rule Overview and Issues (continued)

- Requires Lake Modeling instead of Stream Modeling
- Closed Loop for TDS and other conservative elements and compounds which requires longer modeling periods to include droughts of record
- Minimum flow to be considered IPR Project
- Design Concerns (Redundancy, Resiliency, etc.)
- Operational concerns

# Proposed IPR Rule Development Schedule

- January to August 2016 – Drafting of SWS-R and other Surface Water IPR implementation rules
- October 2016 - Present draft rules to Water Quality Management Advisory Council (WQMAC)
- November 2016 - Informal public meetings on IPR for Surface Water/Implementation Rules
- December 2016 - Formal Public Notice

# Proposed IPR Rule Development Schedule (continued)

- January 2017 - Water Quality Management Advisory Council (WQMAC) recommends approval to DEQ Board
- February 2017- DEQ Board approval
- Spring 2017- Legislative/Governor's review and approval
- Fall 2017- Final Rule adoption
- OWRB has similar schedule for SWS-R implementation rules in OAC:785:46 WQS Implementation

# Regionalization/Consolidation

- DEQ and OWRB have developed a web-based “Cooperative Planning Tool” that could be used by municipalities to explore their regionalization options.
- This screening tool can help municipalities and other interested parties learn about the nearby sources of water that could be used for regionalization planning
- Mat Wormus is available at the DEQ booth to help demonstrate this new tool.

# Regionalization/Consolidation

- **Drinking Water State Revolving Fund (DWSR)**
  - The 1996 amendments to the Safe Drinking Water Act created the DWSRF, a low interest loan fund, for public drinking water systems to fund infrastructure needed to comply with EPA's new and more stringent regulations.
  - DEQ receives an annual DWSRF Capitalization Grant for the loan fund and set-asides
  - 20% of the Grant is mandated to be used as subsidy

# Regionalization/Consolidation

- Regionalization – a water system purchases finished water from another water system
- Consolidation – a water system takes over another water system and becomes one system
- “Principal Forgiveness” may be from 40% to 100% of project cost to regionalize or consolidate water systems
- The percentage to be given varies depending on the cost of the project, the amount of subsidy funds available, and the need for the project
- Placement on the DWSRF Project Priority List – public review

# Regionalization/Consolidation

- Applicant must be able to meet the 1.25% debt coverage and have the financial, managerial, and technical capacity to run a water system – may require the system they are purchasing from be the applicant and recipient of the subsidy
- Existing water treatment plant or well that is out of compliance must be abandoned
- No blending is allowed to reduce contaminants
- Water loss audit must be done to ensure that distribution is tight – so that purchased water is not being lost
- First Come First Serve

# Problems to Overcome

- It takes a lot of “finesse” to bring water systems together to regionalize and consolidate
  - Rivalry in football and basketball
  - Concern of losing their water system
  - Rates are too high
  - Dependent on another system. What if the other system cuts us off?
  - Water loss

# Projects

- ∞ The regionalization and consolidation program has been very **SUCCESSFUL** in Oklahoma

# Adair and Mayes RWD #6 Regionalization

	Project Cost	Subsidy
• Adair MA (THMs)	\$ 830,000	\$332,000
• Mayes RWD # 6 (Capacity)	\$2,590,000	\$500,000



Adair MA

# Colcord and Delaware RWD #11 Regionalization

	Project Cost	Subsidy
• Colcord (radium, red worms)	\$1,385,178	\$950,000
IHS	\$430,178	
Cherokee Nation	\$ 5,000	



# Salina and OOWA Regionalization

- Salina (THM, HAA5, Capacity)  
DWSRF Loan \$1,926,000

Project Cost  
\$3,210,000

Subsidy  
\$1,284,000



# Noble RWD #1 and Perry Regionalization

- Noble RWD #1 (THM)

Project Cost

\$1,155,115

Subsidy

\$1,155,115



# Longtown and Pittsburg RWD #4 Consolidation

- Pittsburg RWD #4 (THM)

Project Cost  
\$600,000

Subsidy  
\$600,000



# Fairmont PWA and Salt Fork WA Regionalization

- Fairmont (Arsenic)  
CDBG \$268,000

Project Cost  
\$1,180,000

Subsidy  
\$862,000



# Coyle and Guthrie Regionalization

	Project Cost	Subsidy
• Coyle (Uranium, gross alpha, radon)	\$610,000	\$610,000



# Garber and Enid Regionalization

	Project Cost	Subsidy
• Garber (Carbon Tetrachloride, nitrates)	\$2,100,000	\$2,100,000



# Meridian and Logan Co RWD #1 Consolidation

	Project Cost	Subsidy
• Meridian (Arsenic, uranium, gross alpha)	\$1,500,000	\$1,048,147
Local Funds	\$451,853	

# Water Loss Audit Pilot

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# Water Loss Audit Pilot

Brandon Bowman  
Capacity Development Coordinator  
Water Quality Division  
Oklahoma Department of Environmental Quality  
405-702-8270  
[brandon.bowman@deq.ok.gov](mailto:brandon.bowman@deq.ok.gov)

# Water Loss Audit Pilot

## Changing Mindsets

How most PWS think of water loss



# From “unaccounted for” to non-revenue:

**If you don't understand  
the problem,  
You may apply the  
wrong solution!**



Types of Non-Revenue Water

# Water Loss Audit Pilot

Local DEQ inspectors conducted water loss audits at 40 small community water systems.

Top-down water loss audits using the AWWA method and software.



# Why are we doing it?

- ∞ To introduce the concept of accurate water loss auditing state-wide
  - No standardized method in use
  - Current methods cannot be compared and are not reflective of reality
- ∞ To demonstrate the usefulness of the tool
  - Increases both water and revenue efficiency
- ∞ Potential Program development

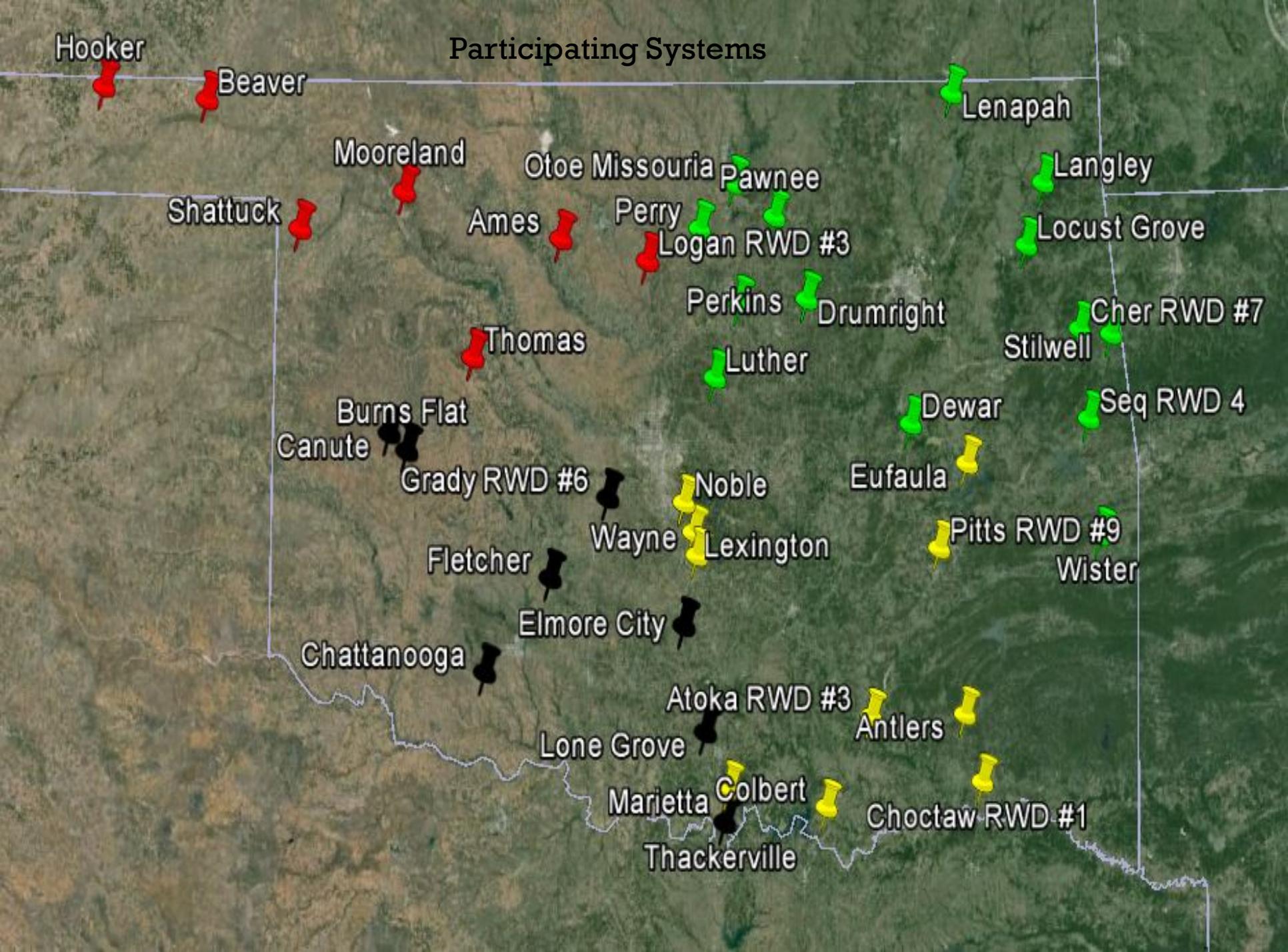


Lost Water



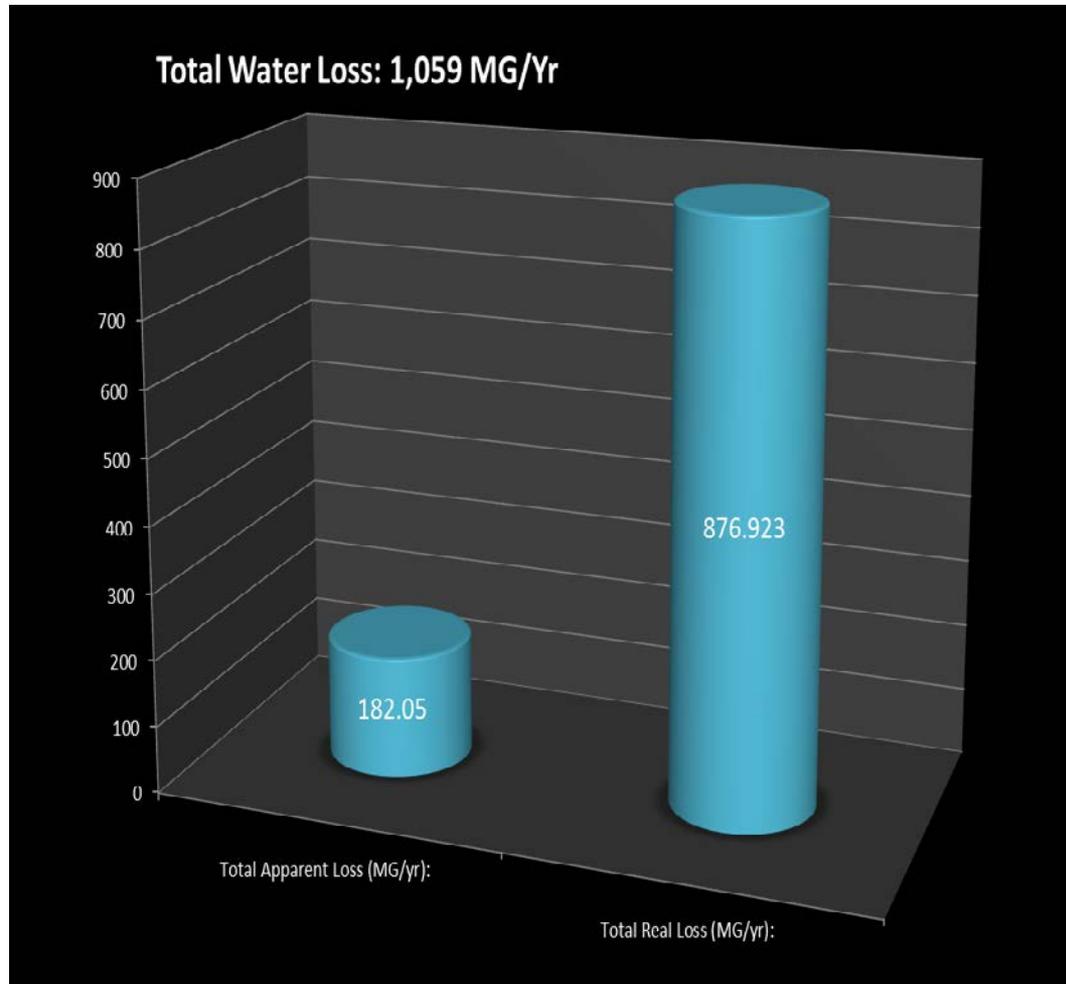
Doesn't Make  
Cents

# Participating Systems



# Results

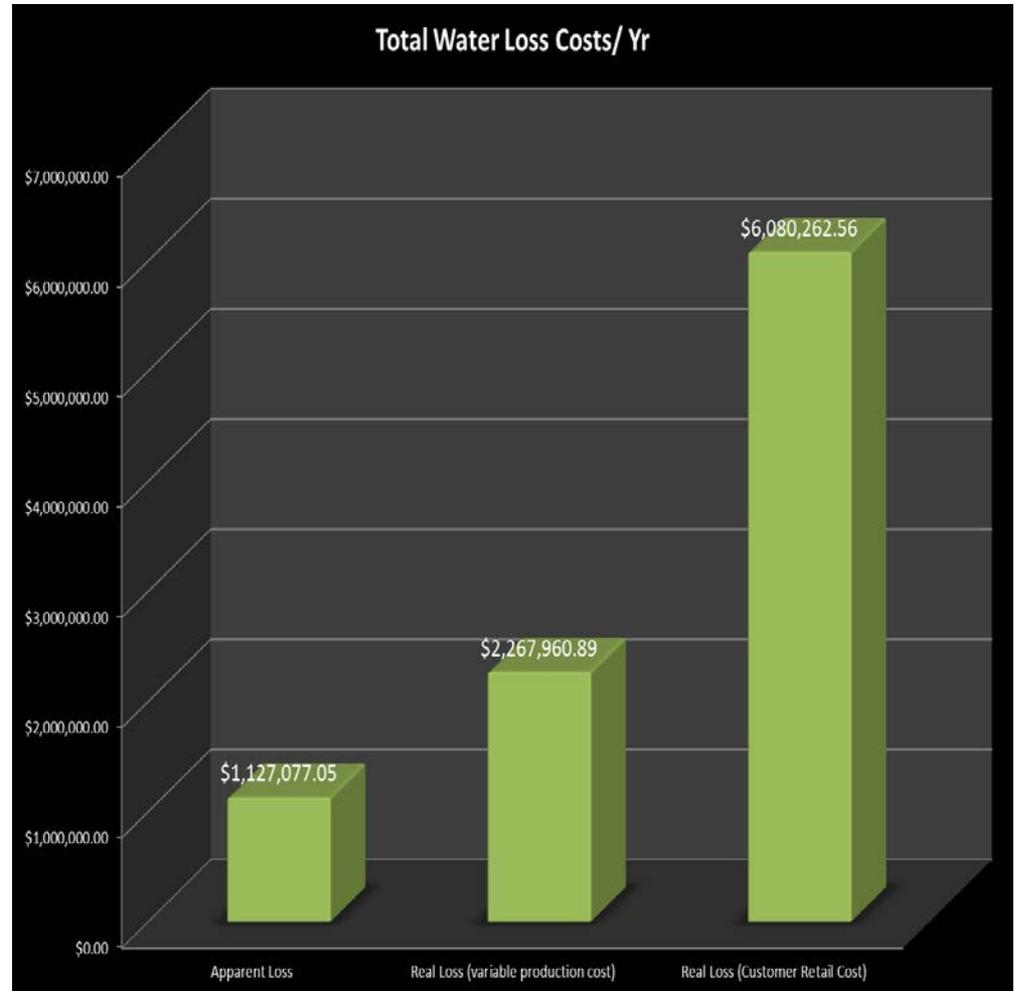
Over 1 billion gallons of loss over a year.....from 40 systems.



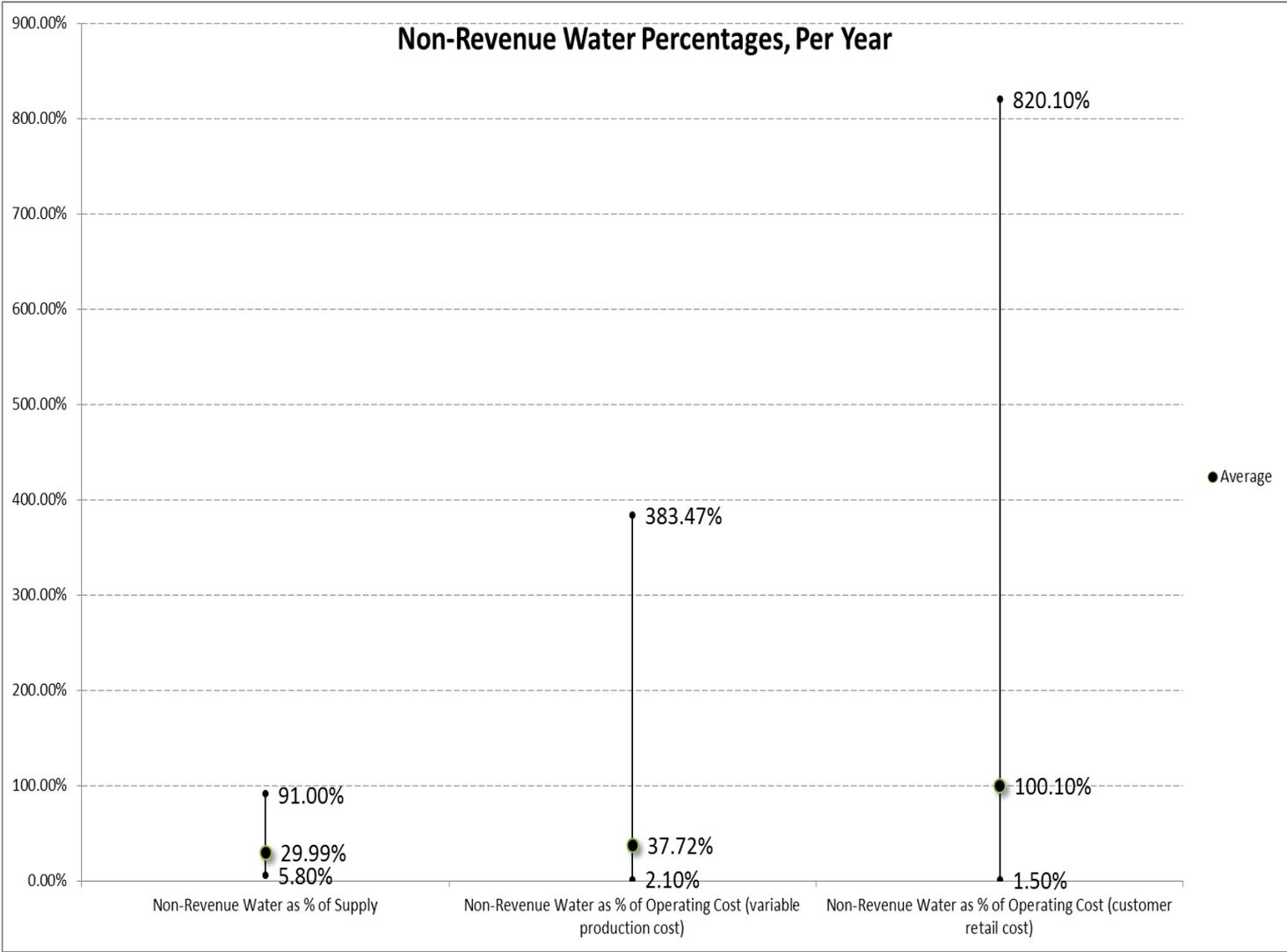
# Results

Over \$1 million lost via theft, under-registering meters, and data management errors.

Over \$6 million lost due to leaks and overflows



# Results

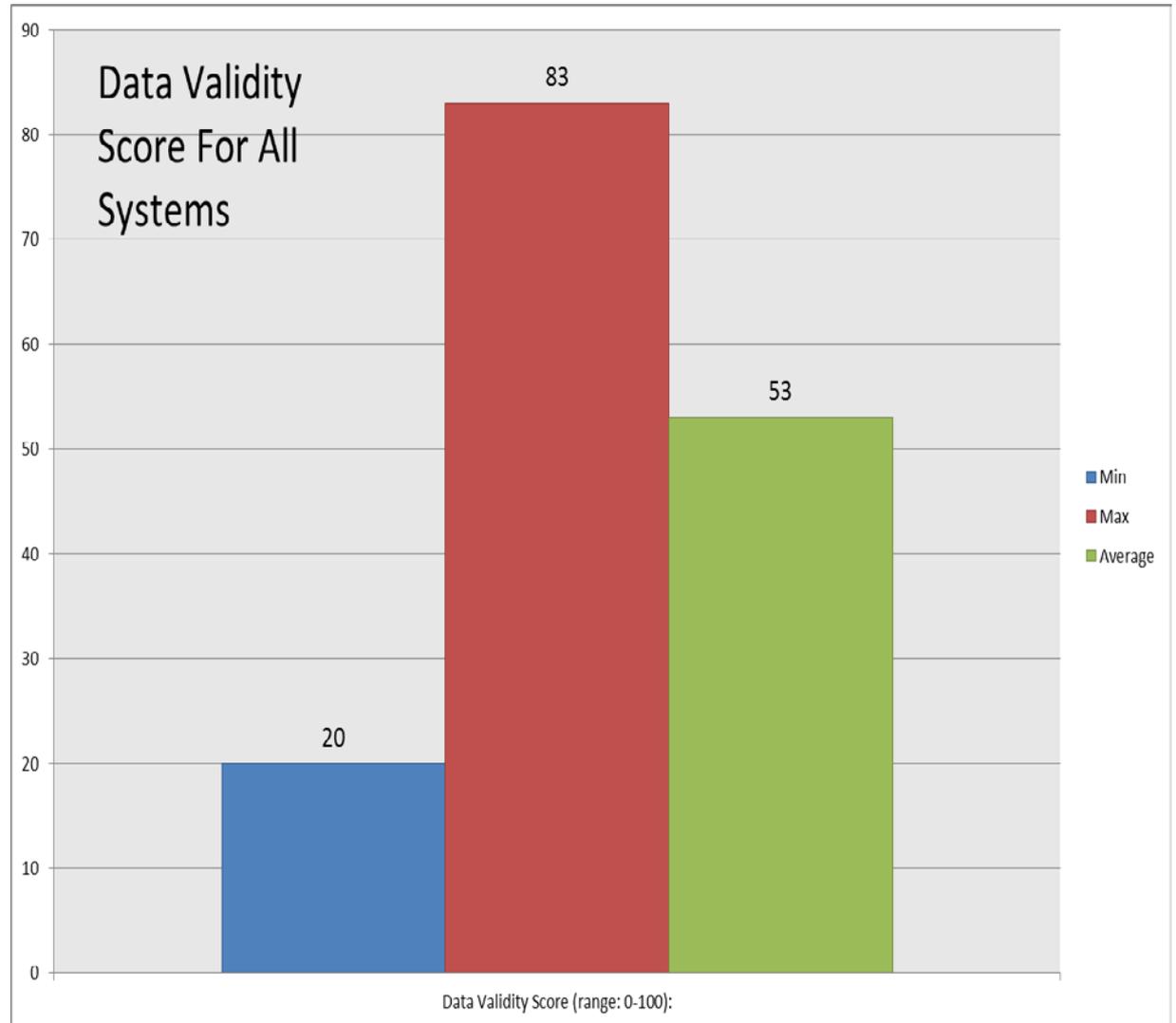


# Results

## Data Validity Score:

Unitless, 0-100.

Indicator of how much confidence to place in data.



# So Where Do We Go From Here?

- Per HB2500, we will be working with ORWA to follow up with systems to pinpoint loss
- Continued push for water loss auditing
  - Standardized method to calculate loss
  - Apples – to – apples comparison
- The drought will return – only a matter of time
- A Key to more efficient resource use



Thank you

Patty S. Thompson, P.E.  
and  
Brandon Bowman

Water Quality Division  
Oklahoma Department of Environmental Quality  
405-702-8187  
[patty.thompson@deq.ok.gov](mailto:patty.thompson@deq.ok.gov)