Investing in a multigenerational & diverse team

OCTOBER 2020

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MAKING THE BUSINESS CASE FOR:

1. CULTIVATING A DIVERSE WORKFORCE
2. MULTIGENERATIONAL TEAMS
3. INVESTING IN YOUR STAFF

2

TEXAS WATER
FOUNDATION

3

4

How we propose to uphold our mission

Create champions of sustainable water management in positions of power: build relationships with leaders and equip them with the ideas and tools to manage water well.

Equip advocates to support sustainable water management: provide aligned organizations with the policy ideas, evidence base, and stakeholder insight to succeed.

Create an educated public that understands the importance of their water: produce clear outreach materials that build popular support for sustainable management.

Build the next generation of leaders in Texas water management: train promising midcareer water professionals and connect them with leadership opportunities.

5

PEOPLE

6

LEADERSHIP

Equipping leaders both in and out of the water sector to make informed decisions.

EDUCATION

Inviting all Texans to rethink how they value water.

POLICY

Providing nonpartisan, nontechnical water issue briefs for decision makers.

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TEXAS
RUNS ON
WATER

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MAKING THE BUSINESS CASE FOR:

1. CULTIVATING A DIVERSE WORKFORCE
2. MULTIGENERATIONAL TEAMS
3. INVESTING IN YOUR STAFF

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BUT FIRST, WHY DOES ANY OF THIS MATTER?

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EPA United States Environmental Protection Agency

Search EPA.gov

Environmental Topics | Laws & Regulations | About EPA

CONTACT US SHARE

Sustainable Water Infrastructure

- Sustainable Water Infrastructure Home
- Water Infrastructure Challenge
  - Policy
  - Infrastructure needs
  - Local Officials
- Building Sustainable Water Infrastructure
  - Water and Energy Efficiency
  - Asset Management
  - Alternative Technologies

Water Sector Workforce

Ensuring that all Americans have access to clean water is a top priority for EPA. Each day communities and businesses depend on clean and safe water for daily routines that can range from drinking a glass of water to irrigating the crops that support our food supply. Behind each of these daily routines are the hundreds of thousands of skilled workers that comprise America's Water Sector Workforce. These workers provide us with clean drinking water and safe wastewater treatment every day.

EPA is undertaking a number of actions to ensure our Nation's vital water workforce has the right skills and other factors to ensure they can meet the myriad of challenges facing the water sector, both

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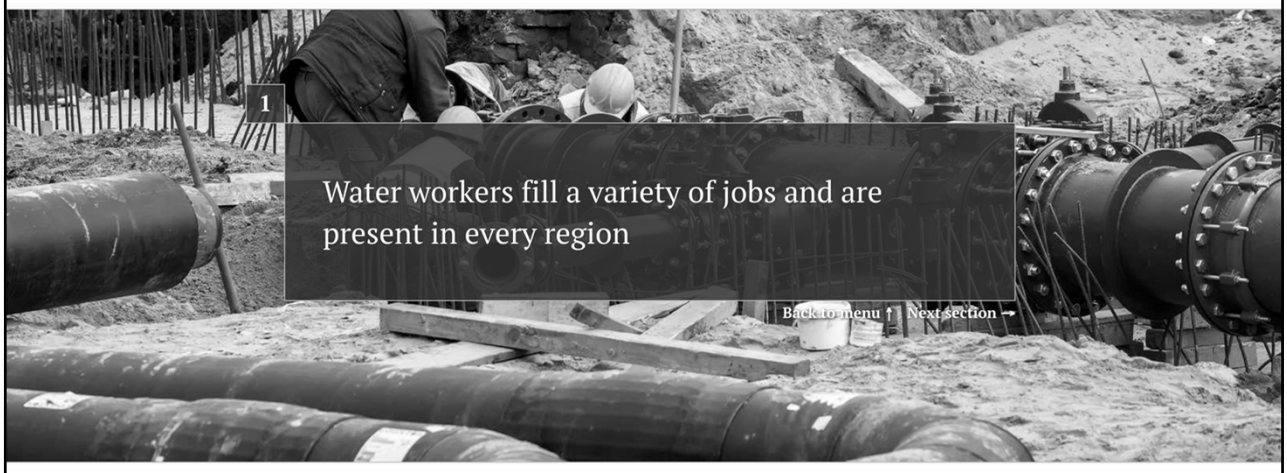

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WATER AND WASTEWATER PERSONNEL CONSIDERED ESSENTIAL WORKERS BY EPA & CISA

March 30, 2020 Wendi Wilkes 0 Comment Drinking Water Headlines

Last week, EPA Administrator Andrew Wheeler sent a letter to Governors in all 50 states, territories and Washington, D.C. urging them to ensure that drinking water and wastewater employees are considered essential workers by state authorities when enacting mobility and travel restrictions to reduce the spread of COVID-19. Drinking water and wastewater services are critical during this public health crisis. In the letter, Wheeler requests that, "water and wastewater workers, as well as the manufacturers and suppliers who provide vital services and materials to the water sector, are considered essential workers and businesses by state authorities..." The letter was announced in an EPA press release which includes additional information.

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HOME | WATER UTILITY MANAGEMENT

An Essential Service

As we are all feeling the impact of in-person social distancing, and many industries transition to working from home, those in the water sector do not have that luxury.

Author — Alanna Maya

Apr 7th, 2020

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Water workers in the 100 largest metro areas
By total employment and share of employment, 2016

Source: Brookings analysis of BLS Occupational Employment Statistics

15

"Almost one-third of water industry professionals will be at or nearing retirement age in the next few years. When you combine that with the fact that the unemployment rate is already at record or near-record lows and other industries are facing the same challenges and going after the same people we are, we have some serious work to do."

Center for Water Studies, Cuyamaca College, May 2019

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4
Water workers tend to be older and lack gender and racial diversity in certain occupations, pointing to the need for younger, more diverse talent
Back to menu ↑ Next section →

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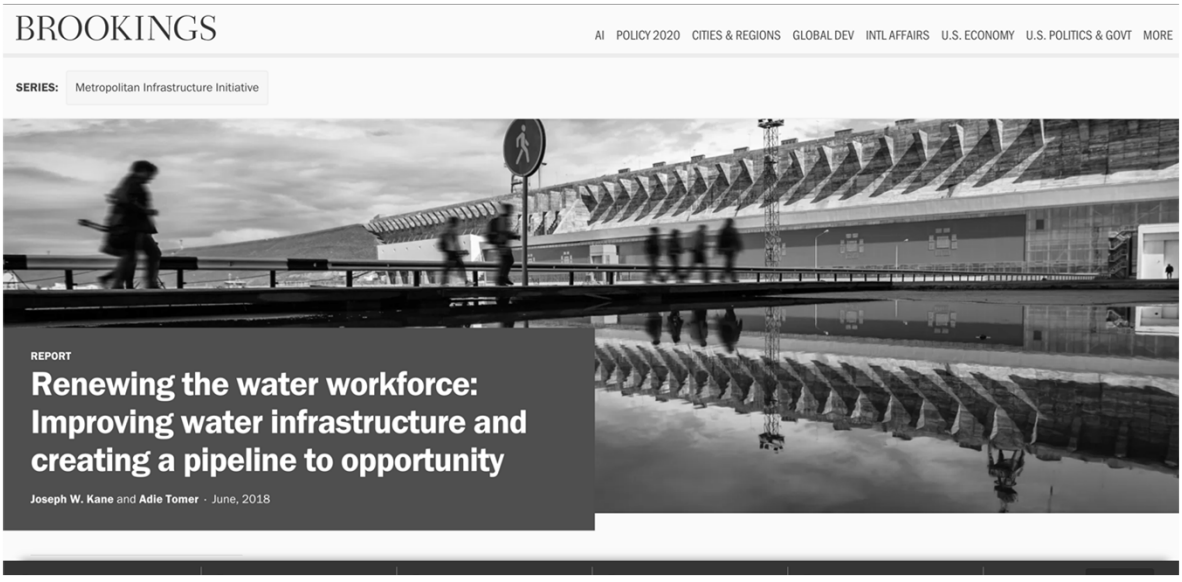
BROOKINGS
AI POLICY 2020 CITIES & REGIONS GLOBAL DEV INTL AFFAIRS U.S. ECONOMY U.S. POLITICS & GOVT MORE
SERIES: Metropolitan Infrastructure Initiative
REPORT
Renewing the water workforce: Improving water infrastructure and creating a pipeline to opportunity
Joseph W. Kane and Adie Tomer · June, 2018

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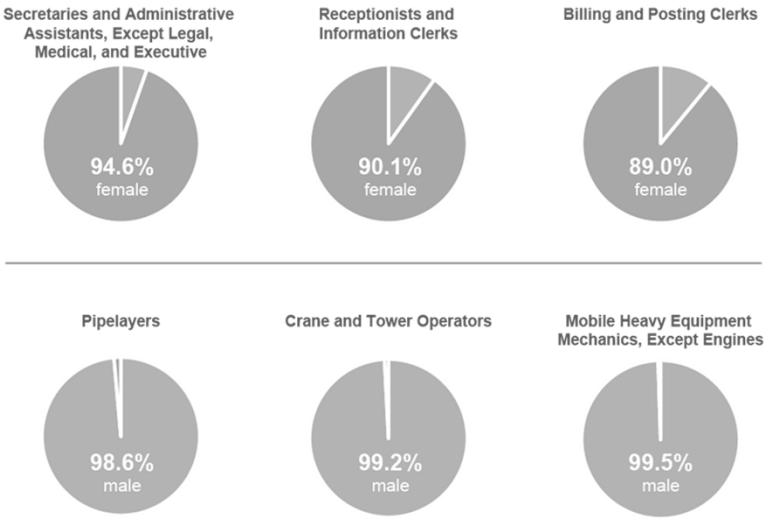
Selected Occupations with High and Low Shares of Female Workers, 2016



Source: Brookings analysis of BLS Occupational Employment Statistics and CPS

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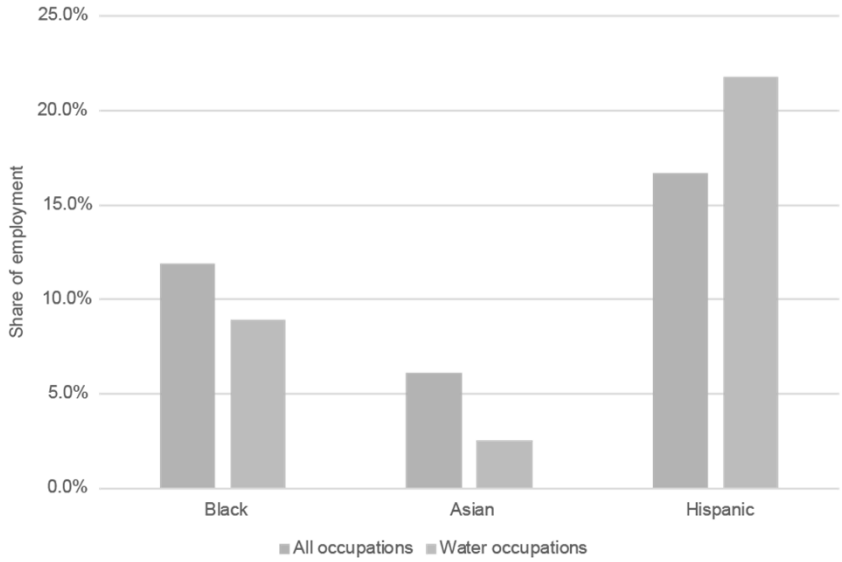
Racial Diversity in Water Occupations vs. All Occupations, 2016



Source: Brookings analysis of BLS Occupational Employment Statistics and CPS

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1. CULTIVATING A DIVERSE WORKFORCE

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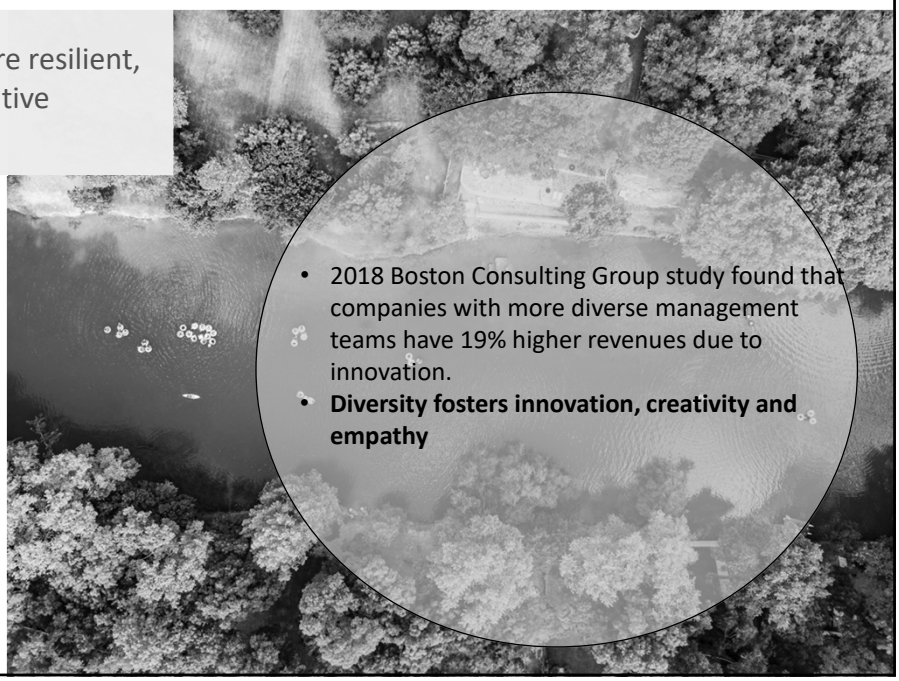
Diverse workforces are more resilient, productive & innovative



- 2018 Boston Consulting Group study found that companies with more diverse management teams have 19% higher revenues due to innovation.
- **Diversity fosters innovation, creativity and empathy**

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Diversity is not just about gender, race and ethnicity

- **Religious beliefs**
- **Political beliefs**
- **Education**
- **Socioeconomic background**
- **Sexual orientation**
- **Culture**
- **Disabilities**

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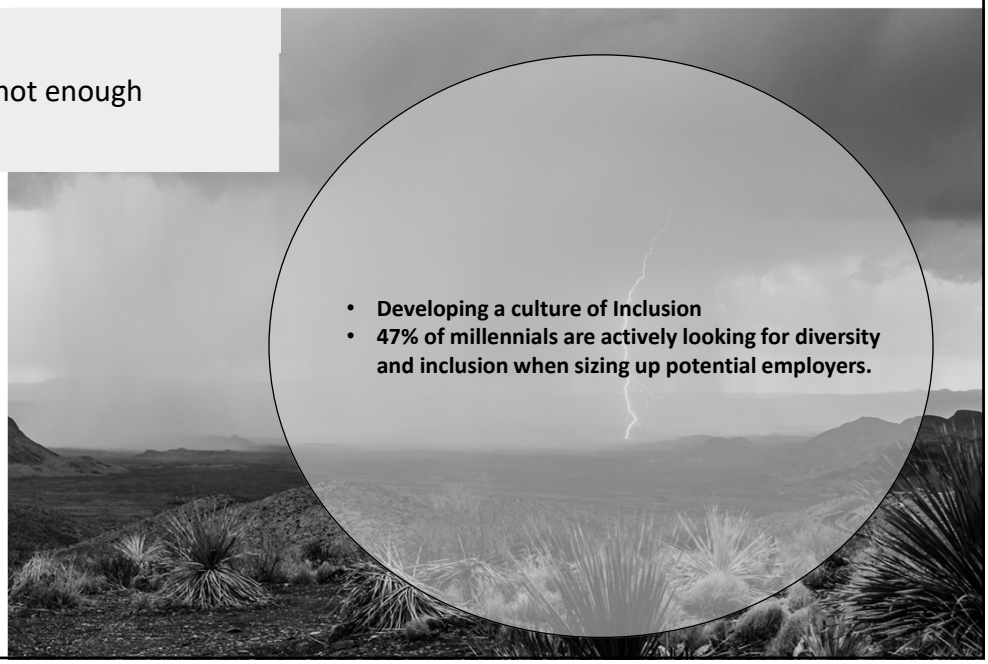
Diversity alone is not enough



- **Developing a culture of Inclusion**
- **47% of millennials are actively looking for diversity and inclusion when sizing up potential employers.**

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2. MULTIGENERATIONAL TEAMS

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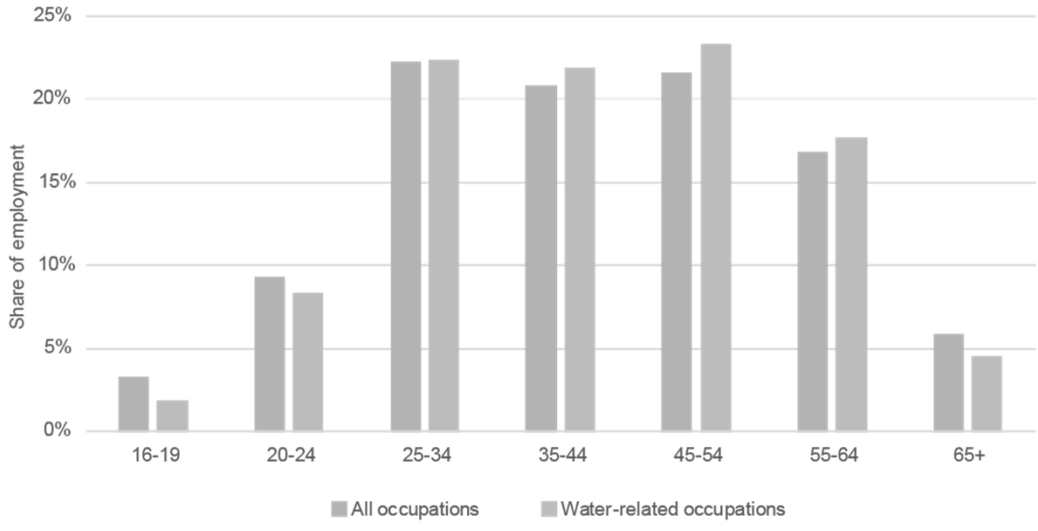
Age Range of Workers in Water Occupations vs. All Occupations, 2016



Source: Brookings analysis of BLS Occupational Employment Statistics and CPS

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For the first time, our workforce has 5 generations working together

- **Presents challenges, such as in communication styles and work/life expectations**
- **Also presents opportunity for innovation and knowledge transfer**

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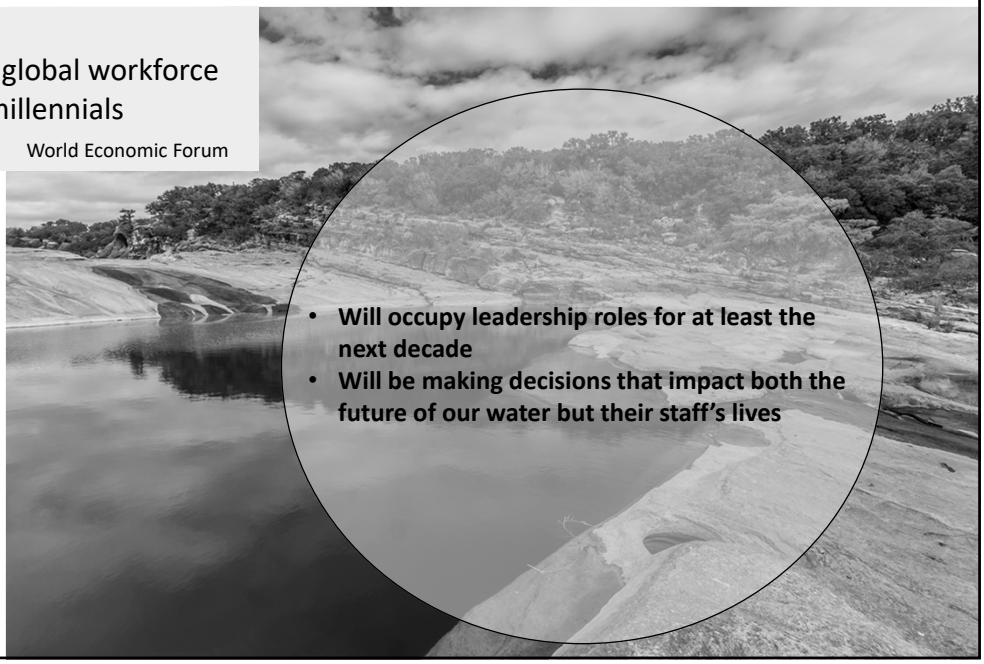
By 2025, 75% of the global workforce will be made up of millennials

World Economic Forum



- **Will occupy leadership roles for at least the next decade**
- **Will be making decisions that impact both the future of our water but their staff's lives**

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3. INVESTING IN YOUR STAFF

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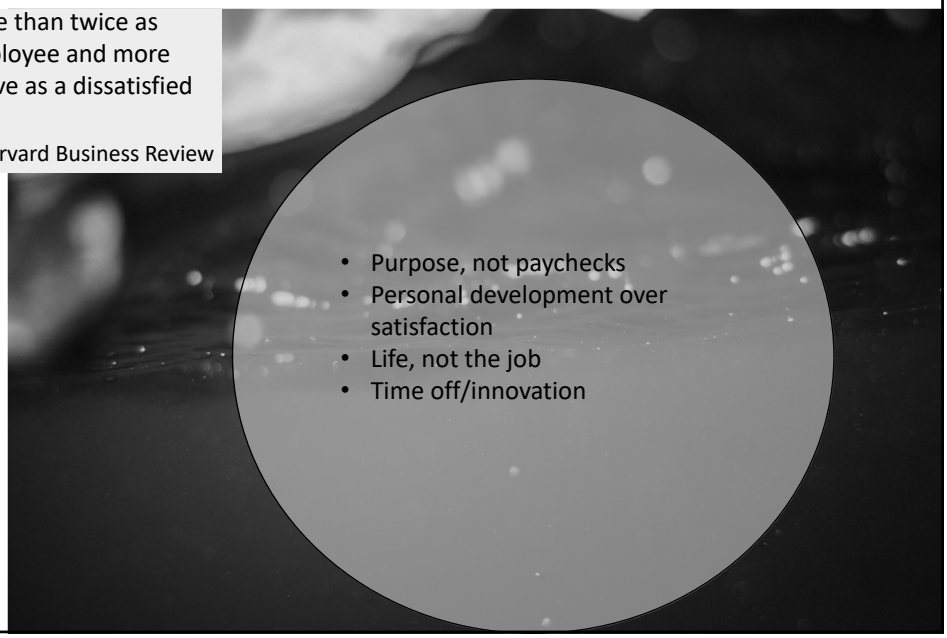
An inspired employee is more than twice as productive as a satisfied employee and more than three times as productive as a dissatisfied employee.

Harvard Business Review



- Purpose, not paychecks
- Personal development over satisfaction
- Life, not the job
- Time off/innovation

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People are our most valuable asset

- **Our workplaces are undergoing transformation with new technologies and increasingly complex requirements**
- **Increase knowledge transfer**

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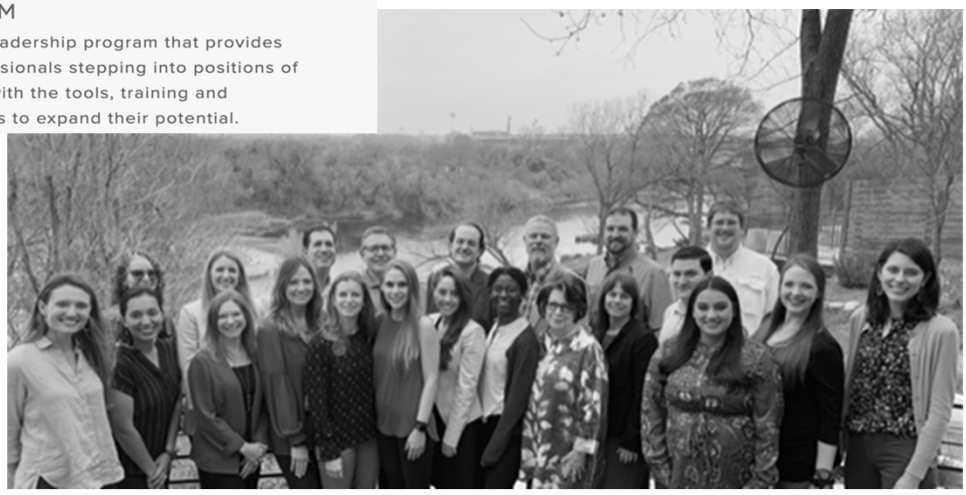
TEXAS WATER LEADERS PROGRAM

An annual leadership program that provides water professionals stepping into positions of leadership with the tools, training and opportunities to expand their potential.



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QUICK SUMMARY

- The water industry is complex
- The water industry is essential
- We need innovation & a stable workforce
- Diversity and inclusion are crucial to innovation & recruiting young staff
- Generational work expectations change
- We need knowledge transfer and succession planning

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The Role of Managers and Directors in Developing Outside Relationships in Achieving Key Objectives

TRWA 2020 FALL MANAGEMENT CONFERENCE

Bruce A. Alexander, Superintendent

East Medina County Special Utility District

1

This presentation will include a discussion on relationships with:

- Board of Directors/City Council Members
- County Judge, County Commissioners and County Officials
- Elected Officials in Neighboring Communities
- State and Federal Lawmakers
- State/Regulatory Agencies
- Neighboring Utilities
- Local Community Leaders
- The Press
- The Public

2

Board of Directors / City Council Members

The relationship between the manager and the governing board of the organization is vital to the success of the organization.

This relationship is built on a clear understanding of the direction of the organization, trust and respect in the actions of the manager, and the authority for the manager to act in the best interest of the organization when it comes to building relationships with outside groups that are needed to help the organization succeed.

3

County Judge

As the Chief Administrative Official of the County, the County Judge helps to guide the actions of Commissioner's Court on issues that often have a significant impact on the operations of a rural water system through the application, approval and enforcement of;

- County Subdivision Rules and Regulations
- The Use of County Road Right of Ways
- The Issuance of Community Block Grants
- Emergency Management

4

County Commissioners

The relationship between you and your County Commissioners is key to the daily success of your water system.

Attend Commissioner's Court meetings and offer to speak on issues that may have an impact on your water system.

Know and understand the County Subdivision Rules and Regulations as well as you know and understand your own rules and regulations for service in a subdivision.

While the Water Code provides you the power to use a county road right of way for the placement of your waterlines, a strong positive working relationship with your County Commissioner is required to prevent and/or eliminate any potential conflicts that may arise from the use of the right of ways.

5

County Officials

There are many officials, both elected and appointed, in the County that require good relationships to succeed. They include relationships with:

- The Sheriff's Department
- The County Health Department
- The County Emergency Management Department
- The Appraisal District
- The County Clerk

6

Elected Officials in Neighboring Communities

- Get to know the Mayors, City Council Members and elected officials in your neighboring communities.
- Share the goals and objectives for the future of your water system as it relates to their future goals and objectives.
- Discuss development plans in and around their ETJ and how you can work together to provide service to high growth areas.
- Work towards solutions to issues of concern before they become a problem that requires outside forces to step in and resolve.

7

State Lawmakers

Get to know your State Representative and State Senator

and their staff!

Attend an event to meet them whenever possible

Invite them to attend a system event and/or meeting

Inform them of who you are and who you represent

Discuss issues of concern and seek support when needed

Always be professional and respectful to the position they hold

8

Federal Lawmakers

Get to know your US Representative and US Senators

and their staff!

Attend an event to meet them whenever possible

Invite them to attend a system event and/or meeting

Inform them of who you are and who you represent

Discuss issues of concern and seek support when needed

Always be professional and respectful to the position they hold

9

State Agencies

Relationships with State agencies such as the Texas Department of Transportation (TxDot) and the Texas Division of Emergency Management (TDEM) are crucial to the success of many rural water systems.

- Most systems use some portion of State Right of Ways for the installation of water lines parallel to or under the roadway. The use of the right of way requires a permit issued by TxDot. The relationship you have with the local and District offices of TxDot help to obtain timely approval of permits.
- TDEM is called on during disasters to provide assistance as needed. Continued good working relationships with TDEM will help to expedite relief when a disaster strikes that affects your system.

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Regulatory Agencies

Three of the most important regulatory agencies that have an impact on rural water systems are:

- Texas Commission on Environmental Quality (TCEQ)
- Public Utility Commission of Texas (PUCT)
- U.S. Environmental Protection Agency (USEPA)

It is imperative that good working relationships be established with each of the local and/or regional offices of each of these agencies.

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Neighboring Utilities

Meet with managers and officials from neighboring utilities to share ideas and problems in building relationships that provide support and assistance as needed.

Be a good neighbor and agree to offer assistance when a neighbor calls for help with materials, manpower or guidance on how to address an issue of concern.

You never know when it may be you seeking assistance.

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Local Community Leaders

Relationships with local community leaders help you to get the word out and build support for your organization.

Local leaders are able to share with you some of the pulse of the community you serve to help improve customer service related issues and spread a positive message of your organization.

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The Press

Relationships with the press is often a concern that may or may not be justified based on what type of relationship you have.

The relationship with the press must be built on honest, truthful and factual communications. Take responsibility and corrective action when necessary based on the issue to be reported and be prepared to challenge a member of the press with accurate information when an error or omission is left out of a story.

Provide your local newspapers with positive impact public interest stories to support your system and rural water whenever possible.

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The Public

- Your relationship with your customers is one of the most important relationships you have.
- How your customers see you as the manager is a reflection of how they view the organization.
- Honest, fair and equitable application of all policies and procedures to everyone regardless of who they are and/or what they represent is required at all times.
- Build and maintain trust with the public.

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So, what's the most important

thing you can do to develop

outside relationships to achieve

key objectives?

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Know your subject well

and have the confidence

needed to succeed.

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Thank you for attending this session of the

2020 TRWA Fall Management Conference

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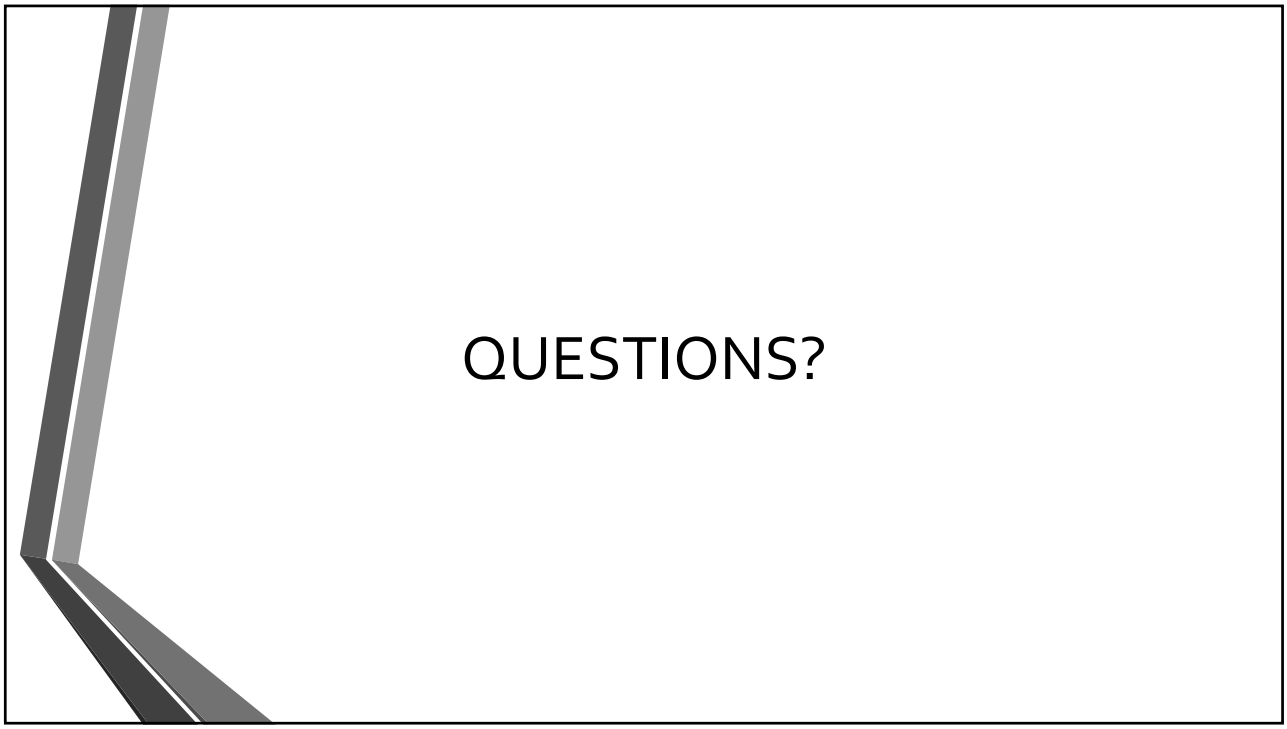

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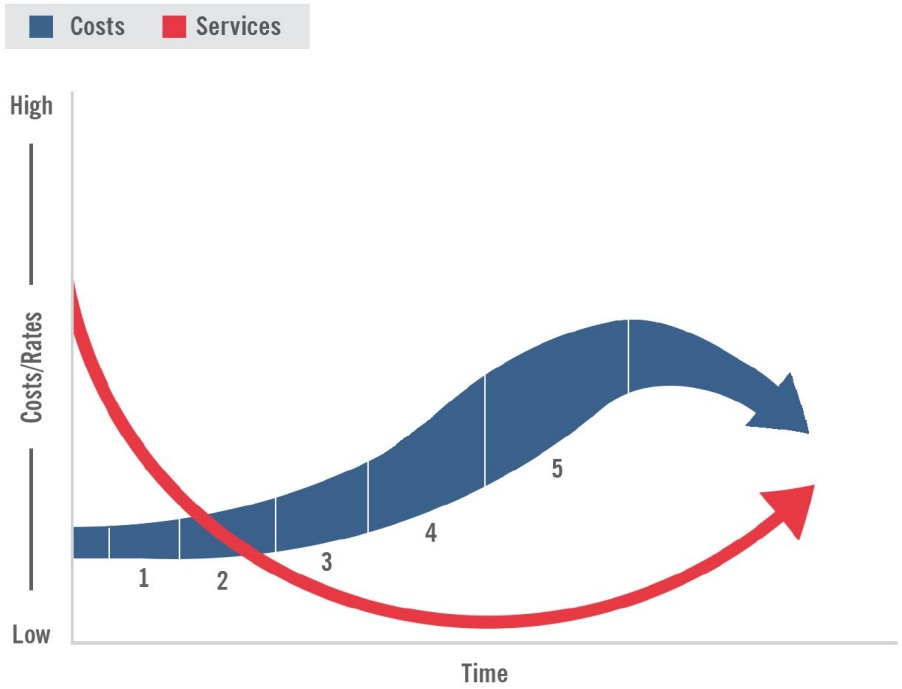
Embracing Technology

Marc Santos, PE - Isle Utilities

TRWA Fall Management Conference
October 22, 2020

Challenges to Embracing Technology



Credit: George Hawkins via Bipartisan Policy Center

1. Initial assessment of existing service
2. Market research
3. Procurement/RFI/RFQ
4. Design/build
5. Adopting/training/SOPs

Presentation Agenda

1. Global Tech Ecosystem
2. Tech Areas to Consider
3. NRW Techs
4. Asset Management Techs
5. Other Resources

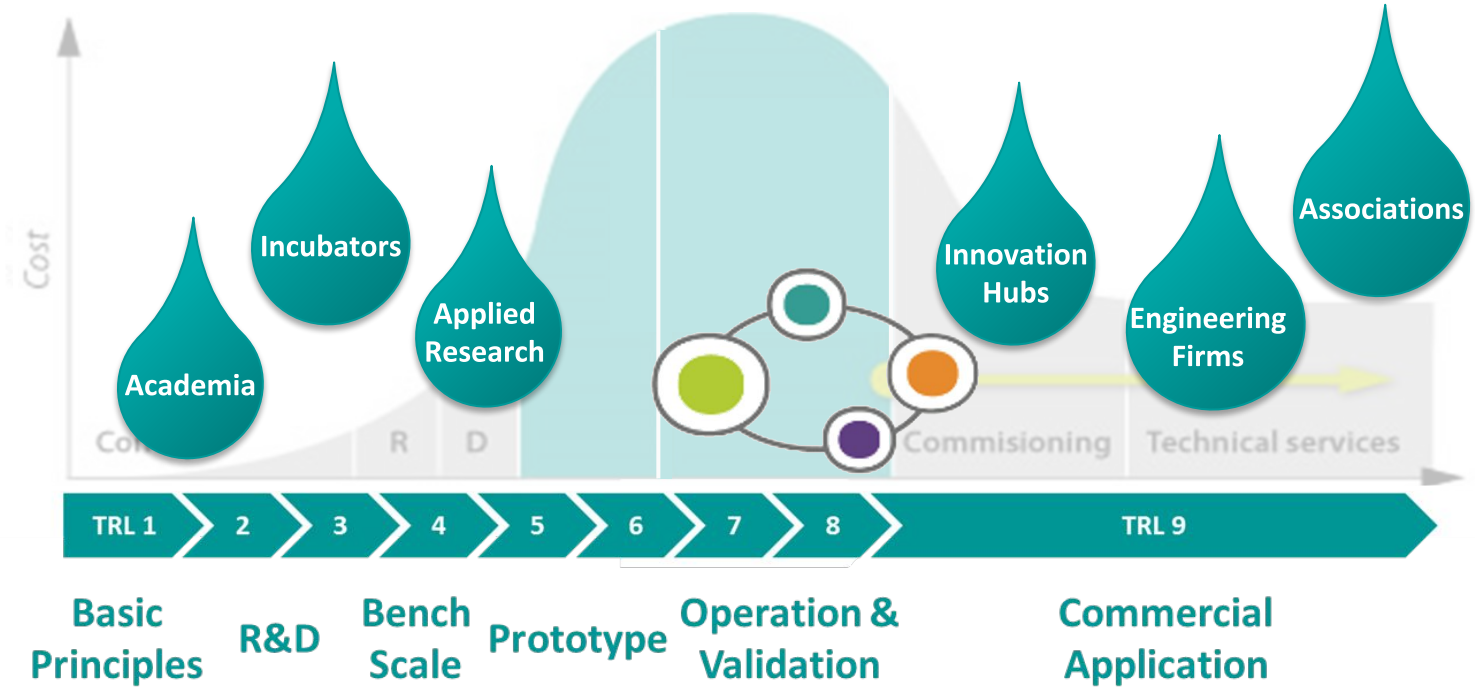
Global Tech Ecosystem

Technology Due Diligence

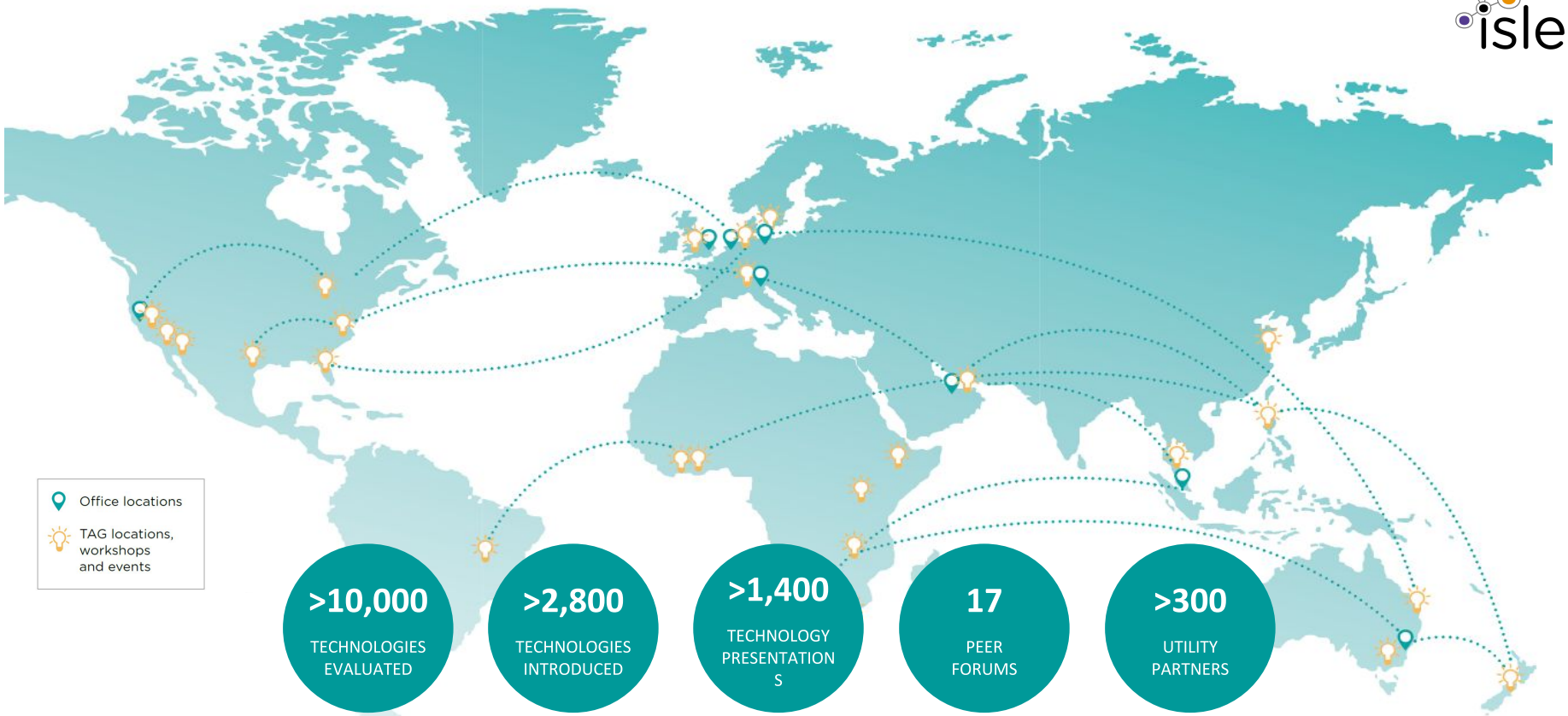
Technology Readiness Level (TRL)

- A method for estimating the maturity of technologies developed at NASA in the 1970s.
- TRLs enable consistent, uniform discussions of technical maturity across different types of technology.

Innovation Ecosystem



TAG Technologies sit between a 6 and 9 on the Technology Readiness Level (TRL) scale. Isle serves as a go-to-market bridge to overcome barriers between development and commercialization.



Isle is a technical consultancy with 85 employees worldwide. All our services revolve around the strategic identification, evaluation, and implementation of best-fit technologies and practices.

Tech Areas to Consider

Some Areas of Improvement with Tech

Immediate

- ✓ **Data** - Improved and digital data collection and communications between field and office staff
- ✓ **Optimization** - Treatment process, chemicals/disposables, energy optimization
- ✓ **Water Loss and I&I** - Reduction of water loss or inflow and infiltration
- ✓ **Reporting** - Efficiency in internal and external reporting
- ✓ **Residuals** - Beneficial use or resource recovery of residuals or biosolids
- ✓ **Billing** - Accurate and adequate billing
- ✓ **Health and Safety** - Personal monitoring, LOTO, and hazard identification

Some Areas of Improvement with Tech

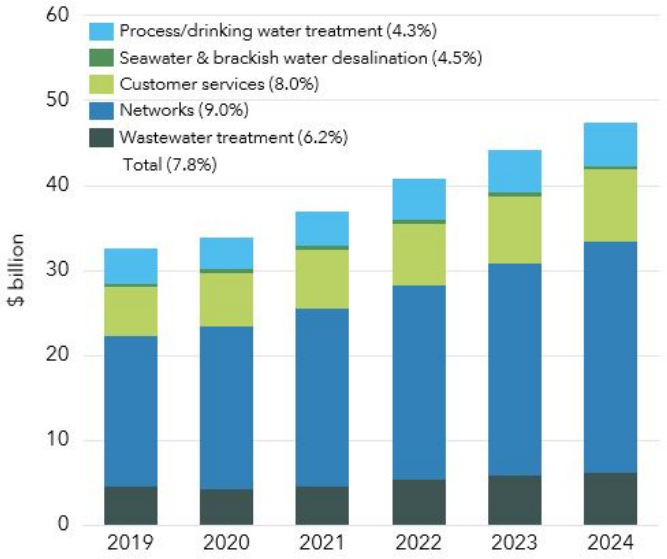
Longer Term

- ✓ **Preventative Maintenance** - Triggering and documenting effective maintenance
- ✓ **Asset Management** - Targeted replacement of linear assets (avoiding emergency fixes)
- ✓ **Communication** - Efficient communication with end users
- ✓ **Emergency** - Emergency preparedness for expected issues
- ✓ **Training** - Succession planning, documentation, and efficient training program

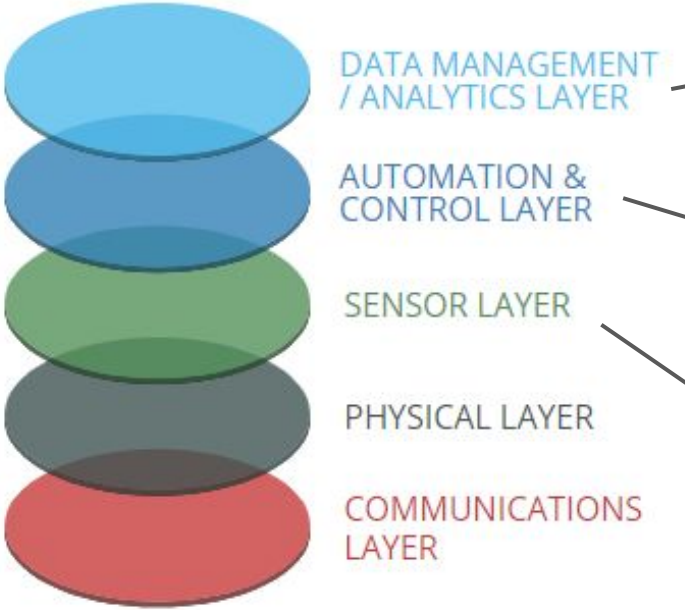
Global Trends: Digital Transformation

Automation and remote operations' role in securing service continuity during the COVID-19 pandemic has underlined the need for digital technologies, enabling support staff and on-the-ground operations staff to work remotely and utilities to remain in contact with their customers.

Utility Digitization Under COVID-19



Digital Transformation



Data Dashboarding & Information Management
- Energy
- Document Management
- Predictive Maintenance
- 3D Visualization Tools

Treatment Optimization & Smart Networks
- Treatment
- Pumping
- Aeration
- Distribution/I&I Flow Optimization

Continuous Remote Monitoring
- WQ Sensors
- Satellite
- Leak Detection
- Asset Management

Source: GWI Water Data

Some Tech Buzzwords

- Machine Learning/Predictive Maintenance
- Artificial Intelligence
- Fuzzy Logic
- IOT - Internet of Things
- Digital Twin
- SAAS - software as as service
- HAAS - hardware as a service
- DAAS - data as a service

Non-Revenue Water

Technology Overview

Mobile (ground mics, correlators)

Satellite/ Aerial

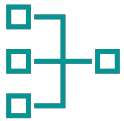
Monitoring Tech/ Fixed network

AI/Machine Learning

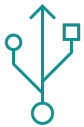
Reactive — Real Time — Predictive

Invasive Monitoring/ Inspection

District Metering/ Flow monitoring



Pressure/ Trunk Monitoring



Longitudinal Sensors/ Fiber Optic

Tech Filters

GLOBAL MARKET SCAN

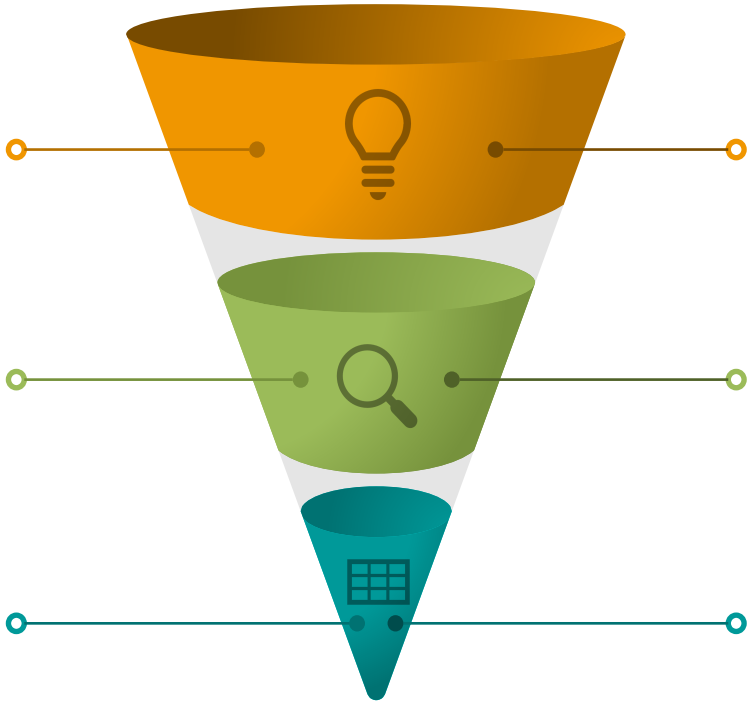
Full scan of the global market to identify all possible solutions in a technology area.

UTILITY TECH NEEDS

Evaluation of technologies for alignment with Utility's critical needs and criteria

BEST FIT LONGLIST

Longlist of techs with best fit for Utility's more immediate tech needs.



CRITERIA FOR LONGLIST

- ✓ Functional Diameter: 4"- 16"
- ✓ Material: PVC and AC pipe
- ✓ Deployment: Hydrants/valves
- ✓ GIS Integration
- ✓ Staff Training

SHORTLISTED TECH METRICS

- ✓ Operation and Deployment
- ✓ Reporting and Analysis
- ✓ Accuracy
- ✓ Communication
- ✓ Software and Data
- ✓ Customer Support

COMPARATIVE EVALUATION

- ✓ Reference Checking

Water Pigeon

USA | TRL 9

LEAK DETECTION

What challenge does this technology solve?

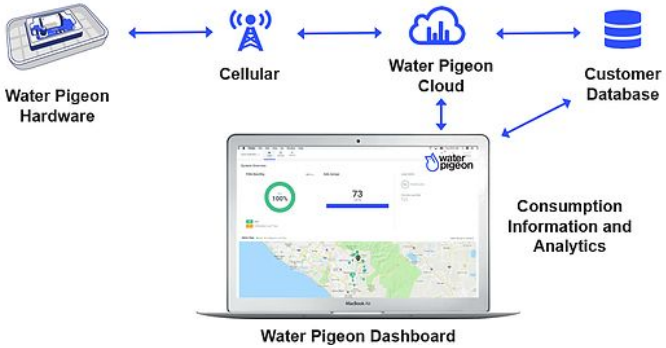
- Alternative to existing automated meter reading (AMR) solutions

How does it work?

- Delivers AMI functionality by replacing existing meter box lids with a lid that has an inbuilt camera to capture images of the meter register
- Images are converted to data via optical character recognition (OCR)
- Transmitted over the existing cellular network to the utility
- Provides the utility with accurate meter reads and the ability to identify leaks on the customer side of the meter

Unique Selling Point / Competitive Advantage?

- Can be implemented at half the cost and one-tenth the time of current AMI/AMR offerings
- Deployed in 5 minutes or less



LEAK DETECTION

Watchtower Robotics

USA | TRL 9

What challenge does this technology solve?

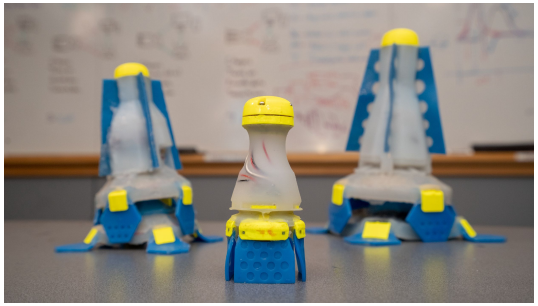
- Early and accurate detection of leaks in distribution pipes

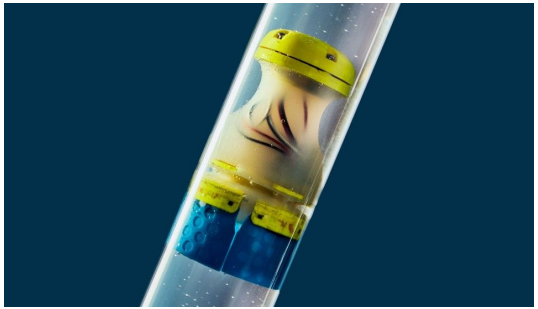
How does it work?

- Lighthouse is a soft body, untethered robot used for detection of leaks in metal and plastic water pipes
- Can be deployed from T junctions or hydrants to inspect pipes while in service
- Maps the pipe during inspection and records changes in pipe diameter
- Uses pressure measurement at the wall of the pipe to detect leaks

Unique Selling Point / Competitive Advantage?

- Lighthouse can detect leaks of 1 GPM with accuracy of 1ft, compared to 100ft accuracy of competing systems





Asset Management

Asset Management Techs

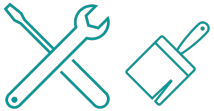
Asset Identification

Asset data management systems

Predictive Maintenance/ Machine Learning

Reactive

Predictive



Rehabilitation/ Coatings/CIPP

Condition Assessment and inspection tools

Equipment health monitoring

ASSET MANAGEMENT

Subsurface Instruments

USA | TRL 9

What challenge does this technology solve?

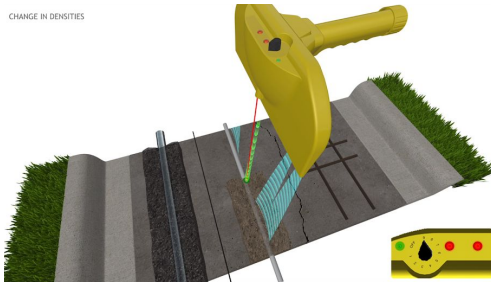
- Locating plastic pipe diameter, depth, and location

How does it work?

- Utilizes a combination of continuous, unmodulated ultra high frequency (UHF) and algorithmic data analysis
- Emits an inverted, conical UHF signal that seeks out the edges of objects
- Can detect objects down to 18 ft/6 m
- Can locate non-metallic pipe including (PVC, PE, PEX, PP, ABS, AC, etc.)

Unique Selling Point / Competitive Advantage?

- Unlike GPR it can work through wet soils, hard clays or solid rock
- It can can a large area in seconds to minutes



ASSET MANAGEMENT

vGIS

Canada | TRL 9

What challenge does this technology solve?

- Gap between GIS data and real-world integration

How does it work?

- vGIS Utilities transforms traditional “flat” GIS data into augmented reality displays and holograms
- Compatible with smart phones, tablets, or Microsoft Hololens
- Pipes and utility lines appear in the field of view as an extension of the real world
- Displays complex data points, such as ground penetrating radar scans

Unique Selling Point / Competitive Advantage?

- Creates instant awareness of surroundings, saving time and avoiding costly mistakes
- Prevents excavation-related accidents

SaaS/HaaS: BUSINESS PROCESSES

Samsara IoT

USA | TRL 9

What challenge does this technology solve?

- Data visibility and analytics for equipment and operating data

How does it work?

- Collects any existing data from sensors, PLCs, pumps, remote assets, and grab samples
- Creates dashboards with custom visualizations with little training
- Enables condition monitoring, predictive maintenance, optimization of pump efficiency and tank operations

Unique Selling Point / Competitive Advantage?

- Unlike traditional technologies, the data is stored in cloud and can be integrated with CMMS, water quality planning, and finance teams
- Allows integration of grab samples and field verifications along with online monitoring

SaaS: BUSINESS PROCESSES

RedEye

Australia | TRL 9

What challenge does this technology solve?

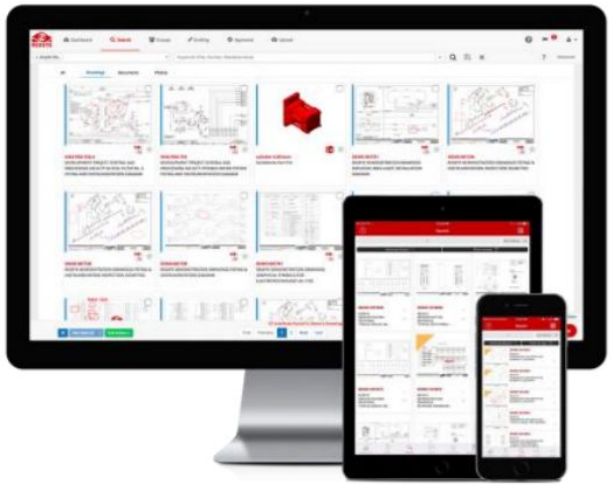
- Engineering drawing management leading to safety and financial risks

How does it work?

- RedEyeDMS is the first purpose-built cloud and mobile engineering drawing management solution
- Upload and link relevant documents, photos, and drawings together
- Find the right information with a single click
- Changes in the field can be captured in real time
- An asset owner's Single Source of Truth (SSOT) for engineering data

Unique Selling Point / Competitive Advantage?

- Allows changes to be recorded, shared, reviewed, and approved in an easy, efficient, auditable manner



Daupler

USA | TRL 8

SaaS:
OPERATIONS

What challenge does this technology solve?

- Time-intensive and inaccurate incident response and data management

How does it work?

- Incident Response Management System (IRMS) helps utilities expedite their responses to critical issues
- Improves customer engagement with an incident response tracking tool
- Uses machine learning to analyze customer reported issues to look for potential causes
- Partners and integrates with various CMMS providers

Unique Selling Point / Competitive Advantage?

- Improves customer satisfaction by reducing response times and engaging citizens with a Response Tracker

Additional Resources

Water Action Platform

The group involves over **1100+** members **608** organizations across **88** countries as of August 2020.

Asset Management

Chemical Free Treatment

Communications

Customer Service

Digital and AI

NRW and Leakage

SDGs

Technology and Innovation

WASH Service Affordability

Wastewater

https://www.wateractionplatform.com/

Thank you!

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Isle Utilities

TRWA 2020 Fall Management Conference

Workforce Development & Retention Strategies

Nichol Howell, TRWA
Professional Development & Training Director

TRWA
Texas Rural Water Association

1

Today's Goals

A changing workforce creates a need for us to change our ways of thinking, of doing business, and of managing our workers.

The Why

Facts around workforce challenges and why it's so important that we have this discussion now.

The How

Tips and techniques on how to start, or continue, tackling this beast, that I synthesized from various sources.

SLIDE 2

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2

Workforce Separations

"A tide of retirements is drastically cutting into the pool of skilled, qualified workers in many utilities and resulting in staffing vacancies of up to 50% in some cases."

~ AWWA, 2019 ~

"From 2016 to 2026, the combination of separations and future growth in the water sector is projected to lead to an average of 9,200 annual openings for water and wastewater operators."

~ The Bureau of Labor Statistics ~

"In the next 10 years, 37% of water utility workers and 31% of wastewater utility workers will retire."

~ EPA, 2017 ~

"Many systems will likely experience losses of 30%-50%."

~Numerous sources, including NRWA ~

SLIDE 3

TRWA
Texas Rural Water Association

3

Workforce Challenges

- Low public awareness of the industr
  of available jobs
- Difficulty finding candidates w
  skills and experience
- Changes in our industry due to dig
  and automation
- Many jobs in our industry require more extensive on-the-job training

53% of water/wastewater workers have a high school diploma/GED or less, and 78% need at least one year of related work experience.

SLIDE 4

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4

TRWA Salary Survey: Education & Experience

Education

- ***Wastewater Operators***
  - 71% = High School/GED
  - 0% = Bachelors Degree
- ***Water Distribution/Field Operators***
  - 69% = High School/GED
  - 4% = Bachelors Degree
- ***Lead Operators/Field Managers***
  - 73% = High School/GED
  - 6% = Bachelors Degree
- ***Manager/Operators***
  - 59% = High School/GED
  - 10% = Bachelors Degree
- ***Plant Managers***
  - 45% = High School/GED
  - 14% = Bachelors Degree

Experience

- ***Wastewater Operators***
  - 86% = 0-15 years of experience
  - 14% = 15+ years of experience
- ***Water Distribution/Field Operators***
  - 90% = 0-15 years of experience
  - 6% = 15+ years of experience
- ***Lead Operators/Field Managers***
  - 52% = 0-15 years of experience
  - 46% = 15+ years of experience
- ***Manager/Operators***
  - 36% = 0-15 years of experience
  - 44% = 15+ years of experience
- ***Plant Managers***
  - 48% = 0-15 years of experience
  - 48% = 15+ years of experience

SLIDE 5

The TRWA 2020 Salary Survey Report is available for purchase for $100 (complimentary for those who participated). The Rate Survey Report is also $100, or you can purchase both reports for $175. The 2018 reports are now 50% off. Visit the TRWA Store to order.

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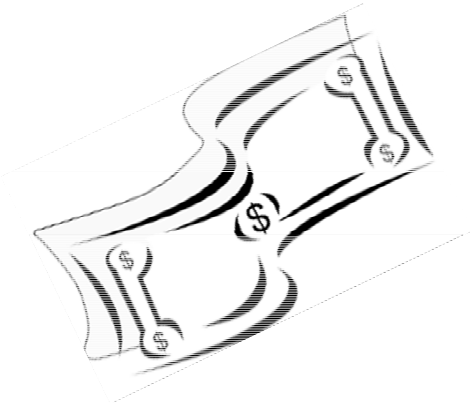
Retention Challenges



- Wastewater Operators = $37,605
- Water Distribution/Field Operators = $39,853
- Lead Operators/Field Managers = $51,318
- Manager/Operators = $55,376
- Plant Managers = $60,195

** salaries vary based on education, licensure, and experience **

45% of workers in the prime of career + Lack of younger talent + Lack of supervisory roles to move into = Attrition

SLIDE 6

TRWA Texas Rural Water Association

6

Workforce Planning

SLIDE 7

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Texas Rural Water Association

Succession Plan

Step 1

- **Identify Key Areas and Positions** = Identify which positions are critical to the organization's operational activities and strategic objectives; and if left vacant, would make it very difficult to achieve current and future business goals.

Step 2

- **Identify Capabilities for Key Areas and Positions** = To establish selection criteria, focus employee development efforts, and set performance expectations; you need to determine the relevant knowledge, skills, abilities, competencies, and capabilities required for the key areas and positions identified in Step 1.

Step 3

- **Identify Interested Employees and Assess Against Capabilities** = Consider key areas and positions that are vulnerable, and the candidates who are ready to advance, or those whose skills and competencies could be developed within the required time frame.

Step 4

- **Develop a Plan for Employee Development** = Define the learning, training, and development experiences that your organization requires for key areas and positions and link employees' learning plans to the knowledge, skills, and abilities required for current and future roles.

SLIDE 8

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8

Knowledge Management Plan

- Shift to electronic O&M manuals
- Video special procedures
- Allow for job-shadowing and cross-training prior to retirements
- Provide new employees orientation and job rotations
- Maintain files that document policy decisions
- Conduct exit interviews with knowledge transfer questions

SLIDE 9

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9

EPA Knowledge Retention Tool

Sheet No.	Type of Resource	Description	Information Captured
1	Checklist	Handoff Checklist	Review and acknowledgement that everything has been documented
2	General	System Overview	General system information
3	Administrative	Documents	Important documents for system operation
4	General	People	Important contacts and their information
5	General	Source Water	Source water information
6	Quick Response	Emergencies	Emergency preparedness contacts and documents
7	Quick Response	Security	Security system information
8	System Operation	Filtration and Treatment	Water treatment mechanisms
9	System Operation	Process Monitoring and Sampling	Sampling techniques and frequencies for compliance and process monitoring
10	System Operation	Operational Supplies	Supplies used in standard operation and where they can be obtained
11	System Operation	System Maintenance	Maintenance and flushing activities
12	System Operation	Storage	Water storage information
13	System Operation	Distribution	Distribution infrastructure and information
14	Administrative	Rules and Regulations	Applicable legislation
15	Administrative	Technology	Operational system software usage
16	Administrative	Operator Certification	Operator certification information
17	Other	Neighboring Utilities	Contact and additional information about neighboring utilities
18	Other	Other Information	Miscellaneous water system information

SLIDE 10 https://www.epa.gov/sites/production/files/2018-03/knowledge_retention_tool_spreadsheet_for_small_water_systems.xlsx

TRWA Texas Rural Water Association

Recruitment Strategies

- Investigate why identifying and hiring skilled workers remains a struggle and create more proactive, innovative recruiting strategies.
- Expand existing campaigns to raise awareness about both the water and wastewater industry and skilled trades.
- Place ad campaigns on high visibility public spaces to broadcast messaging about job opportunities and training resources.
- Attend career fairs in the community and join professional associations.
- Establish an employee referral program.
- Partner with local high schools.
- Look for talent in places that may not traditionally have attracted as much attention.

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Training Strategies

On-the-Job Training

Expend efforts into growing your leadership talent to create a pipeline among the supervisory and managerial ranks.	Provide current employees with advanced technical training in the areas of automation and digital technology.	Participate in the TRWA apprenticeship program, to help fill positions with candidates lacking industry experience.

SLIDE 12

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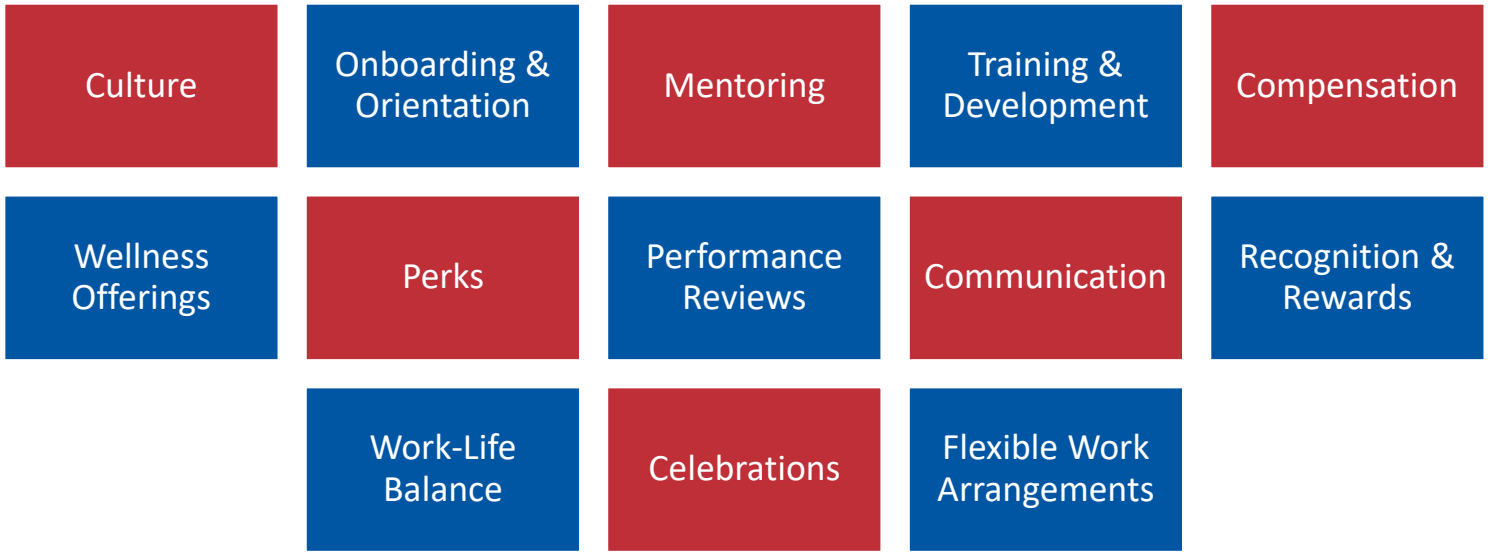
12

Retention Strategies



SLIDE 13

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Coming in 2021!

TRWA Workforce Development Programs

Apprenticeship Program

In 2017, NRWA established and certified its National Guideline Standards of Apprenticeship for Water and Wastewater Operation Specialists through the U.S. Department of Labor.

In an effort to assist the Texas public water systems in recruiting and filling positions with trained and competent workers, TRWA will launch a Registered Apprenticeship Program (RAP) in 2021. When you partner with TRWA, you leverage an established framework, where the apprentices work for you, but the overall operation of the apprenticeship program is managed by us, the program sponsor.

This 2-year program is tailored to transfer the wealth of experience and knowledge from industry experts to the next generation of system operation specialists. Individuals accepted into the program will receive both on-the-job training and technical instruction.

Veteran's Employment Program

TRWA will re-establish the Veteran Employment Program (VEP) first implemented in 2014, as a means to help you attract veteran workers. TRWA implemented the program to inspire and mobilize new interest and talent to work in the rural water and wastewater industry. This is an on-the-job training program approved by the Texas Veterans Commission (TVC) and once the veteran is hired by a water or wastewater utility that is approved as a TVC training facility, he or she is eligible for a monthly stipend from the U.S. Veteran's Administration. This stipend is in addition to his or her regular salary.

Companies that hire veterans can provide added incentives by becoming approved for GI Bill, which assists their current and future veteran employees with using the benefits they've earned towards tuition, fee payments, and a tax-free monthly housing allowance.

SLIDE 14

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Contact Information

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Professional Development & Training Director
nichol.howell@trwa.org
512-289-9850 (M)

TRWA
Texas Rural Water Association

Water Loss Audit– How to Maximize the Benefit

Municipal Water Conservation
Texas Water Development Board

Unless specifically noted, this presentation does not necessarily reflect official Board positions or decisions.

Water Loss Audits

What?

Who?

Why?

When?

Where?

How?

WHO? WHEN?

- All retail public water systems by May 1, 2021
- 3,300 or > connections
- Active financial obligation
- Recommend annual

WHY?

- System efficiency
- Extend supply
- Target asset upgrades
- Saves money
- Public Health
- Financial Assistance
- Regional Water Planning

HOW?

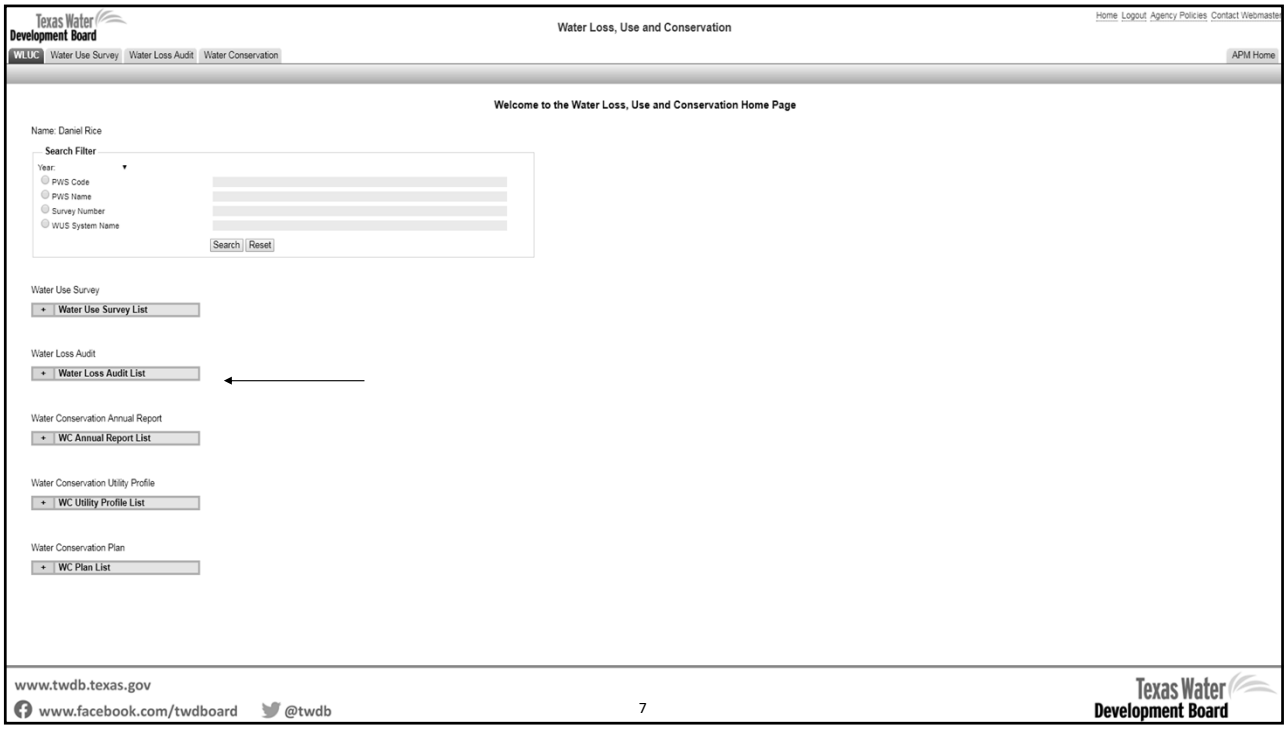
Training Requirement
31 TEXAS ADMINISTRATIVE CODE (TAC)
§ 358.6(b)(4)

- *Effective January 1, 2019, the water loss audit must be performed by a person who has completed water loss audit training……agency website and may also provide such training in person or by video.*
- *The person who completes the water loss audit is required to upload the training acknowledgement with their name on it – not someone else's acknowledgement.*

WHERE?

www.twdb.texas.gov/conservation/municipal/waterloss/index.asp

- Accessing the Water Loss Audit online reporting application (LUC)
- Registered user instructions
- Email address and contact information
- Training webinar


Texas Water Development Board
Water Loss, Use and Conservation
Home Logout Agency Policies Contact Webmaster
WLUC Water Use Survey Water Loss Audit Water Conservation
APM Home
Welcome to the Water Loss, Use and Conservation Home Page
Name: Daniel Rice
Search Filter
Year:
PWS Code
PWS Name
Survey Number
WUS System Name
Search Reset
Water Use Survey
+ Water Use Survey List
Water Loss Audit
+ Water Loss Audit List
Water Conservation Annual Report
+ WC Annual Report List
Water Conservation Utility Profile
+ WC Utility Profile List
Water Conservation Plan
+ WC Plan List
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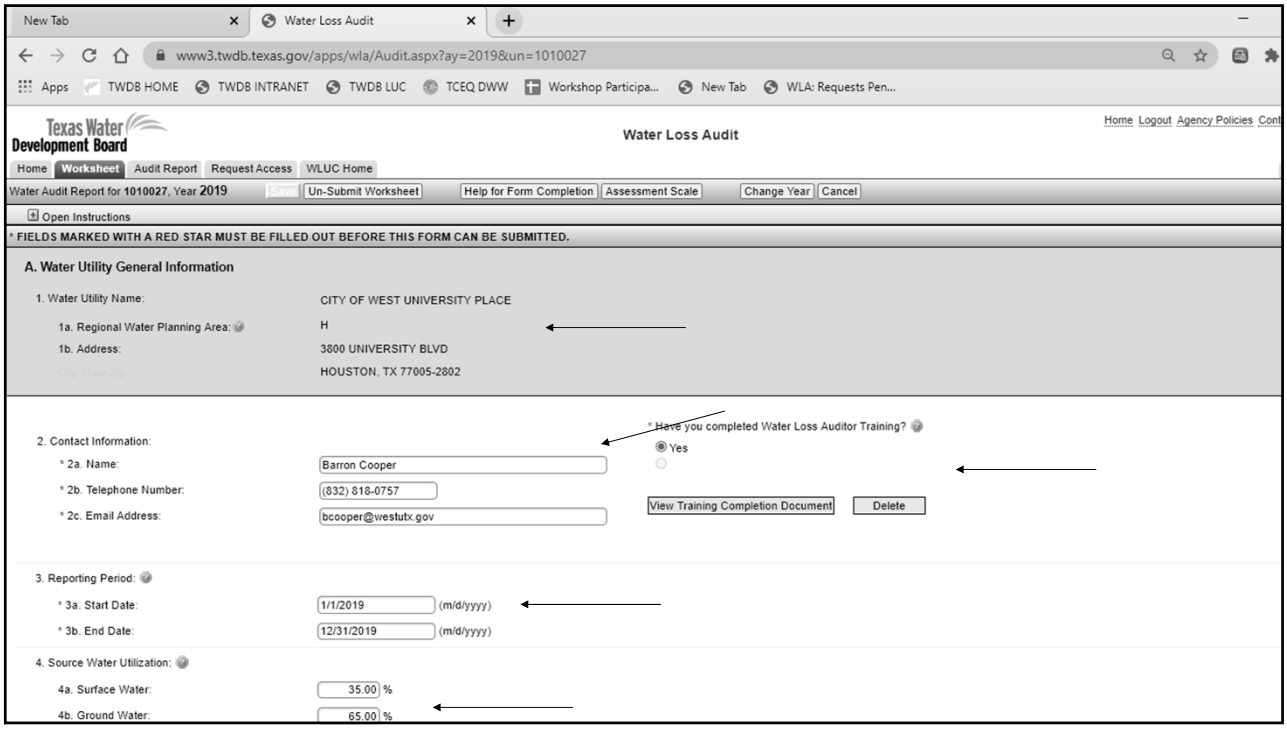
Texas Water Development Board

7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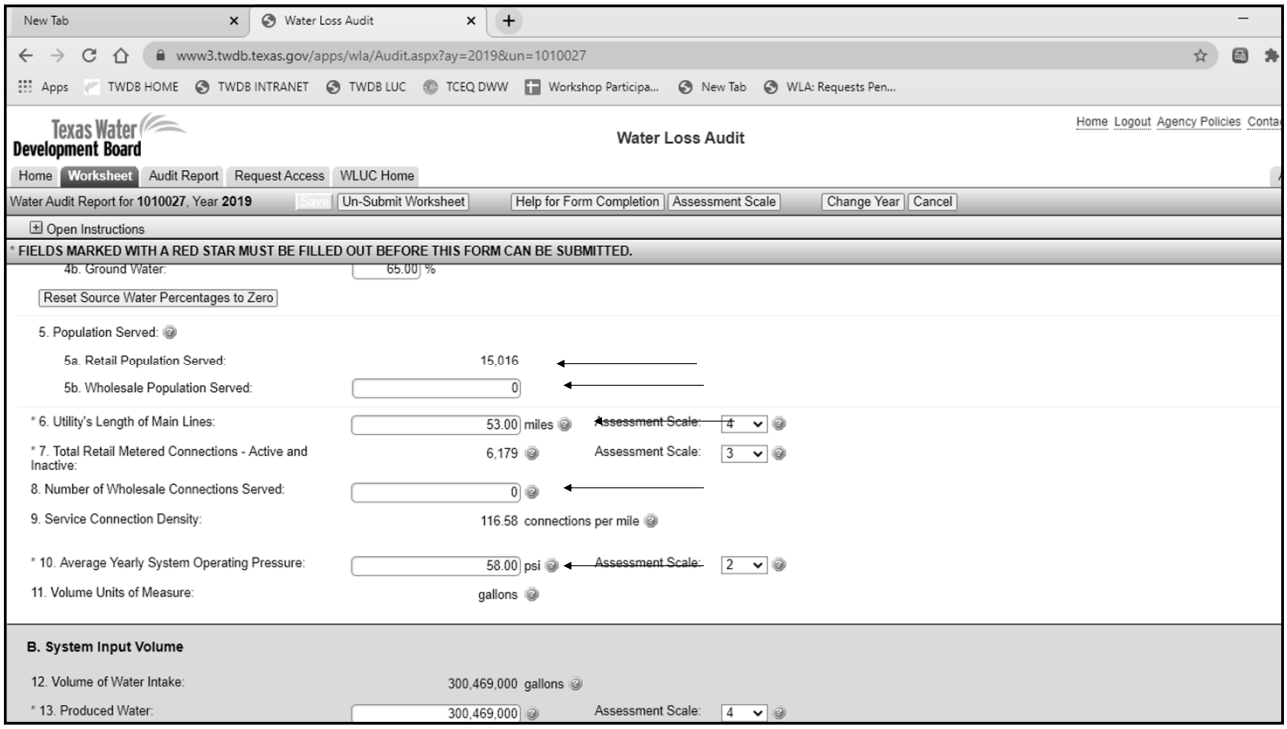
Texas Water Development Board
Water Loss Audit
Home Logout Agency Policies Cont
Home Worksheet Audit Report Request Access WLUC Home
Water Audit Report for 1010027, Year 2019
Save Un-Submit Worksheet Help for Form Completion Assessment Scale Change Year Cancel
Open Instructions
* FIELDS MARKED WITH A RED STAR MUST BE FILLED OUT BEFORE THIS FORM CAN BE SUBMITTED.
A. Water Utility General Information
1. Water Utility Name: CITY OF WEST UNIVERSITY PLACE
1a. Regional Water Planning Area: H
1b. Address: 3800 UNIVERSITY BLVD
HOUSTON, TX 77005-2802
2. Contact Information:
* Have you completed Water Loss Auditor Training?
Yes
* 2a. Name: Barron Cooper
* 2b. Telephone Number: (832) 818-0757
* 2c. Email Address: bcooper@westutx.gov
View Training Completion Document Delete
3. Reporting Period:
* 3a. Start Date: 1/1/2019 (m/d/yyyy)
* 3b. End Date: 12/31/2019 (m/d/yyyy)
4. Source Water Utilization:
4a. Surface Water: 35.00 %
4b. Ground Water: 65.00 %

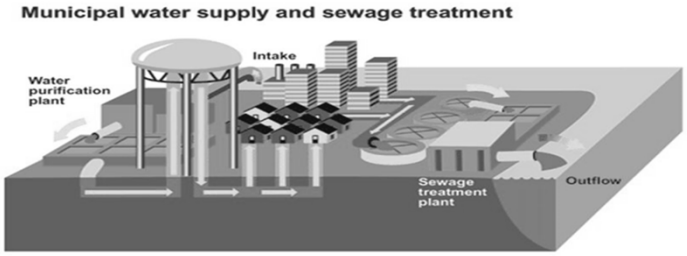
8



9

Water Balance

Provides accountability, as all the water placed into a distribution system should, in theory, equal all the water taken out of the distribution system.



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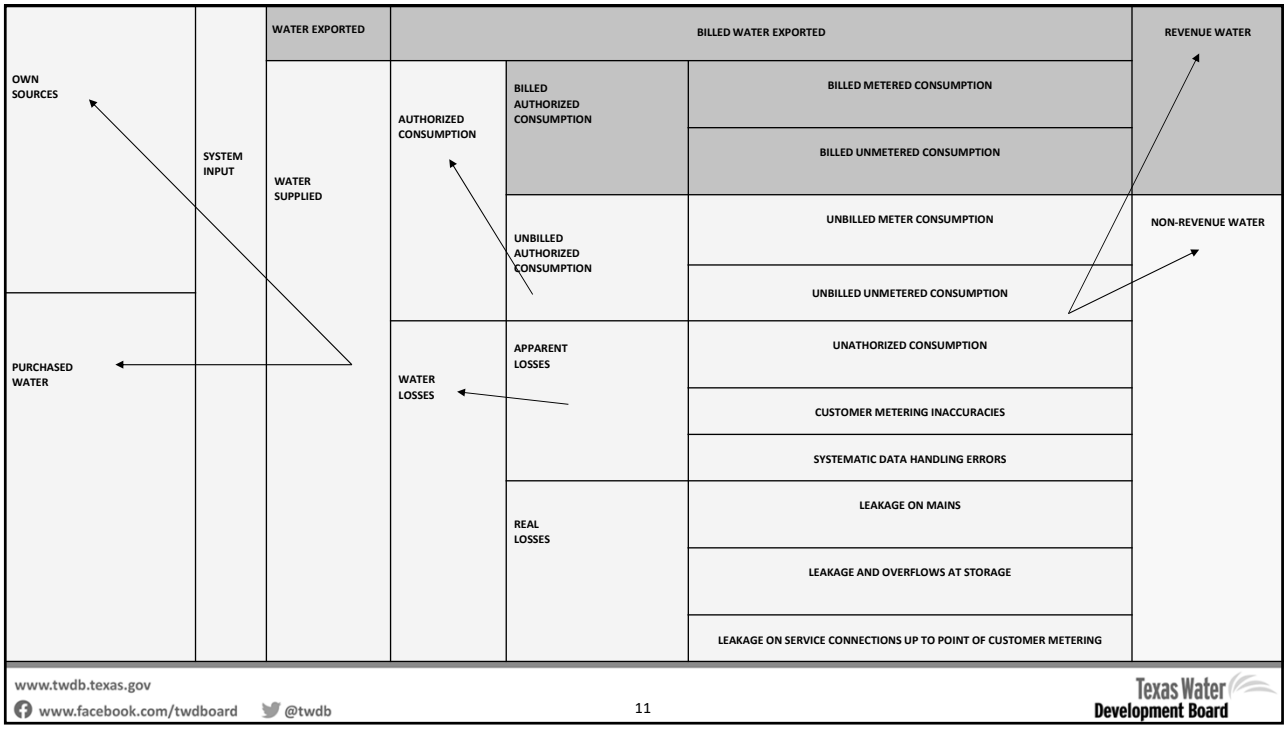
OWN SOURCES
PURCHASED WATER
SYSTEM INPUT
WATER EXPORTED
WATER SUPPLIED
BILLED WATER EXPORTED
AUTHORIZED CONSUMPTION
WATER LOSSES
BILLED AUTHORIZED CONSUMPTION
UNBILLED AUTHORIZED CONSUMPTION
APPARENT LOSSES
REAL LOSSES
BILLED METERED CONSUMPTION
BILLED UNMETERED CONSUMPTION
UNBILLED METER CONSUMPTION
UNBILLED UNMETERED CONSUMPTION
UNATHORIZED CONSUMPTION
CUSTOMER METERING INACCURACIES
SYSTEMATIC DATA HANDLING ERRORS
LEAKAGE ON MAINS
LEAKAGE AND OVERFLOWS AT STORAGE
LEAKAGE ON SERVICE CONNECTIONS UP TO POINT OF CUSTOMER METERING
REVENUE WATER
NON-REVENUE WATER
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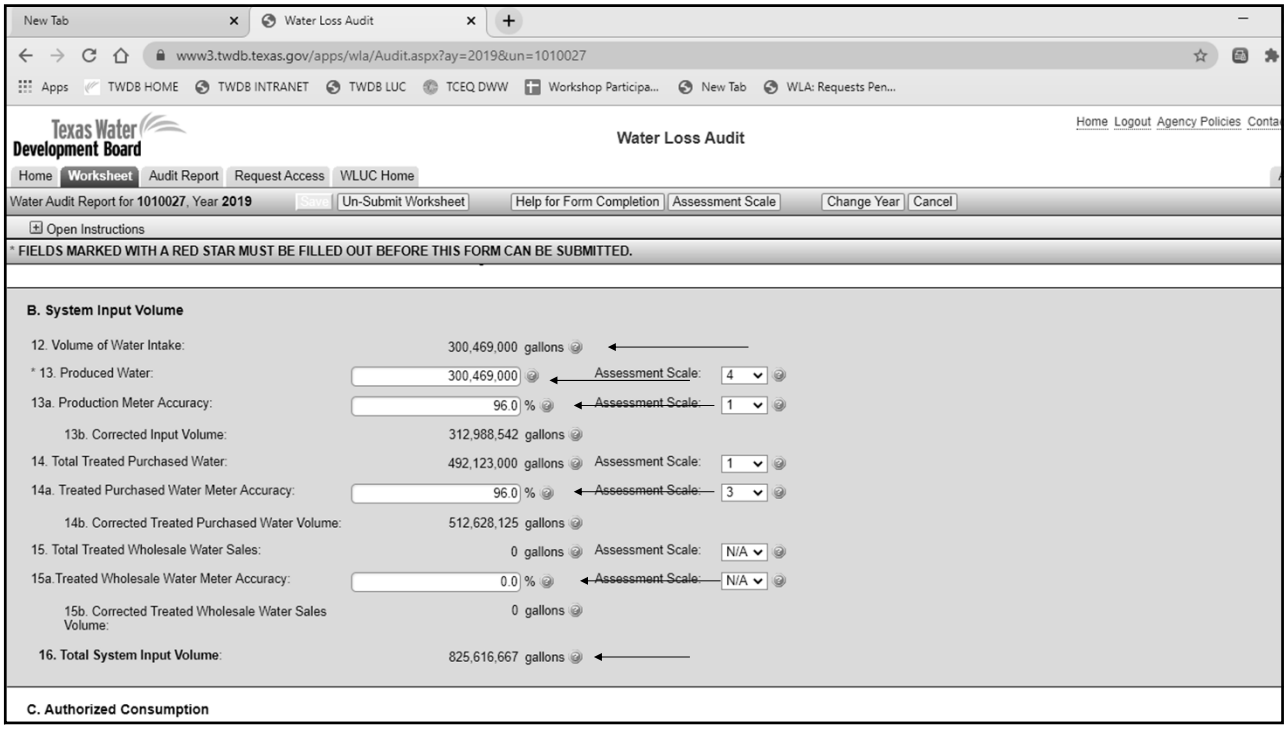
Texas Water Development Board

11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Audit Report
Request Access
WLUC Home
Water Audit Report for 1010027, Year 2019
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Un-Submit Worksheet
Help for Form Completion
Assessment Scale
Change Year
Cancel
Open Instructions
* FIELDS MARKED WITH A RED STAR MUST BE FILLED OUT BEFORE THIS FORM CAN BE SUBMITTED.
B. System Input Volume
12. Volume of Water Intake: 300,469,000 gallons
* 13. Produced Water: 300,469,000 Assessment Scale: 4
13a. Production Meter Accuracy: 96.0 % Assessment Scale: 1
13b. Corrected Input Volume: 312,988,542 gallons
14. Total Treated Purchased Water: 492,123,000 gallons Assessment Scale: 1
14a. Treated Purchased Water Meter Accuracy: 96.0 % Assessment Scale: 3
14b. Corrected Treated Purchased Water Volume: 512,628,125 gallons
15. Total Treated Wholesale Water Sales: 0 gallons Assessment Scale: N/A
15a.Treated Wholesale Water Meter Accuracy: 0.0 % Assessment Scale: N/A
15b. Corrected Treated Wholesale Water Sales Volume: 0 gallons
16. Total System Input Volume: 825,616,667 gallons
C. Authorized Consumption

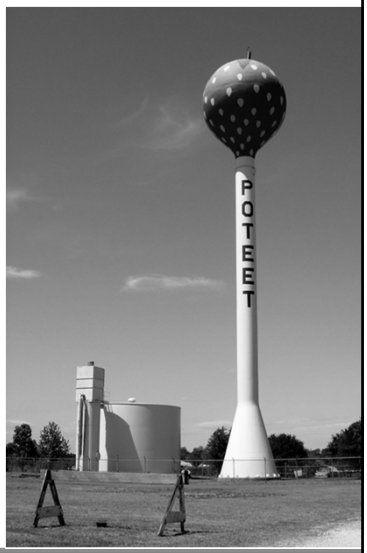
12

Reviewing Common Errors

- Line 12 should be more or equal to Line 13
  - *Line 12 is 1 Million Gallons and Line 13 is 500,000 gallons*
    - *where did the other 500,000 gallons go?*
  - *Line 13 is 1 Million Gallons and Line 12 is 500,000 gallons*
    - *how are you treating more water than you have?*
  - *Line 12 is 1 Million Gallons and Line 13 is 1 Million Gallons*
    - *is this an error?*

System Input Volume

Total amount of water supplied to the distribution system and should be validated and should include an adjustment for master meter inaccuracy.

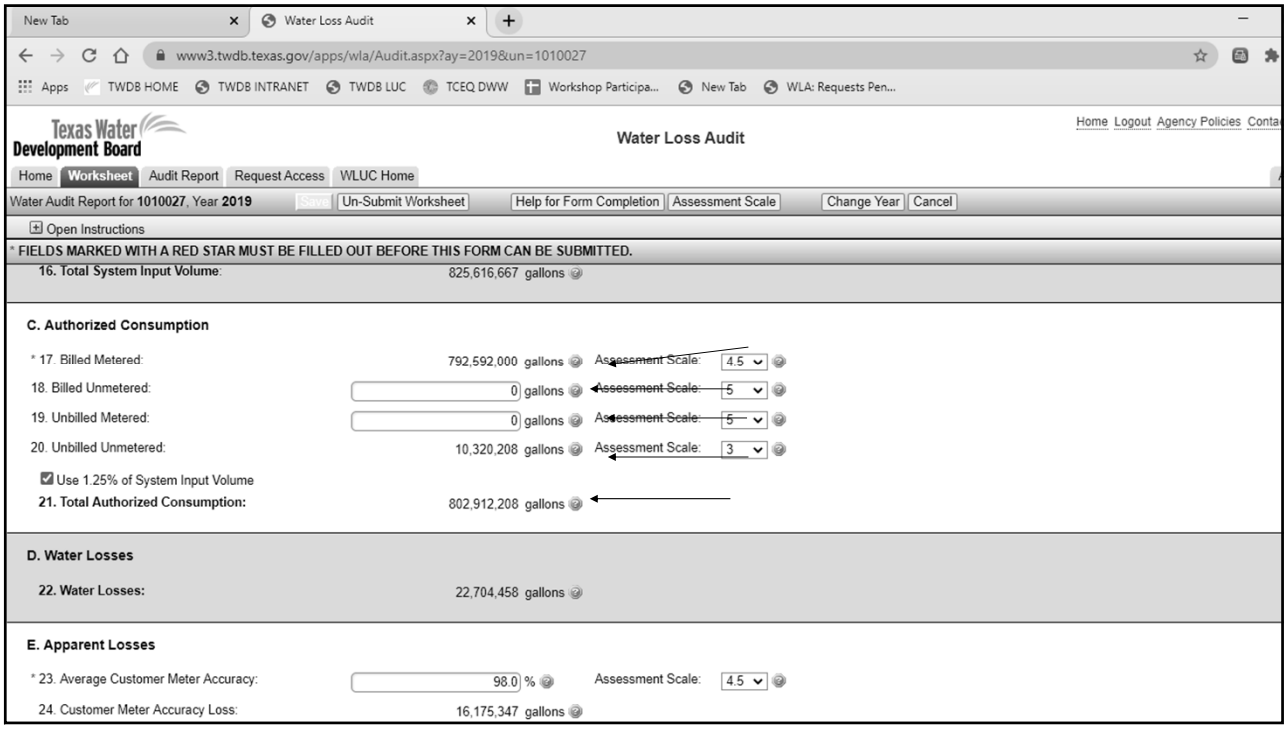


Authorized Consumption

Water that is used by customers that are known to the water system.

	Billed Metered
+	Billed Unmetered
+	Unbilled Metered
+	Unbilled Unmetered
=	Authorized Consumption (mg/yr)

15



16

Reviewing Common Errors

- Line 17 should always be less than Line 16
  - *Line 16 is 1 Million Gallons and Line 17 is 500,000 gallons*
    - *where did the other 500,000 gallons go?*
  - *Line 17 is 1 Million Gallons and Line 16 is 500,000 gallons*
    - *how are you billing out more water than you have?*

Water Losses

Water losses in the distribution system that are not due to authorized consumption and are categorized as either apparent or real losses.

System Input Volume - Authorized Consumption
= Water Loss

Apparent Loss

Commercial or apparent losses are water that is lost that could have been sold. Non-Revenue Water, Water Theft, Slow Meters and Billing Issues

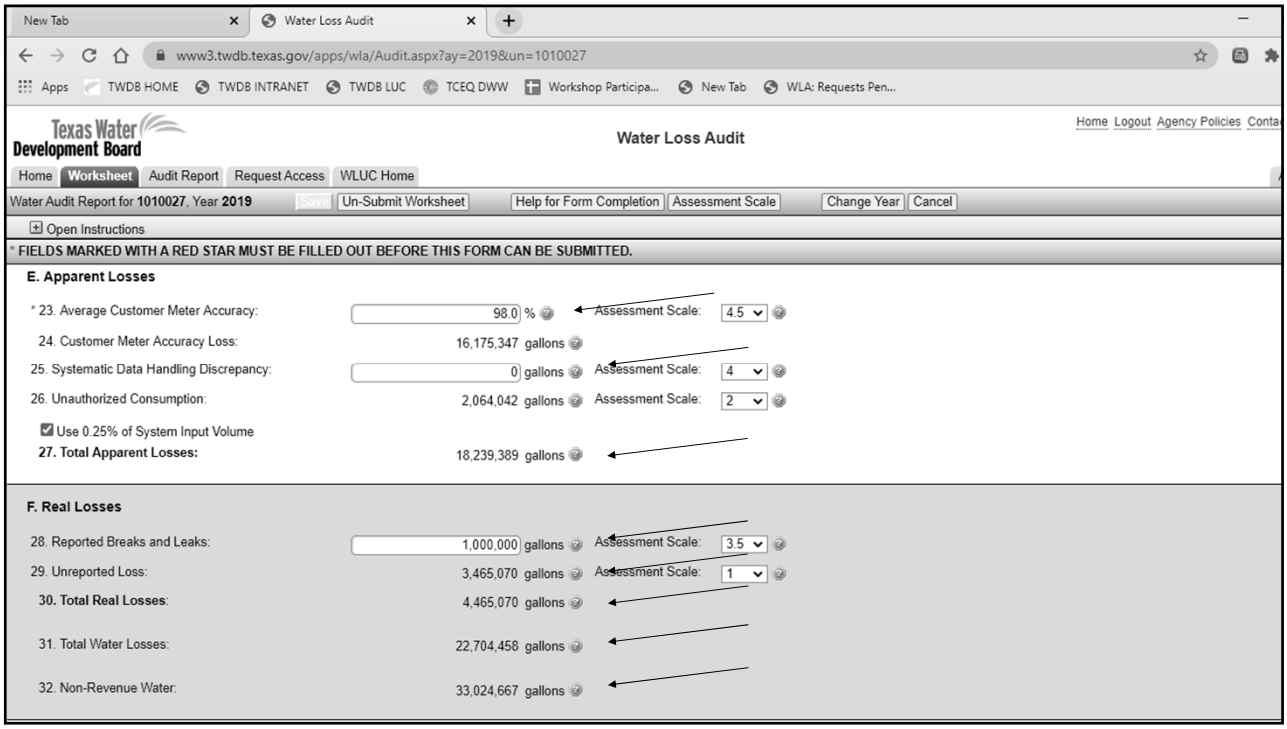
Unauthorized Consumption
+ Customer Meter Inaccuracies
+ Systematic Data handling Errors
= Apparent Loss

Real Loss

Physical Losses – water that enters the distribution system but never reaches a user. Leakage on transmission and distribution mains, storage tank overflows, and service line leak to customer meter.

- *Non revenue water*

Water Losses
- Apparent Losses
= Real Loss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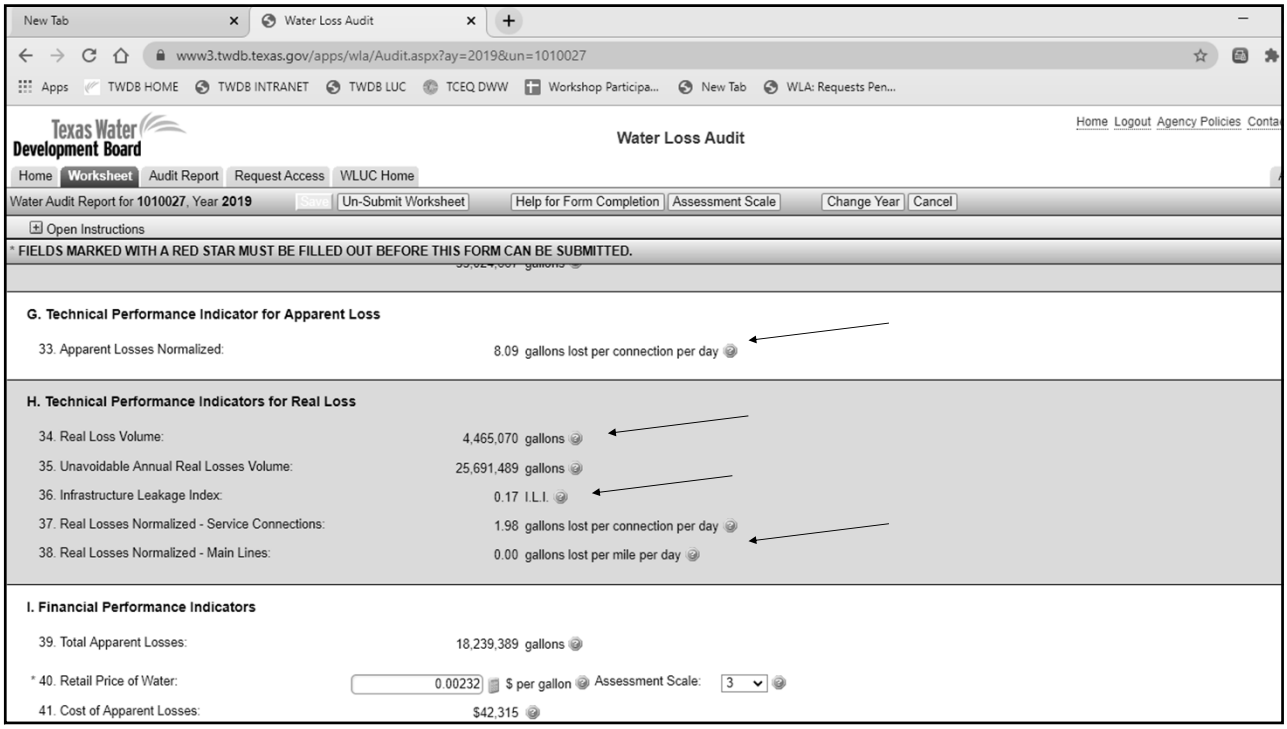
Un-Submit Worksheet
Help for Form Completion
Assessment Scale
Change Year
Cancel
Open Instructions
* FIELDS MARKED WITH A RED STAR MUST BE FILLED OUT BEFORE THIS FORM CAN BE SUBMITTED.
E. Apparent Losses
* 23. Average Customer Meter Accuracy: 98.0 % Assessment Scale: 4.5
24. Customer Meter Accuracy Loss: 16,175,347 gallons
25. Systematic Data Handling Discrepancy: 0 gallons Assessment Scale: 4
26. Unauthorized Consumption: 2,064,042 gallons Assessment Scale: 2
Use 0.25% of System Input Volume
27. Total Apparent Losses: 18,239,389 gallons
F. Real Losses
28. Reported Breaks and Leaks: 1,000,000 gallons Assessment Scale: 3.5
29. Unreported Loss: 3,465,070 gallons Assessment Scale: 1
30. Total Real Losses: 4,465,070 gallons
31. Total Water Losses: 22,704,458 gallons
32. Non-Revenue Water: 33,024,667 gallons

21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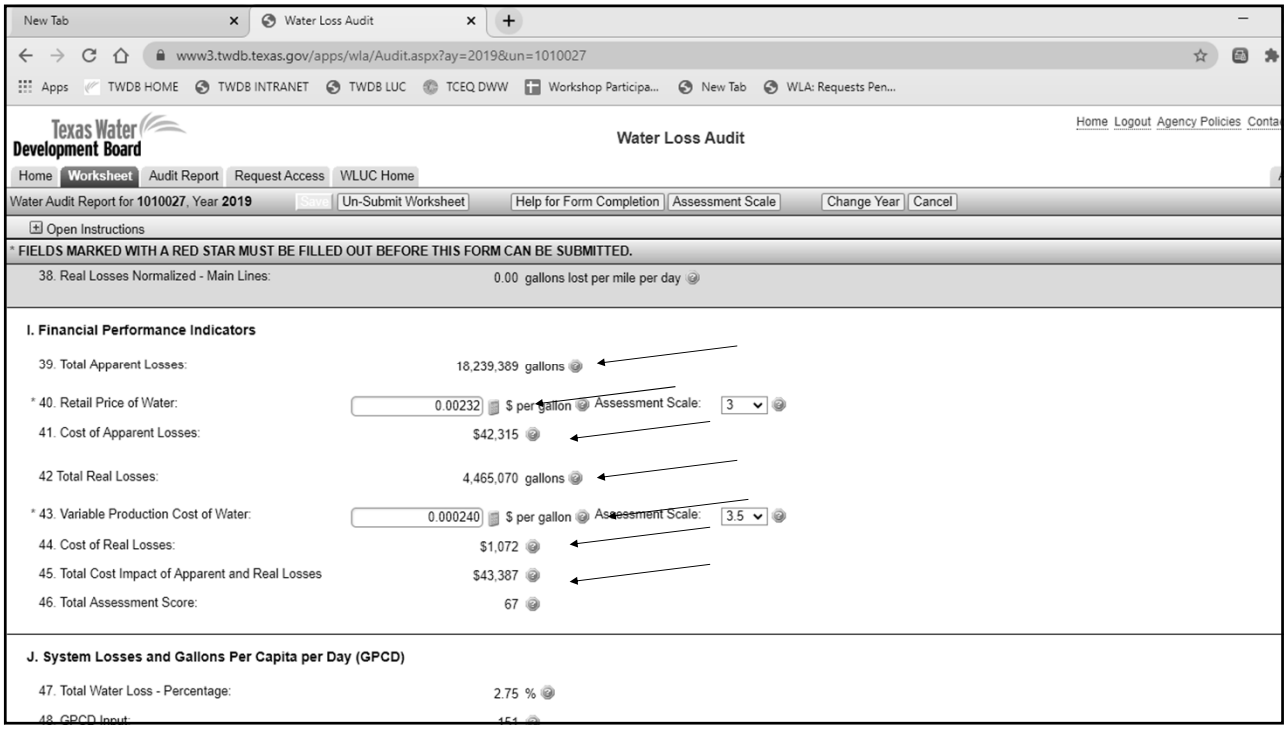
Help for Form Completion
Assessment Scale
Change Year
Cancel
Open Instructions
* FIELDS MARKED WITH A RED STAR MUST BE FILLED OUT BEFORE THIS FORM CAN BE SUBMITTED.
G. Technical Performance Indicator for Apparent Loss
33. Apparent Losses Normalized: 8.09 gallons lost per connection per day
H. Technical Performance Indicators for Real Loss
34. Real Loss Volume: 4,465,070 gallons
35. Unavoidable Annual Real Losses Volume: 25,691,489 gallons
36. Infrastructure Leakage Index: 0.17 I.L.I.
37. Real Losses Normalized - Service Connections: 1.98 gallons lost per connection per day
38. Real Losses Normalized - Main Lines: 0.00 gallons lost per mile per day
I. Financial Performance Indicators
39. Total Apparent Losses: 18,239,389 gallons
* 40. Retail Price of Water: 0.00232 $ per gallon Assessment Scale: 3
41. Cost of Apparent Losses: $42,315

22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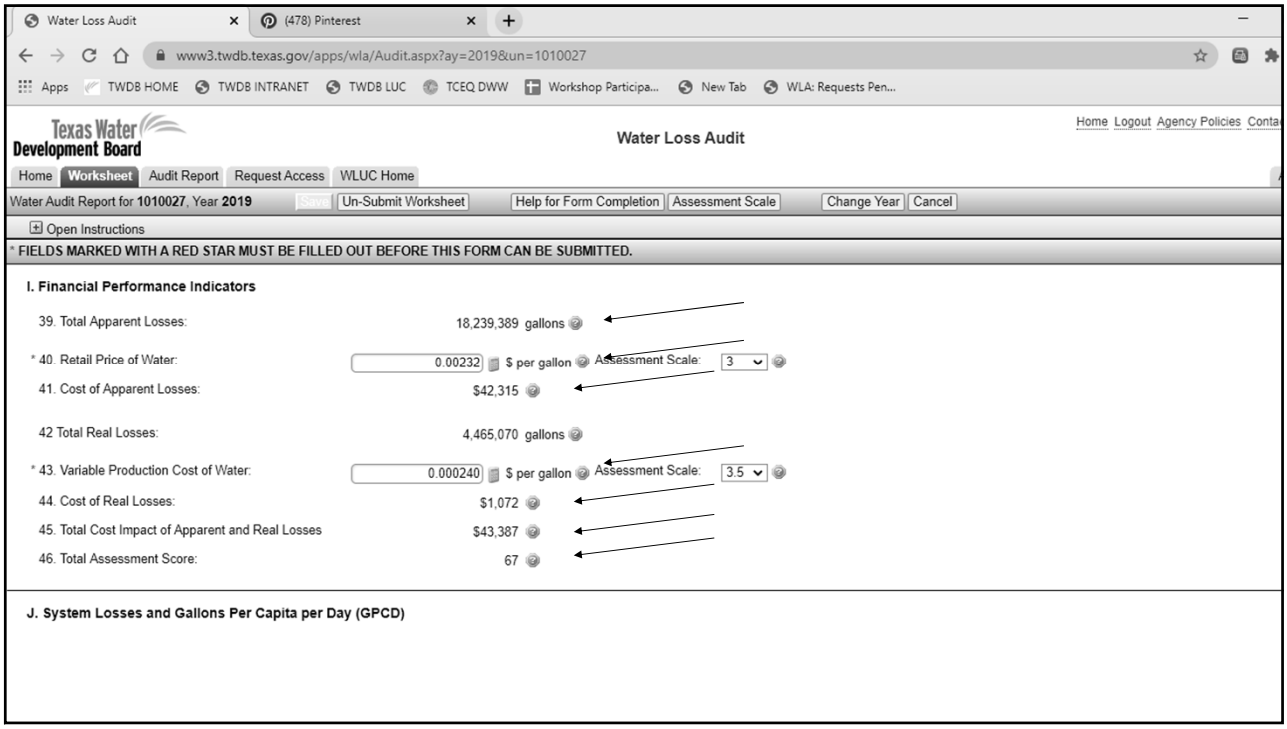
Worksheet
Audit Report
Request Access
WLUC Home
Water Audit Report for 1010027, Year 2019
Save
Un-Submit Worksheet
Help for Form Completion
Assessment Scale
Change Year
Cancel
Open Instructions
* FIELDS MARKED WITH A RED STAR MUST BE FILLED OUT BEFORE THIS FORM CAN BE SUBMITTED.
38. Real Losses Normalized - Main Lines: 0.00 gallons lost per mile per day
I. Financial Performance Indicators
39. Total Apparent Losses: 18,239,389 gallons
* 40. Retail Price of Water: 0.00232 $ per gallon Assessment Scale: 3
41. Cost of Apparent Losses: $42,315
42 Total Real Losses: 4,465,070 gallons
* 43. Variable Production Cost of Water: 0.000240 $ per gallon Assessment Scale: 3.5
44. Cost of Real Losses: $1,072
45. Total Cost Impact of Apparent and Real Losses $43,387
46. Total Assessment Score: 67
J. System Losses and Gallons Per Capita per Day (GPCD)
47. Total Water Loss - Percentage: 2.75 %

23


Water Loss Audit
(478) Pinterest
www3.twdb.texas.gov/apps/wla/Audit.aspx?ay=2019&un=1010027
Apps
TWDB HOME
TWDB INTRANET
TWDB LUC
TCEQ DWW
Workshop Participa...
New Tab
WLA: Requests Pen...
Texas Water Development Board
Water Loss Audit
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Worksheet
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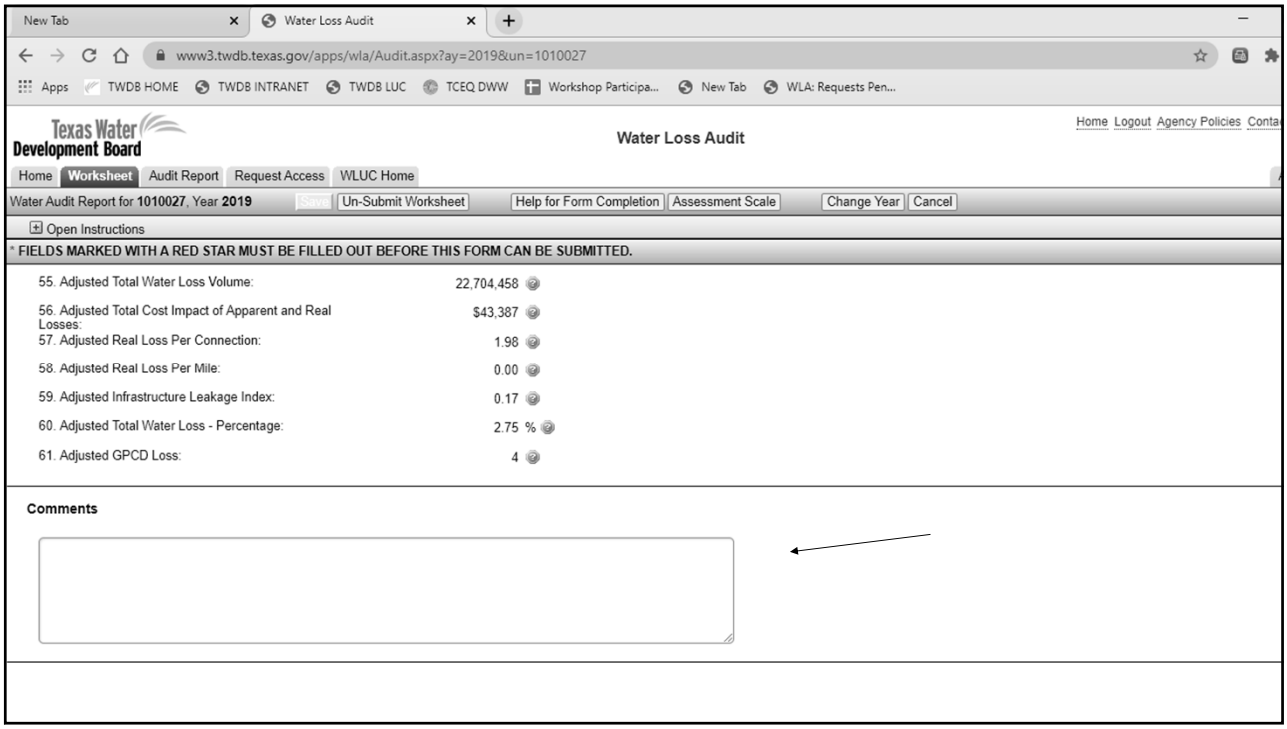

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Performance Indicators

- Line 33 – Apparent Loss, gallons/connection/day
- Line 36 - Infrastructure Leakage Index (ILI): > 3,000 connections
- Line 37 – Real Loss, gallons/connection/day
- Line 41 - Cost of Apparent Loss (Revenue!)
- Line 44 – Cost of Real Loss
- Line 45 – Cost of Water Loss
- Line 46 – Total Assessment Scale
- Line 47 – Total Water Loss, gallons/connection/day
- Line 49 - GPCD (gallons per capita per day)

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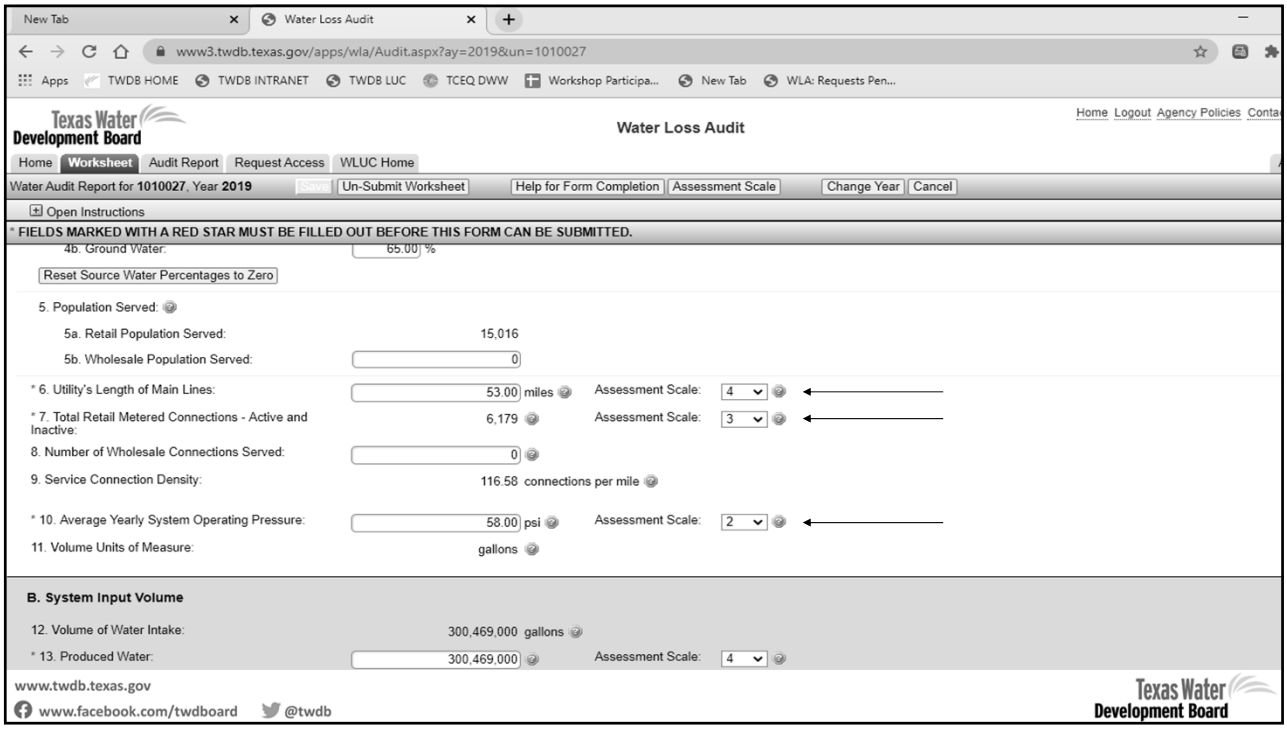
Water Loss Percent

Not a Performance Indicator!

Field on Audit	2019	2020
Total System Input Volume	2,000,000,000 gallons	2,100,000,000 gallons
Total Authorized Consumption	1,650,000,000 gallons	1,750,000,000 gallons
Total Water Loss	350,000,000 gallons	350,000,000 gallons
Percent of Water Loss	17.5%	16.7%
Real Loss per Connection per Day	56.7 gallons per connection per day	56.7 gallons per connections per day
Apparent Loss per Connection per Day	9.8 gallons per connection per day	9.8 gallons per connection per day

Assessment Scale Benefits

- Self-reported Assessments complete the WLA to determine how accurate your data is
- Consider your options and **take action**
- Also known as Water Loss Audit validation
- Bridge from WLA to Action to Conservation Plans



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Component	Length of Main Lines Assessment Scale Table Adapted from American Water Works Association Free Water Audit Software©										
SYSTEM DATA	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	N/A
Line 6 Length of main lines, miles	*Current condition:* Poorly assembled and maintained paper as-built records of existing water main installations makes accurate determination of system pipe length impossible. Length of mains is estimated.	*Current condition:* Paper records in poor or uncertain condition (no annual tracking of installations & abandonments). Poor procedures to ensure that new water mains installed by developers are accurately documented.	*Conditions between 1 and 2*	*Current condition:* Sound written policy and procedures exist for documenting new water main installations, but gaps in management result in a uncertain degree of error in tabulation of mains length.	*Conditions between 2 and 3*	*Current condition:* Sound written policy and procedures exist for permitting and commissioning new water mains. Highly accurate paper records with regular field validation; or electronic records and asset management system in good condition. Includes system backup.	*Conditions between 3 and 4*	*Current condition:* Sound written policy and procedures exist for permitting and commissioning new water mains. Electronic recordkeeping such as a Geographical Information System (GIS) and asset management system are used to store and manage data.	*Conditions between 4 and 5*	*Current condition:* Sound written policy exists for managing water mains extensions and replacements. Geographic Information System (GIS) data and asset management database agree and random field validation proves truth of databases. Records of annual field validation should be available for review.	Not a choice
Improvements in quantifying the length of mains	*To improve to 1:* Assign personnel to inventory current as-built records and compare with customer billing system records and highway plans in order to verify poorly documented pipelines. Assemble policy documents regarding permitting and documentation of water main installations by the utility and building developers; identify gaps in procedures that result in poor	*To improve to 2:* Complete inventory of paper records of water main installations for several years prior to audit year. Review policy and procedures for commissioning and documenting new water main installation.		*To improve to 3:* Finalize updates/improvements to written policy and procedures for permitting/commissioning new main installations. Confirm inventory of records for five years prior to audit year; correct any errors or omissions.		*To improve to 4:* Launch random field checks of limited number of locations. Convert to electronic database such as a Geographic Information System (GIS) with backup as justified. Develop written policy and procedures.		*To improve to 5:* Link Geographic Information System (GIS) and asset management databases, conduct field verification of data. Record field verification information at least annually.		*To maintain a 5:* Continue with standardization and random field validation to improve the completeness and accuracy of the system.	Not a choice

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Component	Number of Retail Connections Assessment Scale Table Adapted from American Water Works Association Free Water Audit Software©										
SYSTEM DATA	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	N/A
Line 7 Number of retail connections, active and inactive *Value for Line 7 is populated from the Water Use Survey*	*Current condition:* Vague permitting (of new service connections) policy and poor paper recordkeeping of customer connections/billings result in suspect determination of the number of service connections, which may be 10-15% in error from actual count.	*Current condition:* General permitting policy exists but paper records, procedural gaps, and weak oversight result in questionable total for number of connections, which may vary 5-10% of actual count.	*Conditions between 1 and 2*	*Current condition:* Written account activation policy and procedures exist, but with some gaps in performance and oversight. Computerized information management system is being brought online to replace dated paper recordkeeping system. Reasonably accurate tracking of service connection installations & abandonments; but count can be up to 5% in error from actual total.	*Conditions between 2 and 3*	*Current condition:* Written new account activation and overall billing policies and procedures are adequate and reviewed periodically. Computerized information management system is in use with annual installations & abandonments totaled. Very limited field verifications and audits. Error in count of number of service connections is believed to be no more than 3%.	*Conditions between 3 and 4*	*Current condition:* Policies and procedures for new account activation and overall billing operations are written, well-structured and reviewed at least biannually. Well-managed computerized information management system exists and routine, periodic field checks and internal system audits are conducted. Counts of connections are no more than 2% in error.	*Conditions between 4 and 5*	*Current condition:* Sound written policy and well managed and audited procedures ensure reliable management of service connection population. Computerized information management system, Customer Billing System, and Geographic Information System (GIS) information agree; field validation proves truth of databases. Count of connections recorded as being in error is less than 1% of the entire population.	Not a choice
Improvements in quantifying the number of retail connections, active and inactive	*To improve to 1:* Draft new policy and procedures for new account activation and overall billing operations. Research and collect paper records of installations & abandonments for several years prior to audit year.	*To improve to 2:* Refine policy and procedures for new account activation and overall billing operations. Research computerized recordkeeping system (Customer Information System or Customer Billing System) to improve documentation format for service connections.		*To improve to 3:* Refine procedures to ensure consistency with new account activation and overall billing policy to establish new service connections or decommission existing connections. Improve process to include all totals for at least five years prior to audit year.		*To improve to 4:* Formalize regular review of new account activation and overall billing operations policies and procedures. Launch random field checks of limited number of locations. Develop reports and auditing mechanisms for computerized information management system.		*To improve to 5:* Close any procedural loopholes that allow installations to go undocumented. Link computerized information management system with Geographic Information System (GIS) and formalize field inspection and information system auditing processes. Documentation of new or decommissioned service connections encounters several levels of checks and balances.		*To maintain a 5:* Continue with standardization and random field validation to improve knowledge of system.	Not a choice

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Total Assessment Score

- Also known as “data validity score” = confidence values are filled in, the program will give you a **Data Validity Score** out of 100
- The score measures the policies used when gathering data for the audit. The score is a number that should be increasing every year.
- Improve the accuracy of the data in order to identify opportunities for water loss reduction.

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Water Loss Control Planning Guide

Functional Focus Area	Level I (0-25)	Level II (26-50)	Level III (51-70)	Level IV (71-90)	Level IV (91-100)
Audit Data Collection	Launch auditing and loss control team; address production meter deficiencies.	Analyze business process for customer metering/billing functions and water supply operation.	Establish/revise policies and procedures for data collection.	Refine data collection practices and establish as routine business process.	Annual water audit is reliable gauge of year-to-year water efficiency standing.
Short-term loss control	Research information on leak detection programs. Begin flowcharting analysis of customer billing system.	Conduct loss assessment investigations on a sample portion of system: customer meter testing, leak survey, theft.	Establish ongoing mechanisms for customer meter accuracy testing, active leakage control, and infrastructure monitoring.	Refine, enhance, or expand ongoing programs based on economic justification.	Stay abreast of improvements in metering, meter reading, billing, leakage management, and infrastructure rehabilitation.
Long-term loss control	N/A	Begin to assess long-term needs requiring large expenditure: customer meter replacement, water main replacement, new customer billing system, or Automatic Meter Reading.	Begin to assemble economic business case for long-term needs based upon improved data becoming available through the water audit process.	Conduct detailed planning, budgeting, and launch of comprehensive improvements for metering, billing, or infrastructure management.	Continue incremental improvements in short-term and long-term loss control interventions.
Target-setting	N/A	N/A	Establish long-term apparent and real loss reduction goals (+10 year horizon).	Establish mid-range (5 year horizon) apparent and real loss reduction goals.	Evaluate and refine loss control goals on a yearly basis.
Benchmarking	N/A	N/A	Preliminary Comparisons – can begin to rely upon Infrastructure Leakage Index (ILI) for performance comparison for real losses.	Performance Benchmarking – ILI is meaningful in comparing real loss standing.	Identify Best Practices – the ILI is very reliable as a real loss performance indicator for best in class service.

* Adapted from American Water Works Association©

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From Audit to Action

Understanding water losses through improved data collection

- Don’t copy the data from your last report!
- Do compare it to your last report to note improvements or new areas of deficiency.
- Create a trend analysis.
- Determine and pilot effective approaches and implementation of performance standards.

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Taking Actions

- Refining data gathering and information
- Metering assessment, testing, or a metering replacement program
- Detecting and locating leaks
- Repairing or replacing pipe
- Operation and maintenance programs and changes
- Administrative processes or policy changes

Questions for Review

- Were the goals of the assessment met? If not, why not?
- Where does the system need more information?
- How often should the system repeat the water loss audit steps?
- Is there another performance indicator the system should consider?
- Look at trends by reviewing last water loss audit – has water loss improved?
- How can the system improve water loss performance?
- Is more training required?

Water Loss Resources

LUC Application
www.twdb.texas.gov/conservation/municipal/waterloss/index.asp

Water Loss Auditor Training
www.twdb.texas.gov/conservation/municipal/waterloss/auditor_training.asp

Reports & Data
https://www.twdb.texas.gov/conservation/municipal/waterloss/historical-annual-report.asp

Questions

Municipal Conservation

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Water Loss Audit

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Key Functions of Management

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Purpose of Presentation

- Identify and Describe the Five Functions
- Challenges of Each Function
- Practical Application of Each Function to Mid and Upper-Level Managers

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Five Functions

1. Planning
2. Organizing
3. Directing
4. Controlling
5. Staffing

SLIDE 3

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3

Planning

- **Description**
  - Encompasses the definition of the organization's goals
  - Establishes an overall strategy for achievement of the goals
  - Development of a comprehensive system (plans) to mesh and coordinate activities
  - Identifies what should be accomplished in the short and long term
  - Provides direction for personnel
  - Anticipates potential changes
  - Minimizes waste
  - Sets Standards
  - The most difficult function!!

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Organizing

- **Description**
  - How work will be assigned (divided) and accomplished
  - A decision process of who will perform tasks (skill and ability)
  - How many employees will be needed
  - Evenly distributes work
  - Delegates responsibility for producing an expected result
  - Involves centralization (assigning tasks with less importance)
  - Involves decentralization (assigning tasks of greater importance)

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Directing

- **Description**
  - All day-to-day activities revolve around directing
  - Function that initiates the action plan
  - Involves assignments and instructions
  - Communicates expected outcomes to employees
  - Communicates accountability to employees
  - Provides understanding of the project, task, or assignment
  - Involves guiding, teaching, and supervising
  - Utilizes leadership, motivation, and influence

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Controlling

- **Description**
  - Involves monitoring performance
  - Sets Standards
  - Standards must be reasonable
  - Checks and appraises performance (effective method)
  - Takes corrective action
  - Critical responsibilities need closer attention (cannot afford mistakes)(workplace hazards)(public health)
  - Observation, monitoring, and appraising leads to greater employee understanding and performance

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Staffing

- **Description**
  - Recruitment (management vs. entry level)
  - Interviewing (panels vs. individuals)(objective)(scoring)(fit?)
  - Selecting and training
  - Evaluating overall performance (counseling vs. annual evaluations)
  - Provides opportunities for advancement
  - Provides employee continuing education
  - Versed in federal and state rules and regulations surrounding employment

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Function Challenges

- **Planning**
  - A combination of education, skill, and technical ability needed
  - Acquiring financial means for the future (projected capital, required resources, and sources of revenue)(annual budgets)
  - Anticipating future staffing levels and necessary skills
  - Acquiring additional water resources for the future
  - Flexibility is important
  - Time management (completing tasks)
  - Crystal ball effect?

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Function Challenges con't

- **Organizing**
  - Communication is the key
  - Administrative oversight (capital Improvement)
  - Management oversight (day to day and improvement plans)
  - Understanding and segregating work assignments evenly
  - Objectivity
  - Eliminate the daily reorganizing exercise (inefficient work habits)
  - Recognize when to decentralize (roles of greater importance)

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Function Challenges con't

- **Directing**
  - Know when to utilize autocratic direction (it has a place)
  - Autocratic direction can create negative consequences (employee resentment)
  - Autocratic direction effects (poor work quality, slower completion times, or frequent mistakes)
  - Know when to utilize consultative direction (empowerment of employees for cooperation, consultation, and solutions)
  - Requires a good understanding of what motivates employees
  - Keeping employees engaged

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Function Challenges con't

- **Controlling**
  - Know how to monitor performance (predicting outcomes as expected)
  - Know when to change course to realize expected outcomes (quickly and timely)
  - Objectively check and appraise employee performance
  - Know when to provide further training (competency vs. centralization)

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Function Challenges con't

- **Staffing**
  - Targeted recruitment (the economy?)
  - The interview process (do they fit?)
  - Empowerment
  - Objective promotions (tenure versus performance)
  - Eliminating complacency (production, safety)
  - Training and education (budget allocations)
  - Employee realization toward advancement and promotion
  - Instill a sense of career for employees

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Upper Level Management: Practical Application

- **Planning**
  - The future (rapid growth)
  - Board or Council involvement
  - Strategic plans (Master and CIP)
  - Financial sustainability (annual, operational, equipment, and CIP)
  - Sources of revenue (rates, impact fees, debt, grants)
  - Human Resources (managerial and time management)
  - Consultants
  - Contracts
  - TCEQ regulations (minimum capacities and water quality)

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Upper Level Management: Practical Application con't

- **Organizing**
  - The decision process (moving forward)
  - General direction (subordinates and consultants)
  - Autocratic and Consultative direction are implemented
  - Decentralization is implemented
  - Timeframes are essential
  - Communication is key
  - Monitoring is key

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Upper Level Management: Practical Application con't

- **Directing**
  - Transition to Action
  - Project Understanding (subordinates)
  - Leadership, Motivation, and Influence are Key
  - Decentralization is on-going
  - Monitoring progress is important (decentralization)

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Upper Level Management: Practical Application con't

- **Controlling**
  - Decentralization is key (micro-managing?)
  - Adhering to time management
  - Expected outcomes
  - Flexibility to make changes as needed
  - Financial adherence (annual budgets, operational, equipment, and CIP)

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Upper Level Management: Practical Application con't

- **Staffing**
  - Promoting objectively
  - Understanding subordinates' strengths and improvement areas
  - Educating and teaching subordinates
  - Effective communication with subordinates
  - Additional staff?

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Mid-Level Management: Practical Application

- **Planning**
  - Capital Improvement (project administration)
  - Mid-range projects
  - Short-range (daily) projects
  - Initial budget management (operational and capital)
  - Centralization and Decentralization (personnel)
  - Future staffing needs and levels (education and skill development, additional personnel)

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Mid-Level Management: Practical Application con't

- **Organizing**
  - Communicating with subordinates
  - Consultative direction
  - Centralization and Decentralization

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Mid-Level Management: Practical Application con't

- **Directing**
  - General direction and specific direction
  - Establishing performance standards
  - Offering support and assistance
  - Systematic work assignments
  - Encourage questions for clear understanding
  - Following up with subordinates

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Mid-Level Management: Practical Application con't

- **Controlling**
  - Monitoring daily and weekly progress of projects
  - Implementation and Management of budgets (action step)
  - Correcting any deviation to expected project outcomes
  - Reporting to higher level managers (projects and budgets)
  - Flexibility (deviations and changes)

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Mid-Level Management: Practical Application con't

- **Staffing**
  - Future plans
  - New hires
  - Education
  - Development of skills
  - Team approach with employees
  - Empowerment of employees
  - Communication is vital

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Management Styles

- **Categories**
  - Transactional – defining goals and setting rewards
  - Transformational – helps employees achieve goals (careers)

Styles

Autocratic – manager makes every decision with little or no input
Bureaucratic – governed by set policies and procedures
Democratic – works with employees to establish goals

What is Best?

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Decision Making

- **Rational-Comprehensive Model**
  - Reasonable direction toward the organization's goals
  - Maximize outputs for a given input or minimize inputs for a given output
  - It holds efficiency as the highest value
  - It identifies alternatives and calculates the cost of each
  - It selects the best alternative that has the greatest likely benefit for the least recognizable cost
  - Time is a challenge
  - The most efficient and appropriate means to reach the desired outcome

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Summary

- **Important Factors for Successful Managers**
  - The People Business!!
  - Education, knowledge, and skill (managers)
  - Financial management
  - Established procedures (policy implementation)
  - Employee empowerment
  - Employee opportunities (not stuck in place)
  - Education, knowledge, and skill (advancement)
  - Employee advancement

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References

- **Water and Wastewater Utility Management, March 2016**
  - **Texas Rural Water Association**
- **Public Administration, C*lashing Values in the Administration of Public Policy, Second Edition, 2006***
  - **Michael C. LeMay**