Oklahoma Department of Environmental Quality

Capacity Development Program Annual Progress Report to EPA State Fiscal Year 2023

OKLAHOMA Environmental Quality

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INTRODUCTION

With the Safe Drinking Water Act (SDWA) Amendments of 1996, Congress put in place a variety of initiatives designed to assist public water systems in providing safe drinking water and complying with the terms of the Act. One of these was the capacity development (CD) initiative, established with the intent of focusing on those systems most in need of assistance, primarily small systems serving populations of 3,300 or less. CD is the process by which the State of Oklahoma assures that drinking water systems acquire and maintain the *technical, managerial, and financial* (TMF) capabilities to successfully operate.

All states are currently implementing state-specific CD programs tailored to meet water system needs. As required in Section 1420 of the Safe Drinking Water Act Amendments of 1996, the Oklahoma Department of Environmental Quality (DEQ) must submit an annual report of CD activities to the United States Environmental Protection Agency (EPA). This report reflects the efficacy of the State's CD Strategy by detailing improvements in the TMF capabilities of the State's public water systems. The annual CD progress report is available on DEQ's website, at https://www.deq.ok.gov/water-quality- division/public-water-supply/capacity-development/.

A *public water system* (PWS) is defined by the SDWA as a system that provides water via piping or other constructed conveyances for human consumption to at least 15 service connections or serves an average of at least 25 people for at least 60 days each year.

There are three types of PWSs:

1. Community Water Supplies (CWS) such as towns and rural water districts;
2. Non-transient non-community (NTNC) systems such as schools or factories; and
3. Non-community (NC) systems such as rest stops or parks.

The 1,324 PWSs in Oklahoma are characterized as follows:

Classification

- 898 community water systems
- 79 non-transient non-community water systems
- 347 non-community water systems

Types of Primary Source

- 178 surface water
- 708 groundwater
- 8 groundwater under the direct influence of surface water
- 347 purchase from surface water
- 75 purchase from groundwater systems; and
- 8 purchase from groundwater under the direct influence of surface water systems.

DEQ has the statutory authority to ensure that all water supply systems will have adequate TMF capabilities prior to their construction in Oklahoma. For new systems, these capabilities are assessed via two DEQ regulatory directives. The first directive derives from Oklahoma Administrative Code (OAC) 252-626: Public Water Supply Construction Standards [https://www.deq.ok.gov/asd/rules-and- regulations/attachment/626/], which states that a PWS must receive a "Permit-to-Construct" from DEQ prior to initiating construction. The other directive requires all operators of a PWS to be licensed by DEQ, according to OAC 252:710: Waterworks and Wastewater Works Operator Certification Regulations: [https://www.deq.ok.gov/wp-content/uploads/deqmainresources/710.pdf].

ENFORCEMENT AND COMPLIANCE MECHANISMS

DEQ's CD program relies on the success of its enforcement and compliance programs. These two programs are partially funded through the Drinking Water State Revolving Fund (DWSRF) 10% State Program Management Set-Aside and 15% Local Assistance and Other State Programs Set-Aside. Funding information is detailed in DEQ's *Final Intended Use Plan, Drinking Water State Revolving Fund State Fiscal Year 2022*. Note that Oklahoma's state fiscal year is from July 1 to June 30.

DEQ maintains a strong enforcement program. Systems with violations of SDWA requirements or with state PWS rule violations are referred to DEQ enforcement staff for analysis of the causes behind the violations and for correction. When it is determined that enforcement is needed, there are three main legal tools available to the agency to bring about compliance: Notices of Violation, Consent Orders, and Administrative Compliance Orders. Boil Orders, while not official enforcement actions, also play a role in protecting public health.

A ***Notice of Violation*** (NOV) is the first formal enforcement document issued to facilities upon failure to comply with SDWA or state PWS rules or regulations. NOVs address matters such as maximum contaminant level (MCL) violations, monitoring failures, improper operating procedures, or construction deficiencies. NOVs have short deadlines for compliance, typically between fourteen (14) and thirty (30) days from the date the water system receives the document.

If it is determined that a system is not likely to regain compliance by a NOV's deadline, the DEQ PWS District Engineer (DE) prepares a ***Consent Order*** (CO). A CO is a mutual agreement between DEQ and the affected system that cites the system's responsibilities, establishes a longer deadline for returning to compliance (with milestones and deadlines for major steps towards compliance), and specifies fines that may be levied against the system as a result of non-compliance.

An ***Administrative Compliance Order*** (ACO) is issued when time is limited and there is a significant health hazard, or when a water system refuses to agree to the terms of a CO. In an ACO, DEQ determines what tasks need to be completed and sets deadlines for the completion of these tasks. Both the CO and the ACO include stipulated penalties for failing to meet the required deadlines.

Boil Orders, while not enforcement actions themselves, are an additional tool used by DEQ to protect public health. These orders are issued to systems that have acute health risks or *E. coli* bacteriological violations. Boil Orders require immediate notification be made to all consumers informing them of how to protect themselves.

In calendar year 2022, DEQ issued 2,128 enforcement actions, which consisted of:

- 1,760 informal enforcement letters;
- 360 NOVs and COs;
- 0 Administrative Compliance Orders; and
- 8 Boil Orders.

A total of 1,422 systems were returned to compliance during calendar year 2022 (some systems returned to compliance more than once).

CAPACITY DEVELOPMENT PROGRAM

The Capacity Development Section (CDS) implements the CD strategy in Oklahoma. The CDS is responsible for fostering the relationship among the various DEQ drinking water programs and between DEQ and other state agencies and organizations that are involved with supporting and assisting public water supplies. The CDS coordinates with the Oklahoma Water Resources Board (OWRB), Oklahoma Rural Water Association (ORWA), Communities Unlimited (CU), Southwest Environmental Finance Center (SWEFC), Oklahoma Municipal League (OML) and other agencies and organizations that provide TMF training and assistance to water systems. This ensures that open lines of communication exist between the entities and promotes cooperative and complementary efforts towards achieving water system sustainability. The overall goal is maintaining coordinated efforts towards increasing PWS TMF capabilities. **The table below** lists the tools currently in use in Oklahoma to assess and enhance TMF capabilities.

Oklahoma's Capacity Development Tools

Tool	*Technical*	*Managerial*	*Financial*
Construction Permitting	X		
PWS Enforcement	X	X	
Operator Certification	X	X	
SWAP	X	X	
AWOP	X	X	X
DWSRF	X	X	X
CD TMF Assessments	X	X	X
Sanitary Surveys	X		
Asset Management Training	X	X	X
Regionalization	X	X	X
FACT		X	X
Rate Studies			X
Water Loss Auditing	X	X	X

WATER QUALITY EFFORTS AND PARTICIPATION

Regionalization and Consolidation

DEQ continued efforts to identify new and existing water systems that may benefit from ***regionalization and/or consolidation*** into larger water systems in SFY 2023. Systems were considered for regionalization/consolidation that:

- Have source water capacity limitations (drought),
- Are undergoing DEQ enforcement proceedings,
- Are considering giving away, selling, or abandoning the system, or
- Have expressed interest in regionalization or consolidation.

Creating combined distribution systems can enhance public health by providing all systems in the combined system with water that is more thoroughly tested and often more plentiful and reliable than they were able to produce on their own. While there were no regionalization or consolidation of PWSs in SFY 2023, DEQ continues to seek out small water supplies that are struggling with compliance and help them consider regionalization and/or consolidation, if appropriate for their situations.

Funding Agency Coordinating Team

The Funding Agency Coordinating Team (FACT), hosted by ORWA, is comprised of the following state and federal agencies and organizations:

- DEQ;
- Oklahoma Department of Commerce;
- OWRB;
- Indian Health Service;
- U.S. Department of Agriculture – Rural Development;
- Oklahoma Association of Regional Councils;
- CU;
- EPA;
- Bureau of Reclamation;
- Cherokee Nation; and
- Chickasaw Nation.

FACT meets quarterly to discuss the status of Oklahoma community water supplies identified in DEQ's enforcement list and to coordinate water and wastewater project funding. Before each meeting, invitations are extended to a few water and/or wastewater systems from across the state that are contending with severe problems and have the greatest *financial* need. Guests are invited for the purpose of helping them identify the best source of project funding as efficiently and effectively as possible.

With most public financing agencies present at FACT, communication barriers are reduced and application processes are streamlined, resulting in rapid assistance. FACT provides a single uniform method for requesting funding and regulatory approvals, and it offers guides, checklists, and forms that are accepted by all FACT-participating agencies. DEQ has been a member of FACT since its inception in the early 1990s and has been instrumental in crafting an organization that helps to correct some of Oklahoma's most difficult to solve public water supply issues. The CDS is an important member of FACT and serves by offering TMF assistance to invited systems.

The assistance provided by FACT has been universally praised by invited water systems, which provide feedback by voluntarily completing a brief survey immediately following the FACT meeting and a follow-up survey a few months later. Survey responses are used to fine-tune the assistance provided by FACT and help plan the direction of subsequent FACT meetings.

WATER QUALITY PROGRAMS

The ***Construction Permitting Program*** assures technical adequacy by reviewing water system engineering reports as well as construction plans and specifications. This technical review helps determine the sufficiency of the source water and the water system infrastructure.

The ***PWS Enforcement Program*** also helps assure the technical capabilities of water systems by providing technical assistance and training to water systems on operations, maintenance, regulations, security, and more. Managerial capabilities are also addressed by providing training to water system managers.

The ***Operator Certification Program*** is charged with training and licensing persons working in water and wastewater facilities in the State. Programmatic oversight helps to ensure that operators have adequate *technical* training to properly treat and monitor drinking water supplied to the public. Also, with oversight from the DEQ Operator Certification section, ORWA provides study material and training for operators for all classifications of water facilities as well as *managerial* training for system managers and board members.

The examinations for operators are administered by the ORWA by means of a DEQ contract, and during SFY 2023, 1,182 individual water operator exams and 158 water laboratory operator exams were given. Also, during SFY 2023, eight (8) public water supply systems were issued NOVs for not having an appropriately licensed operator. If operator license issues arise, DEQ makes these systems aware of training and testing opportunities that are available to them at little or no charge so that the water system is easily able to quickly rectify the issue.

In addition to the training offered by ORWA, training is available in classroom settings (taught by DEQ and other certified instructors/agencies) and via the internet several times during the year. Online classes and exams for operators and other environmental professionals are available at any place with an internet connection, which has included presentations over Asset Management presented by one of the members of the CD Staff.

The ***Source Water Assessment Program (SWAP)*** is designed in accordance with the SDWA Amendments which require development and implementation of a SWAP to analyze existing and potential threats facing the public drinking water sources throughout the state. DEQ developed this program utilizing EPA's Source Water Assessment and Protection Programs Guidance.

SWAP assessments include the following:

- Delineation of the Source Water Protection Area,
- Inventory of the Potential Sources of Contamination,
- Determination of susceptibility of the water to contamination from the inventoried sources
- Release of the results of the assessment to the public.

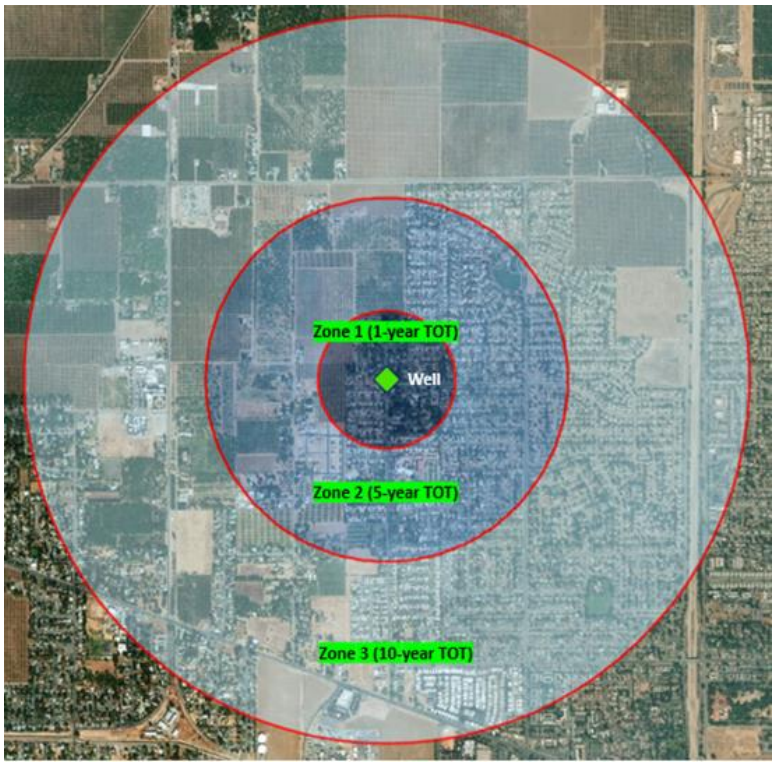
The data collected from a SWAP report is summarized in the water system’s annual Consumer Confidence Report, which identifies the system’s vulnerability and susceptibility score. This report is available for public review.

DEQ began re-developing the program in 2022, focusing largely on collaboration with other departments and organizations to ensure the accuracy of the inventoried sources of contamination. This is in hopes to expand the data gathered and comprise a larger database of all potential sources of contamination as well as staying up to date on all issues that may arise regarding threats to the quality of the state's source water, including information on reported fish kills, superfund and Department of Defense clean-up efforts, and other issues that may arise.

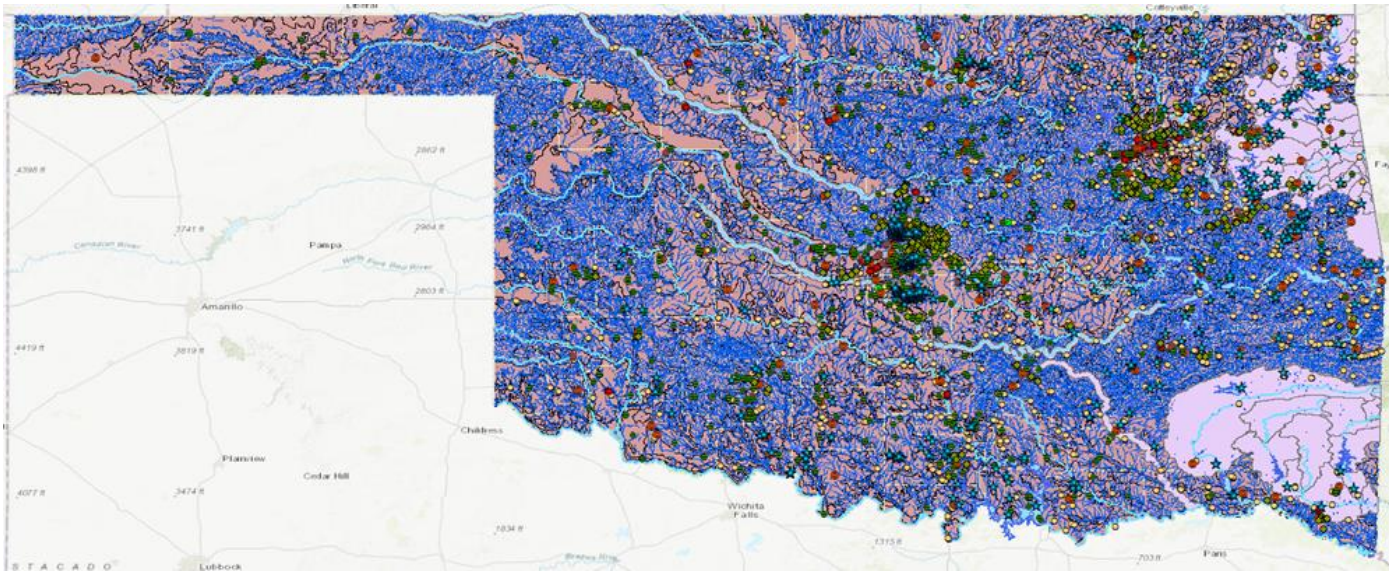
Also in development is a way to communicate recommended preventative measures to water systems tailored to the inventory of sources from the SWAP report and aid systems in locating funding sources for source water protection (SWP) projects. DEQ will educate water systems on the application processes for the Clean Water State Revolving Fund (CWSRF) program with OWRB, the Drinking Water State Revolving Fund (DWSRF) program through DEQ, and help systems to be aware of any grant programs or other sources of funding that may be beneficial for their project.

Visual tools are also integral in communication of Source Water Protection (SWP). Once data collection is complete, it will used to create a map showing source water protection zones around public water supply sources.

Below is an example of a map produced with various input layers indication source water protection zones around wells.



Currently, the DEQ website has an interactive GIS map that utilizes some of the SWP data. DEQ regulated discharges, wells, surface intakes, and other planning information can be found using this map. In development is a localized GIS map that will contain all the potential contamination sources as well as all relevant watershed data made available to DEQ. This should allow DEQ to better monitor the source water in the state, prioritize watersheds based on data, and provide easy access to water systems to see what sources of contamination are near their source water. This map will also be made available to the public once it is completed. **The image below** is an example of what this map currently looks like while in development.



In addition to the internal source water efforts, DEQ is also a member of the Oklahoma Source Water Collaborative with OWRB, OCC (Oklahoma Conservation Commission), ORWA, ODAFF (Oklahoma Department of Agriculture and Forestry), SWAWWA (Southwest Section of AWWA), USDA NRCS (United States Department of Agriculture Natural Resources Conservation Service), and the GWPC (Ground Water Protection Council). This group meets regularly to identify the source water protection needs of surface and ground water systems across the state, as well as to facilitate collaboration across the agencies involved.

The ***Area-Wide Optimization Program (AWOP)*** was first piloted in early April 1999 in Oklahoma by EPA Region 6. This program started as a multi-state effort to optimize particle removal and disinfection capabilities of filtration at conventional water treatment plants. AWOP is now a voluntary approach to improve drinking water quality beyond compliance levels to enhance public health protection, and it is no longer limited to only conventional water treatment plants. Following the AWOP model is one of the most cost-effective and economical ways a PWS can improve their ability to produce safe drinking water, as it is focused on enhancing process monitoring and control using the existing staff and facilities.

EPA Region 6 and Process Applications, Inc. in Fort Collins, Colorado, assisted in the development of AWOP. The Region 6 states: Oklahoma, Arkansas, Louisiana, New Mexico, and Texas, along with Region 7 states: Missouri, Iowa, and Kansas, have combined to make a large AWOP group that meets quarterly. Oklahoma continues its involvement by attending these quarterly regional meetings, as well as the biennial national meetings. The next quarterly meeting, in October of 2023, is currently scheduled to be hosted by Oklahoma DEQ. Oklahoma also participates in and hosts multi-state comprehensive performance evaluations (CPEs) and training workshops.

DEQ AWOP Status

From 1997 through the end of SFY23, DEQ has conducted 25 optimization and seven (7) mandatory CPEs of water systems within the state. The original scope of the CPE effort was, and continues to be, to assist the community and train the operators and engineers in understanding the intricacies of optimizing water treatment. A CPE provides analysis of the facility's design capabilities and a system's administrative, operational, and maintenance practices. Within 60 days following the CPE, systems receive a report from DEQ that outlines factors that may influence the optimization of their treatment operations.

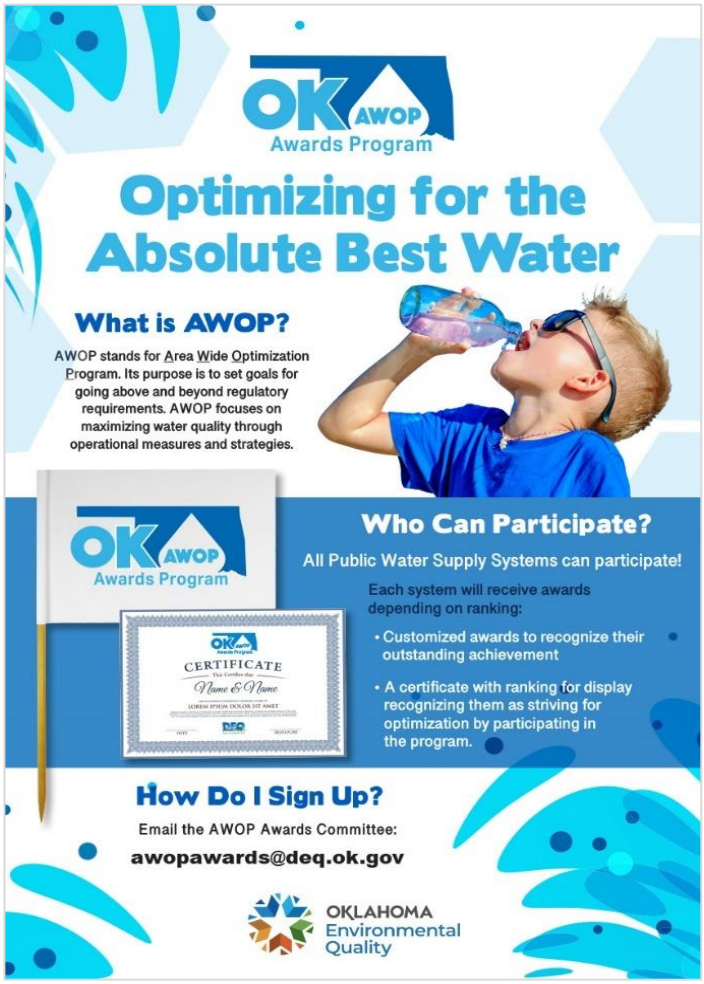
AWOP Multi-State Distribution CPE-Louisiana

While traditional CPEs focused on turbidity and disinfection at conventional surface water treatment plants, AWOP has expanded to address issues like disinfection byproducts, harmful algal blooms, groundwater issues, and more. To learn more about the various types of CPEs, Oklahoma DEQ representatives from Capacity Development, Engineering and Enforcement, and Compliance attended a multi-state distribution CPE in Louisiana in October 2022.

During the multi-state distribution CPE, DEQ staff was split amongst the administration, storage tank, treatment, and distribution system teams. Each team had their own responsibilities, such as assessing the TMF capabilities in administration, evaluating the build and mechanics of the storage tanks and distribution system, and running tests to learn more about optimizing the chlorination treatment. This distribution CPE offered hands-on experience in treating nitrification, iron, and manganese issues, and optimizing chlorination without a full treatment plant. After the week-long process of running tests, interviewing the water operations staff, and evaluating all the historical data of the system, the staff assisted in developing the performance limiting factor sheet as well as the final report that was given to the system. Once the staff returned to Oklahoma, they presented their newly gained knowledge to the rest of the Public Water System group so that others could learn from their experience as well.

AWOP Awards

Oklahoma DEQ also has an AWOP Awards Program, in which water systems sign-up to participate. This program encourages water systems to go above and beyond regulations to meet optimized goals set by the state. The water systems are recognized for their efforts with plaques, trophies, flags, signs, and more. **Below** is a flyer for the AWOP Awards program that offers information about the program, who can participate, and how public water systems can sign up to participate**.**



AWOP Goals

Oklahoma has not performed a distribution CPE but hopes through the collective efforts of those who attended, one can be performed soon. Oklahoma also plans to perform a conventional surface water treatment CPE in the spring of SFY24.

Oklahoma has been finding ways to further the incorporation of TMF concepts in the CPE process, with a focus on bolstering the administrative review with elements from the capacity development program. These elements include the capacity development assessments and water loss audits, with plans to incorporate asset management and source water protection.

The ***Drinking Water State Revolving Fund Loan Program*** was established by the 1996 SDWA Amendments, which allowed EPA to make a capitalization grant to Oklahoma to fund the DWSRF loan program. This program, co-managed by DEQ and OWRB, is dedicated to providing low-interest loans to upgrade public water system infrastructure. It is designed to help those in greatest need based on a priority system that places a primary emphasis on drinking water quality. DWSRF Project Engineers assure the *technical* capabilities of water systems by reviewing engineering reports on proposed construction projects. Borrowers also receive *technical, managerial,* and *financial* assistance from the CDS, who conducts a capacity development assessment and water loss audit on each borrower as well as reviews emergency response plans and asset management plans, providing assistance and guidance to correct any found deficiencies.

Currently, 120 water systems are on the DWSRF PPL for a total of over $1,346,648,674 in projects to be funded within the next few years. DWSRF applicants are assisted throughout the planning, design, bidding, contracting and construction phases of the project by DEQ engineers, environmental specialists, and the CDS. Applications for the DWSRF program are accepted anytime throughout the year.

From 1998 to the present, the program has entered into binding commitments totaling over $2,080,448,783 to fund a total of 269 water system upgrades. In addition to funding infrastructure improvements, the program funds the CD Baseline Assessment Project, lab equipment in the State Environmental Lab, Small System Technical Assistance, SWAP, water loss auditing and leak detection programs, and the PWS Program (partial funding).

During SFY 2023, the DWSRF program received three (3) additional grants in addition to the Base grant. A major condition of the new grants was to use a required percentage of principal forgiveness which varies for each grant. Under the Base grant, DWSRF provided subsidies in the form of principal forgiveness to public water supplies with health-based violations or that serve disadvantaged communities. The total amount of subsidies given was determined by the FY 2022 Capitalization Grant.

For SFY 2023, DWSRF committed $964,077 in health-based subsidy to three systems, and $1,192,200 in disadvantaged subsidy to six systems. DWSRF also provided subsidies in the form of principal forgiveness to public water supplies under the new FY 2022 Bipartisan Infrastructure Law (BIL) grants for disadvantaged communities.

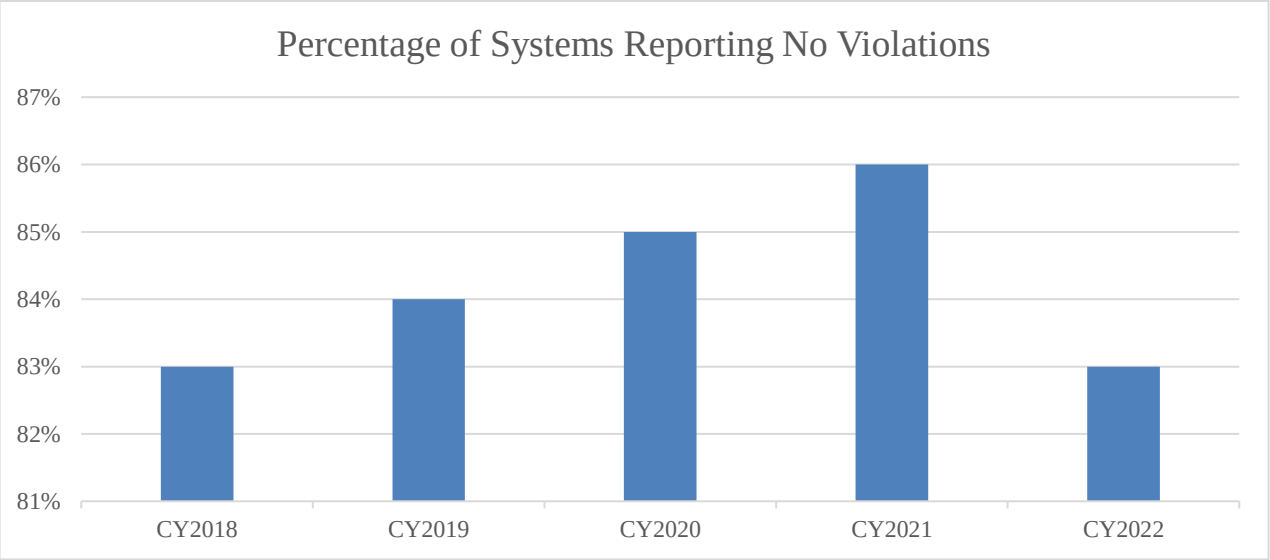
The total amount of subsidies committed for BIL General Supplemental projects was $12,498,920, to nineteen systems. The total amount of subsidies committed for BIL Lead Service Line Inventory (LSLI) projects was $3,234,250, to two systems. Under the BIL Emerging Contaminants (EC) grant, zero subsidy was committed during SFY 2023.

The **PWS Sanitary Survey Program** is implemented by DEQ, in cooperation with EPA Region 6, and in the course of conducting inspections, field staff from the Environmental Complaints and Local Services (ECLS) Division of DEQ and the WQD of DEQ provide technical assistance to PWS system personnel in resolving compliance issues. Across the state, ECLS staff members inspect all water systems annually. In SFY 2023, 894 sanitary surveys were conducted by ECLS and WQD staff, and 642 primacy and non-primacy site inspections were completed by ECLS.

CHALLENGES TO OKLAHOMA'S CAPACITY DEVELOPMENT STRATEGY

Mile for mile, Oklahoma offers the nation's most diverse terrain. It is one of only four states with more than ten ecoregions and has by far the most changes in ecoregions per mile in America. Oklahoma's ecoregions, terrains, and sub-climates include everything from Rocky Mountain foothills to cypress swamps, from tallgrass prairies to hardwood forests, and pine-covered mountains. Each is graced with wide blue lakes, tumbling freshwater rivers, and peaceful country streams. Additionally, there is one man-made type of terrain: urban turf. This variety of ecoregions creates source waters with a correspondingly wide range of quality and conditions. This variability in source water quality creates a correspondingly variety of treatment challenges for public water supplies.

EPA sets national limits on contaminant levels in drinking water to ensure that the water is safe for human consumption; these limits are known as maximum contaminant levels (MCL). For some regulations, EPA establishes treatment techniques (TT) in lieu of a MCL to control unacceptable levels of contaminants. **The figure below** shows the yearly trend in the percentage of systems in Oklahoma reporting no MCL or TT violations.



The State of Oklahoma's PWS Program currently oversees 1,324 active entities that meet the federal definition of a PWS. Of these, 1,101, or approximately 83% of PWSs, reported no MCL or TT violations. **The table below** shows breakdown of the 17% of PWSs with violations for CY 2022.

CY 2022 Violation Breakdown

Contaminant	MCL, TT, or Monitoring	Number of violating PWSs	Number of Violations
Arsenic	MCL	3	13
Arsenic	Monitoring	3	9
Inorganic Chemical	MCL	3	13
Inorganic Chemical	Monitoring	3	12
Nitrate	MCL	20	51
Nitrate	Monitoring	78	108
Synthetic Organic Chemical	MCL	0	0
Synthetic Organic Chemical	Monitoring	54	1,593
Volatile Organic Chemical	MCL	0	0
Volatile Organic Chemical	Monitoring	18	860
Radionuclides	MCL	4	9
Radionuclides	Monitoring	19	256
Disinfection Byproducts	MCL	176	889
Disinfection Byproducts	TT	19	45
Disinfection Byproducts	Monitoring	178	440
Revised Total Coliform Rule	Acute MCL	5	5
Revised Total Coliform Rule	Monitoring	280	586
Surface Water Treatment	TT	27	77
Surface Water Treatment	Monitoring	22	68
Lead and Copper	TT	0	0
Lead and Copper	Monitoring	48	62
Groundwater Rule	TT	0	0
Groundwater Rule	Monitoring	30	44
Public Notice, failure to perform		21	295
Consumer Confidence Report, failure to distribute		86	86

Per Section I of The State of Oklahoma Capacity Development Strategy, DEQ ensures that new systems have TMF capabilities to provide safe and affordable drinking water. All new systems are referred to the CDS, who then assesses the system's TMF capabilities. The CDS then ensures that the system has an appropriately certified operator, notes the dates of sanitary surveys/inspections, determines if plans and specifications were submitted to and approved by DEQ, and makes TA referrals as indicated. A total of three (3) new or newly discovered water systems were identified by DEQ in SFY 2023, one (1) community, one (1) NTNC, and one (1) NC. The Capacity Development Section is working to provide TMF assistance to all of these new PWSs.

ETT IMPLEMENTATION

At the direction of EPA, DEQ has implemented an Enforcement Response Policy and Enforcement Targeting Tool (ETT) aimed to identify PWS systems with health-based violations as opposed to the previous approach, where all the significant non-compliance (SNC) systems were treated equally regardless of the severity of the violation.

This approach utilizes the ETT formula as a basis for determining a PWS's enforcement priority points. It will also be used to help identify and prioritize systems for enforcement response. In the formula, violations that pose a greater risk to public health are given greater importance. The formula calculates a score for each system based on open-ended violations and violations that have occurred over the past five years but does not include violations that have returned to compliance or are on the "path to compliance'' through a specified enforcement action.

Under this policy, violation types are "weighted" with points being assigned for each violation type based on its threat to public health. Points for each "unaddressed" violation are added together to provide total score for each water system. Water systems whose scores exceed "11" are considered priority systems for enforcement unless the violations can be returned to compliance within six months.

The Capacity Development Section and the PWS Compliance Section track new community, NTNC, and NC systems that appear on the ETT list during their first three years of operation, providing them with technical assistance aimed at getting them back into compliance.

ETT scores for PWS systems are available at https://echo.epa.gov/.

PROGRAM INITIATIVES

Water Loss Auditing and Control

Since 2015, DEQ has worked to standardize and promote water loss auditing across the state by the use of the M36 Water Loss Audit Method developed by the American Water Works Association (AWWA). The program has had continuous success tracking and identifying sources of loss and non-revenue water across the state using this scientifically sound, repeatable, and comparable method.

An M36 method water loss audit quantifies volumes and values of real and apparent water losses from a distribution system. Real loss is defined as water that escapes the water distribution system through leakage, breaks, hydrants, and storage overflows. This loss is water that is considered as finished water but is never delivered to customers and results in increased operational costs and stress on source water supplies. Apparent loss is revenue lost due to customer meter inaccuracies, billing system data errors, and/or unauthorized consumption. It is water that *could* have been sold, resulting in lost revenue for the system and distorted production and consumption data.

An M36 method water loss audit also determines the volumes and values of revenue and nonrevenue water that a PWS is producing. Revenue water is the water that a system sells to customers. The amount of revenue water a system can deliver has a direct impact on its ability to pay for operations, make debt obligations, and provide for capital improvement and emergency response funding. In contrast, nonrevenue water is the sum of the real and apparent losses occurring at a system as well as all unbilled authorized usage, such as water used for municipal buildings, parks, swimming pools, irrigation, firefighting, and system flushing. Unbilled authorized usage is a necessity; however, these amounts can become excessive if not tracked. A water loss audit is often the first time many PWS systems become aware of the impact of unbilled authorized usage and can begin controlling it.

The figure below summarizes the volumes and percentages of water use and loss from the 292 water loss audits completed across the state since 2015.

Summary Water Balance (gallons per year identified)

<table>
<tr><td rowspan="2">Volume from Own Sources:
276.394 Billion</td><td>Water Sold As Exports:
8.814 Billion</td><td rowspan="2">Authorized Consumption:
59.454 Billion</td><td rowspan="2">Billed Authorized Consumption:
56.065 Billion</td><td>Billed Metered Consumption:
56.122 Billion</td><td rowspan="2">Revenue Water:
57.300 Billion</td></tr>
<tr><td rowspan="3">Water Supplied:
278.464 Billion</td><td>Billed Unmetered Consumption:
48.983 Million</td></tr>
<tr><td rowspan="3">Unbilled Authorized Consumption:
3.372 Billion</td><td>Unbilled Metered Consumption:
1.810 Billion</td><td rowspan="5">Non-Revenue Water:
18.948 Billion</td></tr>
<tr><td rowspan="4">Water Losses:
15.634 Billion</td><td>Unbilled Unmetered Consumption:
1.579 Billion</td></tr>
<tr><td rowspan="3">Apparent Losses:
1.676 Billion</td><td>Unauthorized Consumption:
183,673,000</td></tr>
<tr><td>Customer Metering Inaccuracies:
1.354 Billion</td></tr>
<tr><td>Water Purchased as Imports:
9.714 Billion</td><td>Systematic Data Handling Errors:
149.582 Million</td></tr>
<tr><td>Real Losses:
14.081 Billion</td><td>Water Main Leaks, Storage Overflows, Customer Service Line Leaks:
14.081 Billion</td></tr>
</table>

Apparent Losses

As defined earlier, apparent loss is water lost due to customer meter inaccuracies, billing system data errors, and/or unauthorized consumption. It is water that could have been sold and contributes to revenue loss, distorted production, and consumption data. Annually, apparent losses account for a smaller percentage of total water loss than real losses; however, apparent losses still represent a significant loss of revenue to most systems participating in the audit, costing on average $36,428.91 per year per audited system and $10.64 million for the group. Apparent loss figures are summarized in the table**, below:**

Apparent Loss	**Minimum**	**Maximum**	**Average**	**Total FY2023**
Annual Apparent Loss:	0.02 MG/Yr.	98.44 MG/Yr.	5.74 MG/Yr.	1,676.31 MG/Yr.
Annual Cost of Apparent Loss:	$25.02/Yr.	$683,393.00/Yr.	$36,428.91/Yr.	$10,637,243.02/Yr,
Unauthorized Consumption	0 MG/Yr.	10.23 MG/Yr.	0.63 MG/Yr.	183.67 MG/Yr.
Customer Metering Inaccuracies	0 MG/Yr.	78.98 MG/Yr.	4.64 MG/Yr.	1,354.69 MG/Yr.
Systematic Data Handling Errors	0 MG/Yr.	12.59 MG/Yr.	0.51 MG/Yr.	149.58 MG/Yr.

Real Losses

Real loss is defined as water that escapes the water distribution system through leakage, breaks, hydrants, and storage overflows. This loss is water that is treated but is never delivered to customers and results in increased operational costs and stress on source water supplies. Overall, real water loss is the largest category of water loss observed from the audited systems, costing on average $62,608.85 per year per audited system. This totals over 14 million gallons per year in identified loss. Real water loss is composed of three types of loss: water main leaks, storage area overflows, and leaks on customer service lines (portions that are the responsibility of the system). The AWWA software is not detailed enough to break down real water loss into these three categories and simply reports the amount as a total of all three.

The AWWA software did, however, provide several performance indicators that detailed the volume, cost, and relative magnitude of real water loss. These are summarized in the table, **below:**

Real Loss	**Minimum**	**Maximum**	**Average**	**Total FY2023**
Current Annual Real Losses	0.14 MG/Yr.	954.38 MG/Yr.	48.36 MG/Yr.	14,121.43 MG/Yr.
Annual Cost of Real Loss	$19.00/Yr.	$3,190,026.02/Yr.	$62,608.85/Yr.	$18,281,784.84/ Yr.

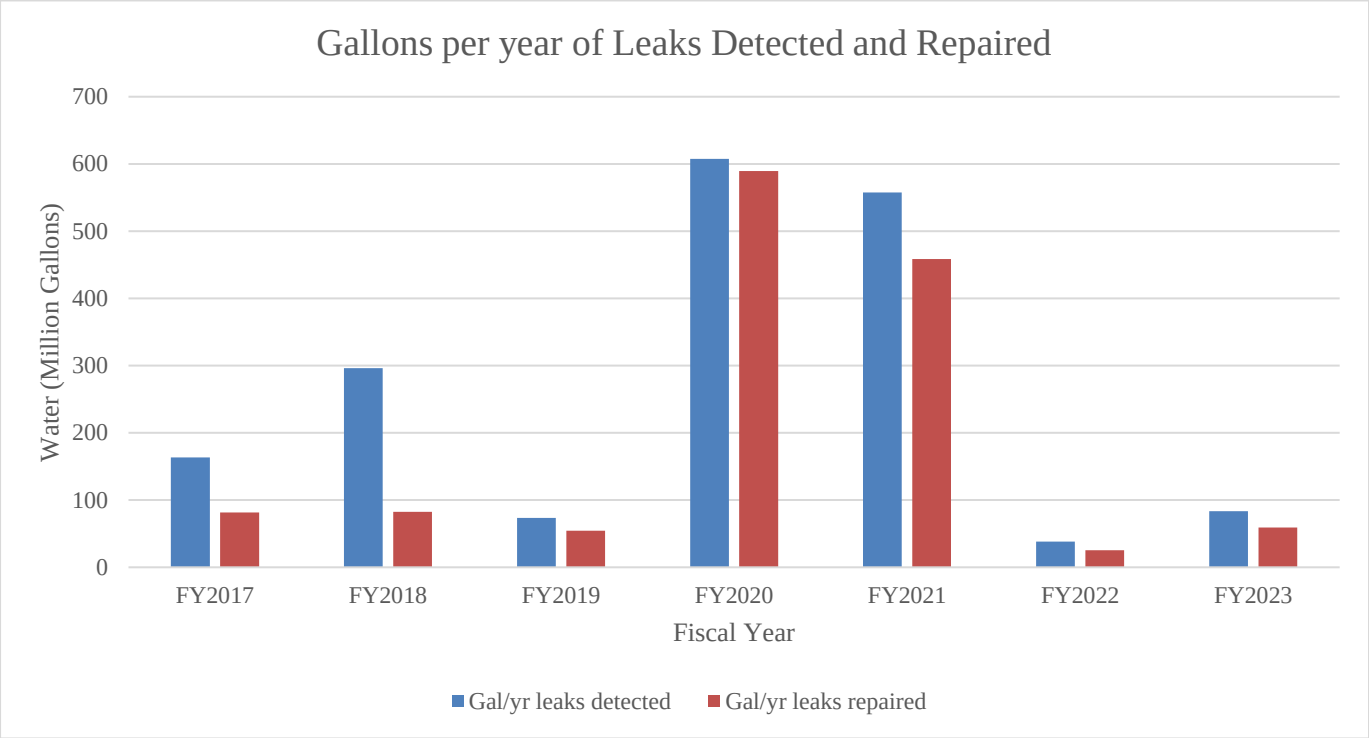
Leak Detection, Meter Analysis, and Loss Correction

Conducting water loss auditing with the AWWA M36 method has improved understanding of real and apparent losses at participating systems; however, this is only the first step towards the ultimate goals of reducing water loss and retaining system revenue. The next step, intervention, takes the results gained from the water loss audit and uses it to guide efforts to find the specific sources of water loss and to implement solutions. This section summarizes the efforts of the technical assistance program performed by DEQ and ORWA which focused on conducting leak detection and meter analysis at PWS systems where an AWWA M36 water loss audit has indicated that significant problems with real and/or apparent loss may exist.

PWS systems that participated in the water loss auditing pilot project and met the criteria of either nonrevenue water (as % of supply) greater than 20% or having apparent loss of greater than 10 gallons per connection per day (or both) qualified for leak detection and/or meter analysis technical assistance from ORWA. Participation in the technical assistance project was driven by the level of interest of the PWS in receiving the help (meaning that the system would benefit from the technical assistance in proportion to the level of effort and interest that the system contributed to the program).

ORWA Leak Detection Assistance Program	**FY2023**	**FY2022**	**FY2021**	**FY2020**	FY2020-FY2023 Totals	Total Overall (FY2017-FY2023)
Systems receiving Leak Detection assistance	9	6	9	5	29	53
Number of Leaks Detected	61	19	103	52	235	351
MG/Yr. of detected leaks	163.200 MG	38.131 MG	557.504 MG	607.589 MG	1.366 BG	1.899 BG
Value/Yr. of Detected Leaks	$888,881	$108,393	$1,649,730	$822,056	$3,469,061.70	$4,738,914.95
Total Number of Leaks Repaired	36	10	71	43	160	215
Gallons/Yr. of leaks repaired	115.100 MG	25.497 MG	458.467 MG	589.350 MG	1.188 BG	1.407 BG
Value/Yr. of Leaks Repaired	$601,087	$71,215.80	$1,457,581	$779,745	$2,909,629.40	$3,479,615.48

For systems that chose to participate, ORWA met with system personnel, reviewed the results of the water loss audit, and then coordinated an in-depth schedule of leak detection and meter analysis help. The typical technical assistance event took place over 2-3 weeks and involved locating leaks, analyzing meters and training PWS staff how to conduct their own leak detection and meter analysis. Following the completion of this technical assistance effort, participating systems receive a detailed report indicating the location, volume, and value of all identified leaks. Systems are encouraged to act on the information provided and make repairs where possible. **The table above** shows six-year summary of PWSs receiving technical assistance following a water loss audit, and the **figure below** depicts gallons per year of leaks detected and repaired.



In total, 53 systems have received leak detection help from the ORWA, where, together, they have identified 351 leaks estimated at 1.899 billion gallons/year. Of the 351 leaks identified by ORWA, 215 of them have been repaired by the systems. These repairs have recovered an estimated 1.407 billion gallons of water per year valued at an estimated $3,479,615.48 per year.

The amount of saved revenue has shown real, immediate, and positive impact, even saving at least one system from the brink of bankruptcy. Additional benefits seen by systems that have participated in the program are increased financial capacity, continued loss reduction, and better operational knowledge anddecision making.

Also, DEQ will continue to build on the success of the water loss auditing and control program by performing additional water loss audits at PWS systems that request the help and by continuing funding for ORWA's work conducting leak detection and meter analysis technical assistance. In contrast to other states where water loss auditing and control is involuntary, these methods can obtain significant cooperation and meaningful results via voluntary participation and free technical assistance, which can be seen in the results.

Capacity Development Baseline Assessment

Introduction

In 2017, DEQ began work on a project to assess the Technical, Managerial, and Financial (TMF) capacity of small municipal PWSs and rural water districts in Oklahoma. Named the 'Capacity Development Baseline Assessment,' the project was designed to develop a clear concept of state-wide TMF needs, determine which systems are most in need of help, and delineate the unique set of needs faced by each system. The project functions by conducting capacity development assessments at all municipal PWSs and rural water districts in Oklahoma serving 10,000 or fewer individuals. By using the comprehensive capacity development assessment tools developed by DEQ and used originally for assessing DWSRF borrowers and newly created systems, a clearer picture of the TMF sustainability needs across the state was gained.

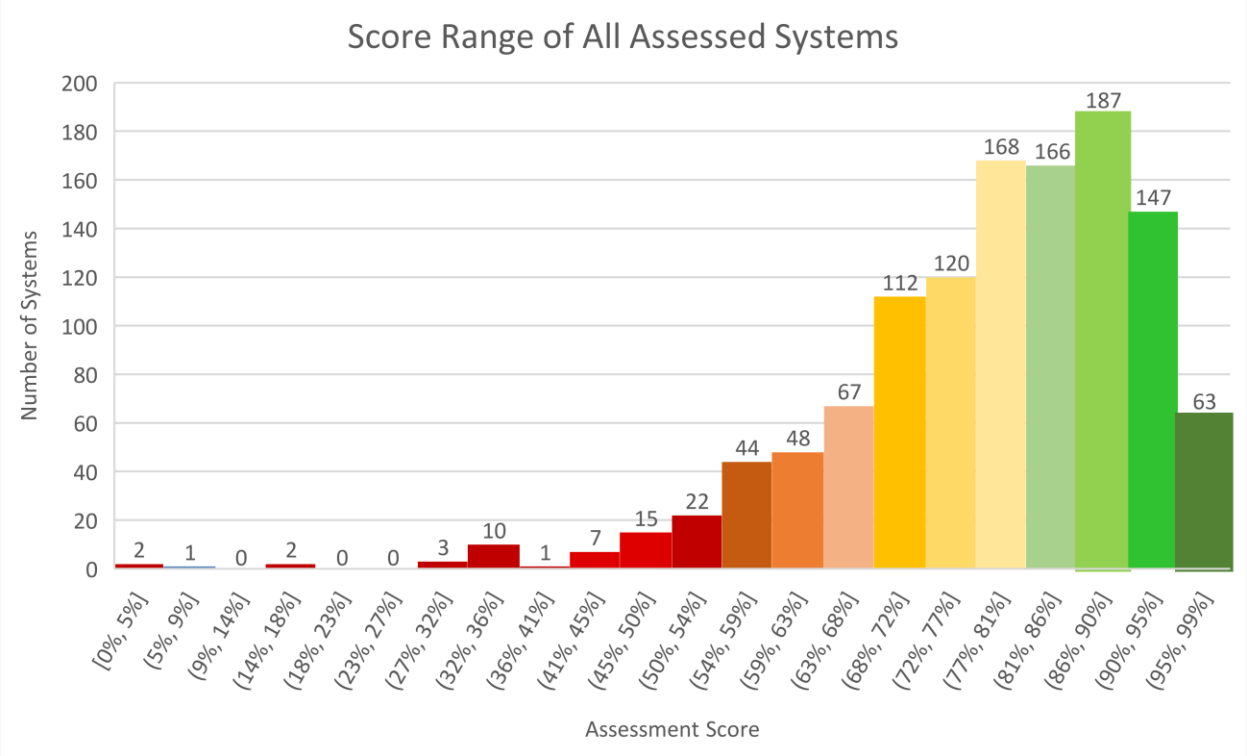
The baseline capacity development assessment project was implemented as a cooperative venture between the Water Quality Division (WQD) and the Environmental Complaints and Local Services (ECLS) division at DEQ. To complete the large number of assessments required of this project, a cadre of local ECLS inspectors were called up to conduct the assessments with PWS system personnel. ECLS inspectors are DEQ personnel that PWS systems see most frequently; therefore, relationships and trust were already established and a framework for efficient completion of the project already existed. This project capitalized on this framework to conduct the assessments.

Results

The results of this project allowed DEQ to identify trends and correlations within the data including the state-wide average assessment score and the greatest issues affecting a significant proportion of Oklahoma water systems. A total of 1,213 Capacity Development Assessments have been completed as of June 30, 2023. Preliminary results of the 1,213 completed assessments indicate that, on average, water systems have 78.47% of the necessary TMF capacity to achieve sustainability. This means that, on average, assessed systems are missing (21.53%) almost one quarter of the items, procedures, policies, and resources needed to become sustainable. **The table below** details the Capacity Development Assessment data.

Summary Characteristics of Audited Community Water Systems

Capacity Development Assessments (CDAs) completed by Date	Number of Assessments	Average Score
CDAs completed FY2023	137	80.01%
Total Number of CDAs Completed	1,213	78.47%



The above graphic illustrates the score range of all systems assessed under the capacity development baseline assessment. This data was collected over seven years and represents the technical, managerial, and financial capacity of over one-thousand Oklahoma water systems.

Facility Name: Example Water System

DWSRF Project Number: Triennial Governors Report

Completion Date: 9/28/2023

Prepared By / Title: ODEQ Capacity Development

CAP DEV SCORE: **81.7%**

Instructions: Capacity development refers to the financial, managerial, and technical conditions that lead to the succesful and sustainable operation of a water system. The purpose of this checklist is to help pinpoint areas in the operation of your water system that might significantly impact your ability to produce safe water now and in the foreseeable future. The form should be completed by a managing operator or other official that is familiar with the day-to-day operations of the system. None of the information placed on this form is intended for use in enforcement actions. If you are interested in assistance and/or resources on any specific topic, please make a note in the comments section and DEQ will contact you.

Please note: items in bold are *required* for DWSRF loan applicants.

If you have any questions, please contact the Capacity Development Section at (405) 702-8100.

echnical Capacity

	Operation and Maintenance Plan	Yes	No	Comments
1	Operation and Maintenance plan available and regularly updated, detailing all aspects of operating the water system.	◉ Yes	○ No	
2	Operation and Maintenance plan addresses leak detection/repair, flushing, meter calibration, elimination of cross connections, regular valve exercising, and testing/exercising of emergency/backup equipment.	◉ Yes	○ No	

The snapshot above is the top portion of an example Capacity Development Assessment.

Capacity Development Baseline Assessment Results (Cont.)

Ten Most Common TMF Issues

Percentage of systems without	TMF Capacity Deficiency
75%	Without SoonerWARN (**Mutual Aid**).
65%	Do not conduct **energy audits** on a regular basis.
59%	Have no written plan to **eliminate dead ends** in distribution system when feasible.
57%	System has no **water rights** management plan, or is unaware of the water rights they do possess.
53%	System has not conducted a **risk assessment** (EPA VSAT or other method) and an **emergency response plan (ERP)** and has not certified with EPA that both steps have been completed. ERP must be reviewed and practiced annually.
52%	System has no written plan to r**espond to and address deficiencies noted on sanitary surveys** or other inspections.
50%	**Operations & Maintenance plan** is not regularly reviewed by board.
49%	Does not track **water loss** yearly with AWWA M36 Method.
44%	Has no **Operations and Maintenance plan** available and/or regularly updated, detailing all aspects of the water system.
44%	No written plan to regularly **test backflow preventers**.

The table above identifies the top ten issues among Oklahoma water systems as reported by the Capacity Development Baseline Assessment. According to the data, most common deficiency for water systems is “not a member of SoonerWARN” or any mutual aid group. SoonerWARN is Oklahoma’s Water/Wastewater Agency Response Network. It is the formalized system of “utilities helping utilities” with mutual aid during emergency situations. The lack of systems involved in SoonerWARN may because of little promotion or marketing. The importance of having mutual aid is highly recommended to water systems.

An overview of the baseline capacity development assessments over a three-year period yielded the following three conclusions:

1. Of all the Technical, Managerial, and Financial (TMF) issues surveyed, the top ten (10) limitations of Oklahoma systems are 'technical.'

The top ten limitations of Oklahoma water systems were found to be in the technical section of the TMF assessment. Two out of the ten most common issues were related to Operation & Maintenance (O&M) plans. Based on the assessment data, systems tend to lack regularly updated board approved O&M plans. A complete and up-to-date O&M plan is crucial for PWS system sustainability. This plan should cover all aspects of system operations to ensure continuous water system operation in the event of an emergency.

O&M plans are also excellent tools to train new staff, to document and preserve institutional knowledge concerning system operations. PWS governing boards are encouraged to review O&M plans at least annually to become familiar with system operational challenges and to develop a knowledge base for making accurate, strategic, and informed decisions.

2. Of all the deficiencies surveyed, seven (7) out of ten (10) included a lack of 'written policy or plan'.

According to the table above, it is common for systems to lack any written plan, policy, or procedure. Most systems say they have a plan yet after more investigating, it usually is not actually written down. The importance of having every plan, procedure and audit written down is highly recommended. Without these plans written down for all system staff to view, the possibility for chaos and disorganization is inevitable. One of the main objectives for capacity development is to assist these systems with developing or implementing a written plan, policy, or procedure.

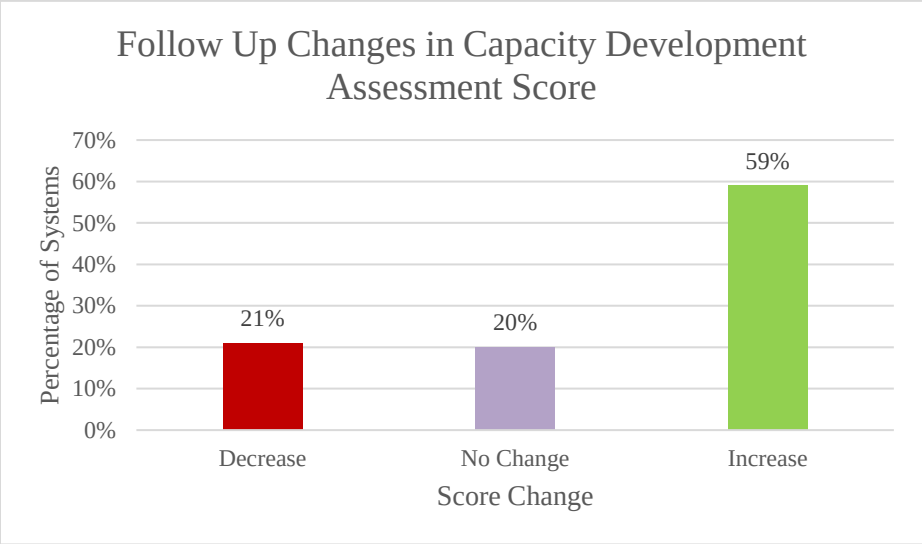
3. Operators leaving or retiring has a major impact on the sustainability of a system.

There are multiple factors that contribute to a system's capacity development score decreasing over time. One of the biggest influences is high employee turnover. Many of the small systems assessed by DEQ have one operator who has run the system for many years, often taking on many different responsibilities within their community. As those employees retire or leave their systems the institutional knowledge carried by that employee is lost, making written plans and policies even more difficult to create.

Follow Up Results

Since the completion of the Baseline Assessment Project, DEQ and ECLS have conducted follow up with systems who completed their initial capacity development assessment to evaluate the effectiveness of the assessment and subsequent technical assistance. So far, 546 follow-up capacity development assessments have been conducted during 2021-2023. These follow-up assessments make up 45% of the total capacity development assessments completed during the project's duration.

Based on the initial assessments, completed between 2018 and 2020, and the follow up assessments, completed between 2021 and 2023 show that 59% of systems assessed have increased their score over the three-year period (**in the table below**). This is just one of the ways that Capacity Development measures the success of technical assistance. According to the table below, about 20% of systems showed no change in score after the follow up assessment. This reason could be because the system did not request any assistance and was not part of a DWSRF project. Also in the table below, 21% of the systems scores decreased after the follow up assessment. The most common reason for this is because of water system staff turnover which leads to a lack of communication and transfer of knowledge.



Capacity Development Assessment Goals

The current assessment has a total of 107 'yes or no' TMF questions. The Capacity Development Section is in the process of updating the assessment by reducing the number of questions, making the assessment easier to understand, and providing easier access to technical assistance after completing the assessment. The updated assessment will also allow systems to provide a larger range of responses; in addition to being able to answer 'yes or no' to an assessment question they can also answer "Yes, needs verification' or "N/A" if the question does not apply to their system.

Capacity Development staff hopes to complete the updated assessment by fall of 2023. After completion, training sessions will be held to inform ECLS staff of changes and a pilot year for the assessment will begin.

After the assessment is completed, capacity development staff will review the responses and provide technical assistance as requested by the system. Currently, templates for emergency response plans, communications policies, operations and maintenance plans, and asset management planning exist.

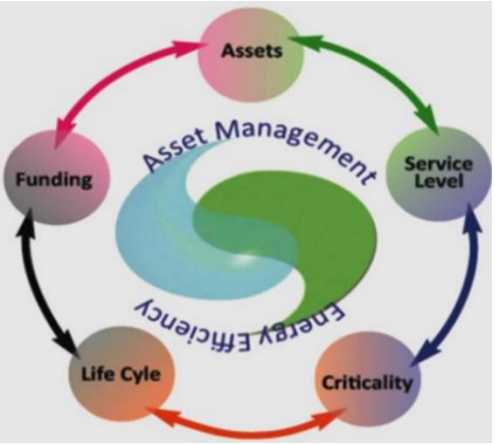
Asset Management

Asset management is the practice of operating a PWS so that the cost of owning and operating infrastructure capital assets is minimized while delivering the service level that satisfies customers. Termed "applied common sense" by the water industry, it is a means of operating a system that maximizes efficiencies and maintains sustainability, allowing a system to provide safe water at an affordable cost - indefinitely.

An Asset Management plan is built around 5 core components:

- Building an asset inventory,
- Determining a target level of service,
- Determining criticality of assets,
- Calculating life cycle costing, and
- Developing a long-term funding plan

Building an asset management plan that follows these core components guides water systems toward obtaining the longest and most efficient use of infrastructure possible while ensuring customers receive the quality of service they expect from the system.



The five core components of an asset management plan

The Capacity Development Asset Management Tool

The Capacity Development Section has developed an asset management plan tool that is available to any Oklahoma PWS system, free of charge. The Microsoft Excel-based tool assists systems in cataloging their assets, determining the likelihood and consequence of failure, and exploring timeframes and funding options for asset replacement.

Plans are in place to further improve upon the tool. The Capacity Development Section is utilizing the contract with ORWA to provide cost estimates for a wide array of assets commonly seen in the water industry. The cost estimates will be updated annually at minimum by ORWA and will be built into the asset management plan spreadsheet. This data set will be extremely useful when coordinators are in the field providing technical assistance. Often, PWSs may not have records for the cost of items purchased decades ago. The expense of asset replacement is valuable information for future financial planning.

Asset management plans are vital for making informed decisions on infrastructure acquisition, construction, operation, maintenance, renewal, replacement, expansion, and disposal. Having a plan in place that is regularly updated will minimize risk, help manage costs, and ensure the continuous delivery of safe drinking water to customers.

Asset Management Tool Improvements

The Capacity Development Section assisted with the completion of 44 Asset Management Plans. Improvements continue to be made to DEQs Asset Management Tool. The figures below show examples of some of the improvements made to the asset management tool since its implementation in 2021.

Asset Management Tool Improvements (Cont.)

The snapshot below shows the data collection page from the Asset Management Tool, detailing the specifics of each asset. The life expectancy is now color-coded to help visualize which assets will expire first.

I.D. Number	Category	Type	Size	Description	Location	Installation Date	Installation Estimated?	Current Condition	Repair and Maintenance History	Estimated Year of Failure	Life Expectancy
MeFl-2020-2	Meter	Flow	6"	Mag meter	at WTP	2020	☐	Good		2032	10.00
MeFl-2017-1	Meter	Flow	6"	Turbine	at WTP	2017	☐	Good		2029	7.00
TrCh-2018-1	Treatment	Chlorination	200 gal	Tank	at WTP	2018	☐	Good		2034	12.00
TrCh-2018-2	Treatment	Chlorination	200 gal	Tank	at WTP	2018	☑	Good		2034±5	12.00

The snapshot below shows the current predicted cost data calculation in the Asset Management Tool. These equations can be found in the tool under Calculations Tab.

The value of a dollar (in comparison to 1913) is found for the year of purchase and the current year (2022).	The difference in the dollar values between 2022 and the year of purchase is found, then divided by the dollar value for the year of purchase. This calculates the inflation rate between the years.	The inflation rate is then multiplied by the initial price. This gives the amount of dollars added over the years.	The extra dollars are then added to the initial price to find the cost to purchase in 2022.	Find the complete calculation below:
1913: $1 = $1 2022: $1 = $29.40 Year of purchase: $1 = x	$\frac{\$29.40 - x}{x} = r$	r x initial price = $ added	$ added + initial price = Cost to purchase in 2022.	$(\frac{\$29.40 - x}{x}$ x initial price) + initial price = Cost in 2022

The snapshot below shows the future predicted cost data calculation in the Asset Management Tool. These equations can be found in the tool under Calculations Tab.

The inflation rate for 2022 is found using the most recent data from the U.S. Congress Joint Economic Committee.	The difference in years between 2022 and the estimated year of failure is found.	The inflation rate is multiplied by the difference in years, as well as the cost to purchase in 2022. This gives us the amount of dollars added past 2022.	The dollars past 2022 are then added to the cost of purchase in 2022 to find the estimated price in the year of failure.	Find the complete calculation below:
"Core" CPI Inflation for 2022 = 4.9%	2022 - Year of Failure = Y	0.049 x Y x Cost in 2022 = p	p + Cost in 2022 = Price in Year of Failure	(4.9% x Year of Failure x Cost in 2022)+ Cost in 2022 = Price in Year of Failure

The snapshot below shows the Consequence of Failure Calculation in the Asset Management Tool. These equations can be found in the tool under Calculations Tab**.**

Consequence of Failure (CoF) Score	For each question within this section, a score is assigned depending on the answer. This score is a sum of the individual question scores				
	Yes back-ups = +0 No back-ups = +1	Loss of water 0-25% = +0.5 26-50% = +1 51-75% = +1.5 76-100% = +2	Yes compliance violations = +1 No compliance violations = +0	Yes health/environmental concerns = +1 No health/environmental concerns = +0	Sum of questions = Consequence of Failure Score
Probability of Failure (PoF) Score	For each question within this section, a score is assigned depending on the answer. This score is a sum of the individual question scores				
	Yes in last 1/3 of life = +1 Not in last 1/3 of life = +0	Above capacity = +2 At capacity = +1 Below capacity = +0	Yes additional maintenance = +1 No additional maintenance = +0	Yes increased maintenance = +1 No increased maintenance = +0	Sum of questions = Probability of Failure Score
Criticality Score	Consequence of Failure Score x Probability of Failure Score = Criticality Score. Max = 20				

Asset Management Tool Improvements (Cont.)

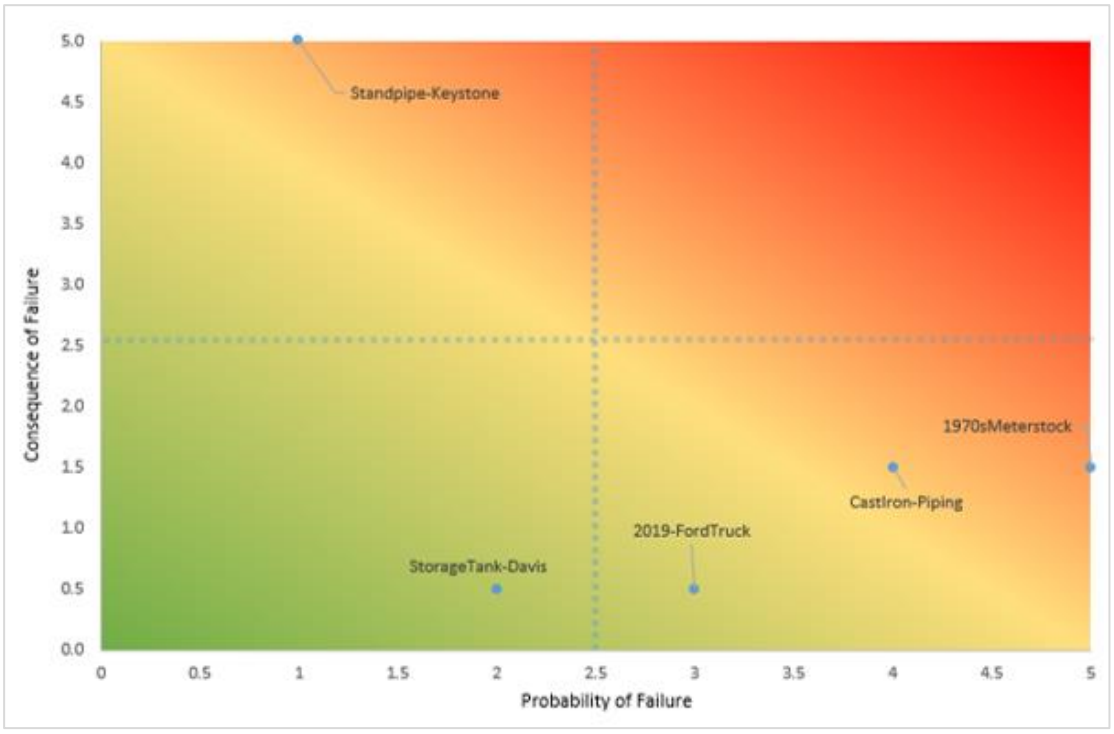
The Capacity Development Section has added a summary page tab to the Asset Management Tool. This page automatically populates assets by criticality. The reason for the addition of this page is to have one main page that gives a quick summary that is easy to understand. A screenshot of this addition is in the **image below.**

Recommendations:	# of Assets
Immediate Work	20
Schedule for Rehab/Replace	
Aggressive Monitoring	
Sample Monitoring	46

Summary (by most critical)

	ID Number	Category	Type	Size	Description	Criticality Score	Estimated Year of Failure	Projected Cost of Replacement	Long-Term Funding Source	Estimated Calculation Disclaimers
1	SoWe-1990-1	Source	Well		well 2 north	2.00	2022±5	$1,740,163.99	Annual Budget	The YEAR OF FAILURE and PROJECTED COST were calculated using an estimated installation date.
2	PuMe-2013-1	Pump	Metering		well 2 north	2.00	2022±5	$31,205.95	Annual Budget	The YEAR OF FAILURE and PROJECTED COST were calculated using an estimated installation date.
3	BuWe-1990-1	Building	Well house		well 2 north	1.50	2040±5	$61,406.04	Annual Budget	The YEAR OF FAILURE and PROJECTED COST were calculated using an estimated installation date.
4	TaSt-1980-1	Tank	Standpipe	120 ft	standpipe tower	1.50	2022	$1,178,156.39	Annual Budget	The PROJECTED COST was calculated using an estimated intial price.
5	SoWe-1980-1	Source	Well		Well 1 east by tower	1.00	2022	$336,616.11	Annual Budget	The PROJECTED COST was calculated using an estimated intial price.

The Capacity Development Section also created a graphic results page. Assets are automatically graphed based on the probability of failure and the consequence of failure. Assets that are more likely to fail *and* cause regulatory or health violations upon failure will be graphed in the 'red' section of the graph. Assets that are less likely to fail and/or will *not* cause violations upon failure- will be graphed in the 'green' section of the graph. A snapshot of this new graphic results page **is below:**



Asset Management Outreach

America's Water Infrastructure Act of 2018 (AWIA) required that states amend their capacity development strategies to include a description of how the state will encourage the development of asset management plans at PWS systems. The Capacity Development Section has completed a revision of the state's strategy, which now includes the promotion of asset management best practices and details the training and technical assistance that the agency will provide. The strategy revisions focus on providing training seminars, one-on-one assistance, and providing for third-party asset management plan development via the ORWA technical assistance contract.

The section has conducted at least eight (8) trainings/presentations on asset management to other agencies and states in the last three years. The asset management tool has been showcased nationally during ASDWA meetings and webinars. Other states and agencies from across the United States have requested copies of DEQ's Asset Management Plan, and some have used the tool as a base to create their own.

A list of trainings and presentations given:

- Asset Management Tool Training to ORWA
- Asset Management Tool Presentation to the Oklahoma Strategic Alliance
- Asset Management Presentation to EPA coordinator
- Asset Management Tool Presentation at ORWA Conferences
- Asset Management for Small Systems ASDWA/OK Presentation
- Asset Management Tool Presentation for ASDWA EBTB National Meeting

There is also an asset management training presentation on the DEQ website that is available to view and obtain operator certification hours. The website link to the online training is here: https://www.deq.ok.gov/water-quality-division/operator-certification/online-training-catalog/

Asset management plans are a requirement for any PWS undergoing a project with DEQ's DWSRF section. Once completed, regular updates to the plan are strongly encouraged.

DEQ offers free technical assistance for asset management creation for PWSs. DEQ also sends a copy of the completed asset management plan to the water system to continuously update the data. DEQ's partner, ORWA conducts asset management plans using DEQ's tool as well. They have been fully trained and complete them with systems upon request.

In response to the amendments to Section 1420 of SDWA brought about by Section 2012 of the America's Water Infrastructure Act (AWIA), DEQ's CD section will increase efforts toward promoting and supporting the implementation of Asset Management (AM) at the state's PWS systems. To further support AM training, DEQ intends to explore additional training and technical assistance avenues in the state for water systems. Additionally, DEQ will be developing a process to measure the success of the implementation of these plans and revise accordingly to achieve successful results.

Lead Testing in Schools and Child Care Facilities in Drinking Water Grant Program

Background

Starting in early CY2020, the Capacity Development Section began implementation of a new program aimed at reducing or eliminating lead from the drinking water in public schools and public or private childcare centers. Using funding appropriated by the Water Infrastructure Improvements for the Nation Act- Section 2107 (WIIN 2107), the Lead Testing in School and Child Care Program Drinking Water Grant Program (or LWSC for short) offers free and voluntary testing of lead in drinking water outlets to any Oklahoma public school or public/private childcare center that requests to participate. In addition to free lead sampling in drinking water- schools will receive direction on how to address high lead levels based on EPA's "3Ts" guidance and follow up sampling if necessary.

In the past, lead was a common component of faucets and water supply plumbing. If the water transported and delivered by such plumbing is corrosive, lead can leach out from lines and fixtures and enter the water- exposing anyone using the water to lead. Lead is a highly toxic metal that is harmful to all humans, and no level of lead in the body is considered safe. Children are at particular risk of adverse health effects from lead, including nervous system damage, learning impairment, bone development problems, hearing damage, and anemia. The LWSC program aims to protect the health of children by reducing or eliminating children's exposure to lead in the water they drink at school or childcare centers.

Along with no-cost testing, program participants implement EPA's 3Ts guidance to:

- **Communicate,** throughout the implementation of the program, the results and important lead information to the public, parents, teachers, and larger community,
- **Train** on the risks of lead in drinking water and of the importance of testing for lead, as well as developing key partnerships to support the program,
- **Test** using appropriate testing protocols and a certified laboratory, and
- **Take Action**, including the development of a plan for helping schools and childcare facilities in their response to test results and in addressing potential elevated lead where necessary.

Program Partners

The program is guided by a coalition of agencies and organizations, including: the Secretary of Energy and Environment's Office (OSEE), the Oklahoma Parent Teachers Association (OPTA), and the Departments of Education (OSDE), Environment (DEQ), Health (OSDH), and Human Services (ODHS). This partnership seeks to prioritize facilities that serve younger children (ages 6 and under), facilities serving or located in disadvantaged communities, and facilities that are older and are more likely to contain lead plumbing.

The program also works with groups internal to DEQ, including State Environmental Laboratory Services (SELS), Environmental Complaints and Local Services (ECLS), the Engineering and Enforcement section, and the Land Protection Division.

The SELS division has played an integral role to the success of the program. SELS developed the application forms, plumbing profile questionnaire and outlet inventory form for the program. The SELS division also plays a large role in the program by creating sample kits for each sampling event and performing laboratory analysis on the samples. Communication with the SELS division regarding sampling schedules, and results notification is imperative. **The image right** features a DEQ SELS staff member testing for lead after a sampling event.

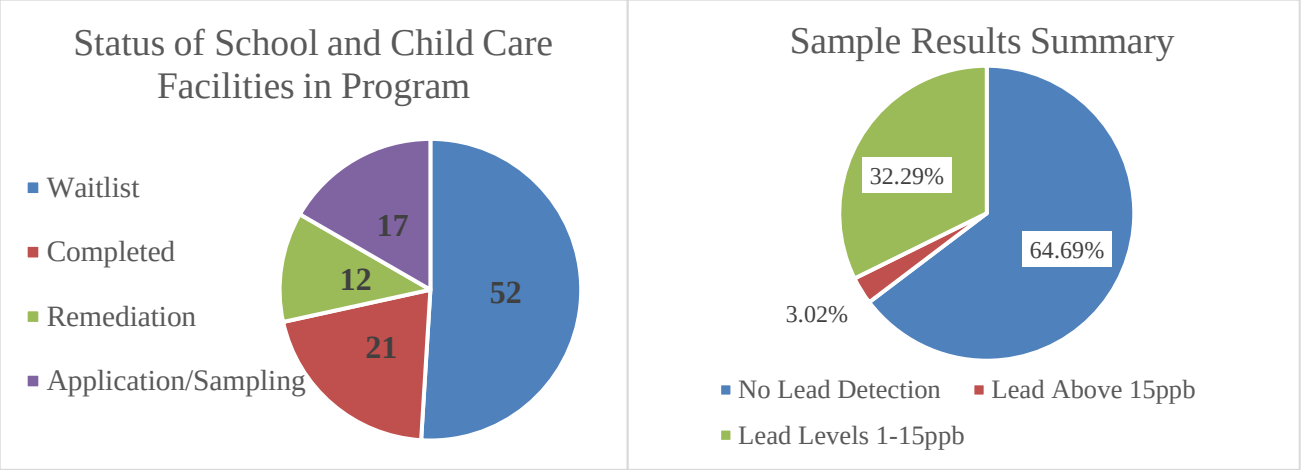
The Lead Testing in Schools Program also works together with the Engineering and Enforcement Section within DEQ for some schools that are also their own water supplies. This past year the program reached out to two public schools that have groundwater wells as the primary water source for their school. One school had a lead exceedance and the other had a copper violation. The Lead Testing in Schools Program and Engineering Section is currently working with both schools to come up with a viable solution.

The Land Protection Division of DEQ has also contributed greatly to the success of Oklahoma's LWSC program. Their partnership, specifically their choice to offer remediation funding through the Site Cleanup Assistance Program (SCAP), has encouraged many schools to sign up and continue with the program after sampling. So far, seven schools have been reimbursed for fixture remediation and replacement of high lead detections (over 15ppb). A total of $38,458 in SCAP funding has been reimbursed to schools for fixture replacement after high lead detections (over 15ppb). This SCAP funding used for remediation efforts has directly impacted 9,089 students and staff- all of whom will no longer be exposed to lead in their drinking water at their place of work and education.

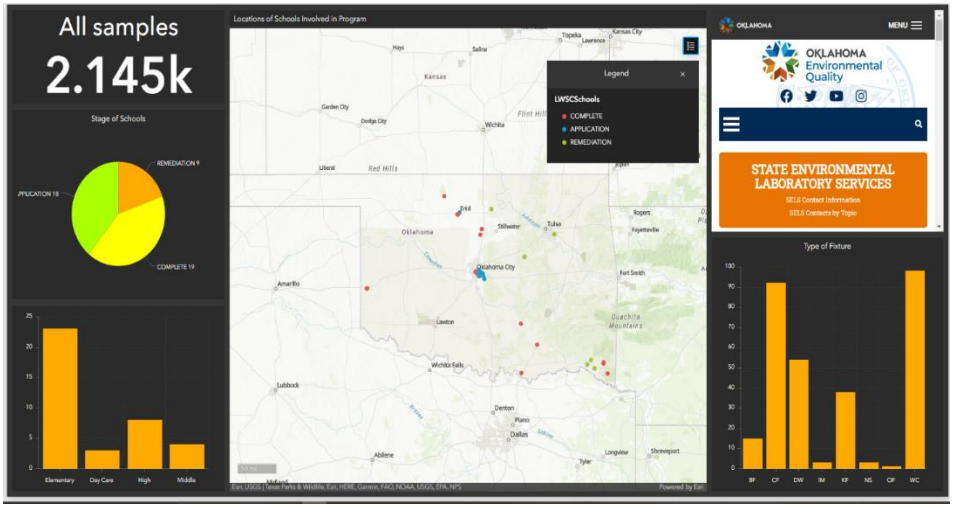
Beginning in FY2024, the ECLS division will help the Capacity Development Section with sampling efforts throughout the state. Sampling requirements necessitate that water samples must be collected before a facility opens and before any water is used. This has presented a challenge to central Oklahoma based staff as program enrollment is available to schools and childcare facilities across the state- regardless of distance from the central offices. The ECLS division's involvement in the program will allow for sampling to continue at a consistent pace while balancing internal staffing constraints and limitations.

Program Updates

There have been many improvements since the start of the program in early CY2020. As of June 30, 2023- one-hundred and two (102) facilities are involved in the program; sixty-six (66) public schools, thirty-five (35) childcare facilities and one (1) youth facility. Currently, there are 3,326 eligible public schools and daycares in Oklahoma. Of the one-hundred and two (102) schools signed up to participate, thirty-three (33) schools have been sampled. **The pie chart below (left)** details that status of each participating schools and childcare centers within the program. A total of twenty-one (21) schools/childcare centers have completed the program.



The pie chart above (right) shows the results of the thirty-three (33) sampling events completed by the program. More than half of samples taken (64.69%) had no lead detections, 32.29% of samples had lead levels between 1-15ppb, and 3.02% of samples were above the 15ppb maximum contaminant level (MCL) for lead.



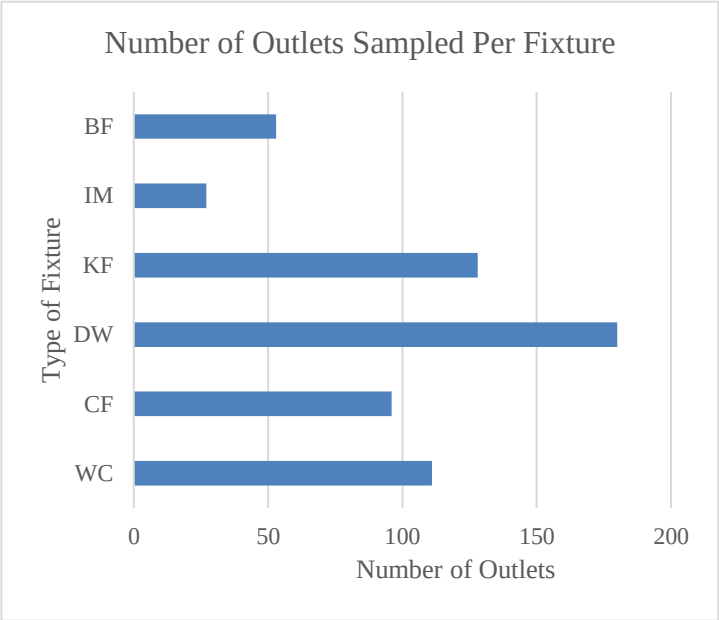
The program has also created a GIS (Geographic Information Systems) dashboard that showcases all sampled data and a map to view information on each school tested. This dashboard is public and viewable at the link below: https://deq.maps.arcgis.com/apps/dashboards/0ced35b721704791b02eae1210606a8a

Data Analysis

DEQ has performed data analysis on all samples taken from the start of the program. Most samples taken were from drinking water fountains, kitchen faucets, water coolers with chiller units, and classroom faucets. There were minimal ice machines and bathrooms faucets for drinking at schools. The abbreviations for each type of fixture are listed below:

- WC: Water Cooler with Chiller Unit
- CF: Classroom Faucet
- DW: Drinking Water Fountain
- KF: Kitchen Faucet
- IM: Ice Machine
- BF: Bathroom Faucet

The chart identifies the number of outlets sampled per fixture. Drinking Water Fountains (DW) is a machine that is connected to the buildings water supply for a continuous supply of water was sampled the most. Kitchen Faucets (KF), Water Coolers (WC) and Classroom Faucets (CF) were sampled frequently while Ice Machines (IM) and Bathroom Faucets (BF) were less often sampled.

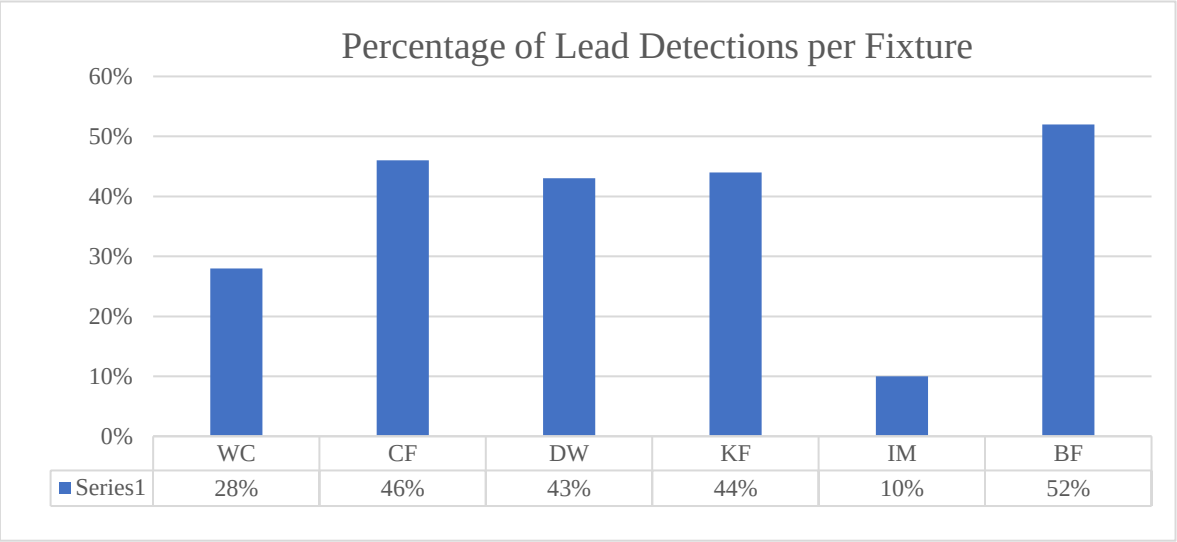


The image above is of a Classroom Faucet (CF) and Drinking Water Fountain (DW) that were sampled at a school. There were multiple schools with two (2) fixtures on each sink. These are often found in schools built prior to 1980.

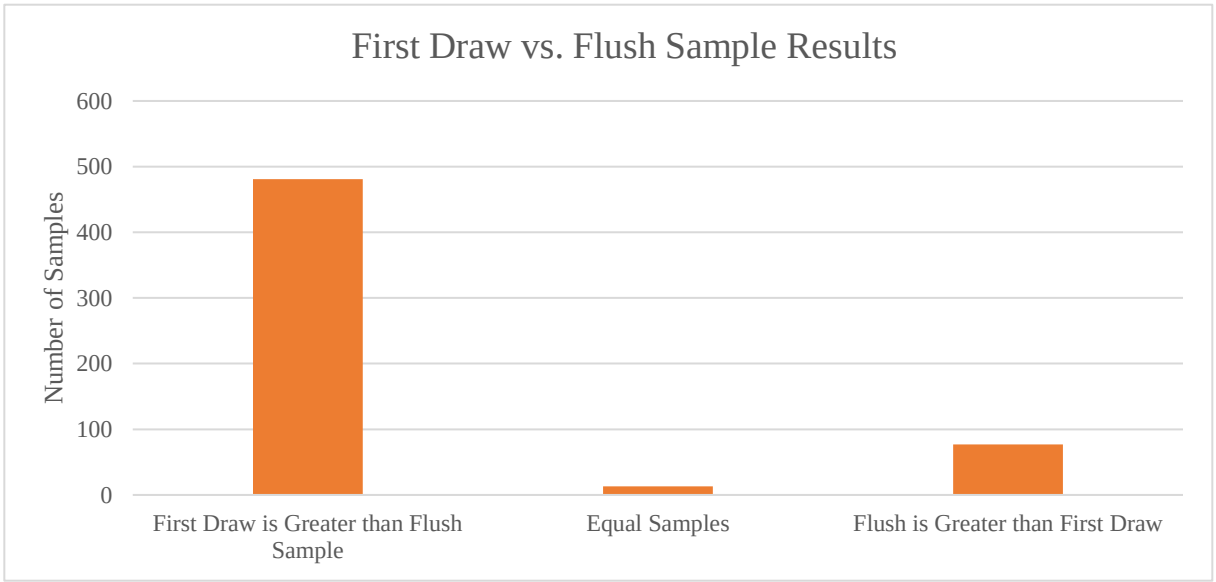
The image above is of a Kitchen Faucet (KF) that was sampled from a school in the program. There was an average of zero to three (0-3) Kitchen Faucets sampled per school.

Data Analysis

DEQ also performed a data analysis based on the sample results of each of those fixtures. **The chart below** shows the percentages of lead detections per fixture. Bathroom Faucets (BF), Kitchen Faucets (KF), Drinking Fountains (DW) and Classroom Faucets (CF) all had more than 40% of their samples contain lead. Ice Machines (IM) and Water Coolers (WC) had minimal lead detections due to the default installation of filters.



DEQ also performed data analysis for all samples in determining if more lead was detected in the first draw or the flush sample. **The chart below** depicts that most samples resulted in higher lead results in the first draw and decreased in the flush sample. This gives reason to believe that the lead source for most of the samples are coming from the fixture not in the plumbing lines.

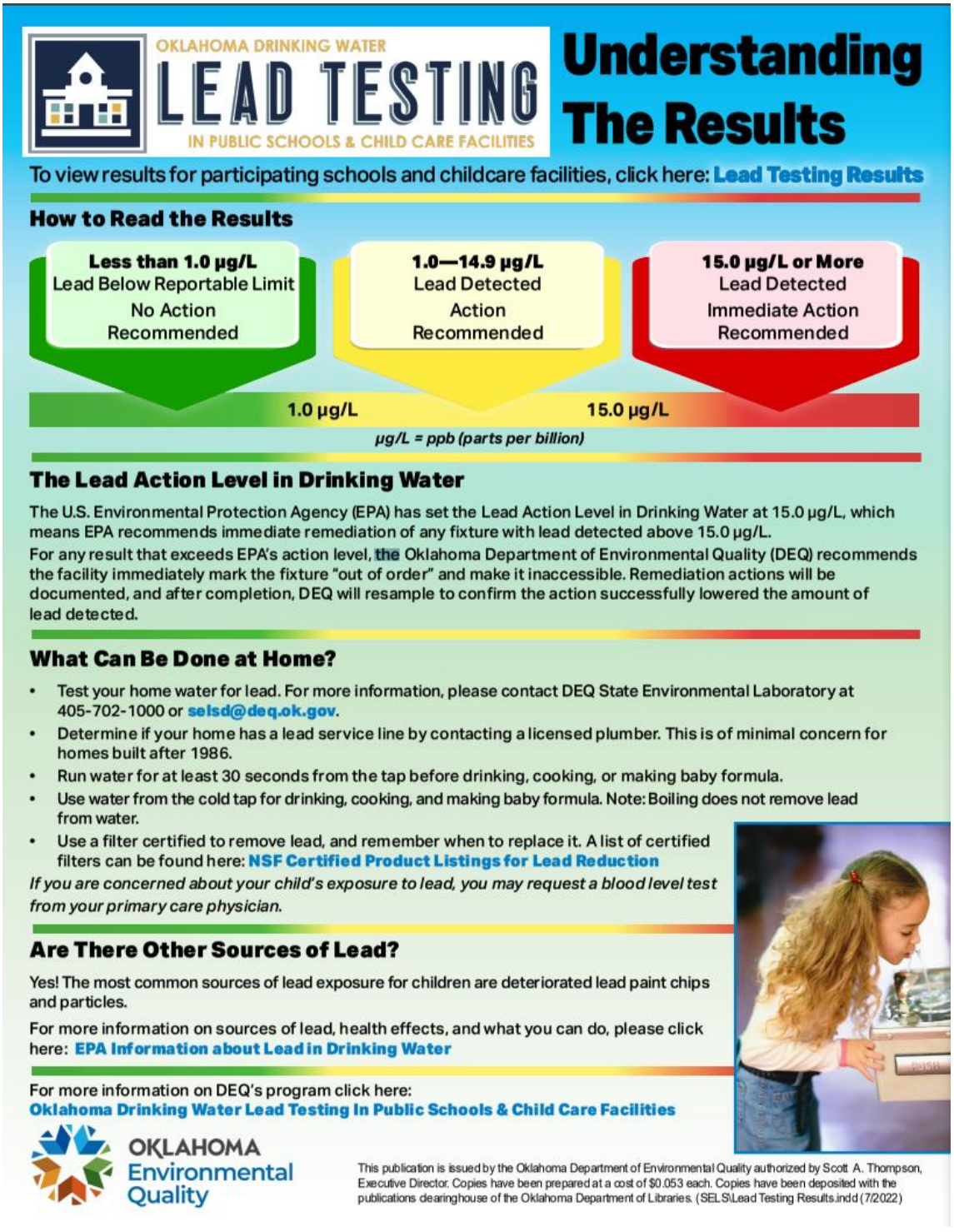


Program Improvements

The program has developed a Report that includes participant information, sample results, program status, remediations completed, SCAP funding information, and other program highlights. This Report is updated and published every quarter on the DEQ Lead Testing in Drinking Water in Schools and Child Care Webpage as well as DEQ social media platforms. This has been a great way to showcase the program's hard work and accomplishments. The first two pages of the program's most recent report **are above.**

The Capacity Development Section has also created signs for schools to put above drinking water fixtures that have had lead detects **(image on the right**). This would be recommended for use if school officials decide to permanently convert a fixture to a 'hand-wash only sink' or as temporary solution. This sign is sent as a Portable Document Format (PDF) to schools with their respective results.

Program Improvements (Cont.)



OKLAHOMA DRINKING WATER
LEAD TESTING
IN PUBLIC SCHOOLS & CHILD CARE FACILITIES

Understanding The Results

To view results for participating schools and childcare facilities, click here: **Lead Testing Results**

How to Read the Results

Less than 1.0 µg/L	1.0—14.9 µg/L	15.0 µg/L or More
Lead Below Reportable Limit	Lead Detected	Lead Detected
No Action Recommended	Action Recommended	Immediate Action Recommended

1.0 µg/L — 15.0 µg/L

µg/L = ppb (parts per billion)

The Lead Action Level in Drinking Water

The U.S. Environmental Protection Agency (EPA) has set the Lead Action Level in Drinking Water at 15.0 µg/L, which means EPA recommends immediate remediation of any fixture with lead detected above 15.0 µg/L.

For any result that exceeds EPA's action level, the Oklahoma Department of Environmental Quality (DEQ) recommends the facility immediately mark the fixture "out of order" and make it inaccessible. Remediation actions will be documented, and after completion, DEQ will resample to confirm the action successfully lowered the amount of lead detected.

What Can Be Done at Home?

- Test your home water for lead. For more information, please contact DEQ State Environmental Laboratory at 405-702-1000 or **selsd@deq.ok.gov**.
- Determine if your home has a lead service line by contacting a licensed plumber. This is of minimal concern for homes built after 1986.
- Run water for at least 30 seconds from the tap before drinking, cooking, or making baby formula.
- Use water from the cold tap for drinking, cooking, and making baby formula. Note: Boiling does not remove lead from water.
- Use a filter certified to remove lead, and remember when to replace it. A list of certified filters can be found here: **NSF Certified Product Listings for Lead Reduction**

If you are concerned about your child's exposure to lead, you may request a blood level test from your primary care physician.

Are There Other Sources of Lead?

Yes! The most common sources of lead exposure for children are deteriorated lead paint chips and particles.

For more information on sources of lead, health effects, and what you can do, please click here: **EPA Information about Lead in Drinking Water**

For more information on DEQ's program click here:
Oklahoma Drinking Water Lead Testing In Public Schools & Child Care Facilities

OKLAHOMA Environmental Quality

This publication is issued by the Oklahoma Department of Environmental Quality authorized by Scott A. Thompson, Executive Director. Copies have been prepared at a cost of $0.053 each. Copies have been deposited with the publications clearinghouse of the Oklahoma Department of Libraries. (SELS\Lead Testing Results.indd (7/2022)

The program has created a Lead Results Interpretation sheet to help school staff and parents understand the lead detection results. Most of the public does not know what the EPA Action Level is or what amount of lead requires immediate action. This document is intended to mitigate miscommunication with the public. The document above is on the webpage and sent to schools with their respective results. **See image above.**

Success Stories

A portion of the success of the program is due to water systems contacting their respective schools to sign up for the program. In early 2020 there was hesitation from schools to participate in the program. Without that push from the water systems, the program would not be where it is today. There was a total of 15 schools that either signed up for the program because of promotion from their water system or they worked together with their water system. The list of the schools includes:

- Broken Bow Water System
  - Broken Bow High School
  - Rector Johnson Middle School
  - Dierks Elementary
  - Bennett Elementary
  - Haworth Public Schools
  - Valliant Public Schools
  - Forest Grove Public School
  - Wright City Public School
- Town of Jet
  - Timberlake Public Schools
- City of Enid
  - Hayes Elementary
  - Hoover Elementary
  - Taft Elementary
  - Coolidge Elementary
  - Longfellow Middle School
- Colbert PUA
  - Colbert Public Schools

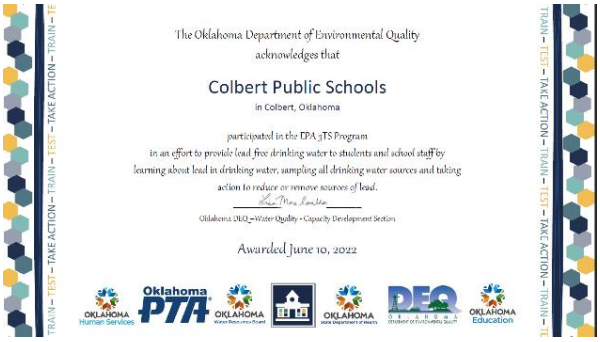
PARTICIPANT TESTIMONIAL

"I would like to express my appreciation for Oklahoma DEQ in providing the Lead Testing in Drinking Water Program. This program will be essential in helping our water system, schools and daycares navigate through the new Revised Lead/Copper Rule. With Oklahoma DEQ's guidance our system will be able to provide the best quality water for our customers. Once again, thank you for your help."

-Jennie Woods
Broken Bow Water Treatment Supervisor

One water system in particular, Broken Bow Water System provided tremendous initiative and promotion for the program. Not only did they get eight (8) schools in their surrounding area to sign up but worked with the school and DEQ every step of the way. The staff of the water system helped DEQ by helping collect samples, escorting DEQ around the buildings, scheduling, communication and repairing fixtures. A quote from the Water Treatment Supervisor of Broken Bow is in the **text box above.**

Another success story includes Colbert Public Schools. This school signed up for the program in 2021 and was sampled for lead in drinking water. After the initial sample, there were four (4) water fountains with high lead detections (over 15ppb). The school requested $6,295 of SCAP funding for the water fountains to be replaced with new fixtures. The SCAP funding was granted, and the school completed replacement of the fixtures. The fixtures were re-sampled in 2022 and there were no lead detections. The school received the **certificate to the right**, in honor of their completion of the program.


The Oklahoma Department of Environmental Quality
acknowledges that
Colbert Public Schools
in Colbert, Oklahoma
participated in the EPA 3Ts Program
in an effort to provide lead free drinking water to students and school staff by
learning about lead in drinking water, sampling all drinking water sources and taking
action to reduce or remove sources of lead.
Oklahoma DEQ • Water Quality • Capacity Development Section
Awarded June 10, 2022

Program Student Involvement

Beginning July 1, 2022, DEQ began developing a student pilot program where high school or college students can participate in the LWSC Program and gain experience and knowledge about the water industry outside of the classroom. The program will allow students to assist in developing inventory and assist in sampling for the LWSC Program. In addition, students will have the opportunity to tour the State Environmental Laboratory to learn the process of analyzing for lead in drinking water. The program officially launched in Spring 2023. The link to sign up is on DEQ's website.

(above) Student Volunteer Program sign up page from the DEQ website.

Expected Outcomes

Expected outcomes for the 'Lead Testing in Public Schools & Childcare Facilities' project are:

- The reduction of children's exposure to lead in drinking water.
- Training schools or childcare programs to begin implementing a testing program and mitigating lead exposure by utilizing the 3Ts toolkit in determining the best action to take for remediation.
- Improvement of school staff and community knowledge on lead in drinking water and other environmental harms.
- Water quality improvement and lead exposure reduction in drinking water.
- Establishment of routine practices such as those outlined in the 3Ts guidance.
- Fostering sustainable partnerships at the state and local level to allow for a more efficient use of resources and the exchange of information among experts in various areas of school, childcare, utility, and health sectors.

PWS Sustainability

Adequate TMF capacity is a critical component of PWS sustainability and is required for a system to consistently provide safe drinking water to the public. Acquiring and maintaining this TMF capacity can be challenging for any water system. A failure to maintain TMF capacity can lead to unsustainable, inefficient operation and frequent or continuous violations of health-based, primary drinking water standards.

If a water system requests technical assistance, the CDS schedules a visit with the PWS to help with various TMF policies and plans to improve the sustainability of the water system. To maximize assistance throughout the state, Oklahoma DEQ has contracted with ORWA to provide TMF assistance with rate analyses, financial management planning, SWP planning, and much more.

In SFY 2023, 142 instances of technical assistance were provided to unique systems across Oklahoma, each of them receiving customized assistance based on their needs. The specific assistance that was provided in SFY 2023 to these systems is detailed in the **table below**.

Type and Number of TMF Assistance Provided for PWS Sustainability 7/1/2022-6/30/2023

TMF Assistance Type	# of Assistances Provided
Emergency Response Planning and Procedures	23
Rate Analysis	40
Source Water Protection Planning	1
Asset Management Plans	25
Water Loss Auditing	30
Leak Detection Assistance	9
Other Technical Assistance (SOP, O&M & Policy Templates)	14
Total	**142**

To maximize effectiveness, each participating PWS received a package of technical assistance activities focused on their individual needs. There is no maximum amount of time or effort that may be expended on an individual system; as much assistance and guidance as needed will be provided to the participating system. Participation is voluntary and is driven by the level of interest of the participating system.

Small, Underserved, and Disadvantaged Communities

Adequate TMF capacity is especially critical, but often difficult, for the success and sustainability for small (less than 10,000 in population), underserved (by having been in violation of a health-based primary drinking water standard at some point over the past five years), and disadvantaged (communities where the median household income is at 85% or less than the national median household income according to the United States Census Bureau / American Community Survey) communities. Inability to possess adequate TMF capacity can lead to health-based enforcement actions, unpreparedness during emergencies, financial issues, and more.

Over the past six years, the DEQ has been surveying the TMF needs of rural and small municipal PWS systems via the Capacity Development Baseline Assessment Project. Each system was assessed on 109 different aspects of operational sustainability. Preliminary results of the survey found that, on average, the assessed systems possessed 78.19% of needed TMF capacity, and that both decreasing TMF score, and population correlated with an increasing likelihood and frequency of primary drinking water standards violations.

In SFY 2020, DEQ and ORWA, as members of the Oklahoma Strategic Alliance, joined forces and developed a program aimed at improving and enhancing PWS sustainability at small, underserved, and disadvantaged communities. Named the Long-Range System Sustainability (LRSS) Program, the program leads PWS systems through a series of programs and trainings that once complete, provide a significant boost to TMF capacity and system sustainability. The LRSS program focuses on many of the issues examined by the Baseline Assessment, and systems that complete the program demonstrate an improved TMF score, as well as improved efficiency, operations, and fiscal condition. **The image below** features representatives from OWRB, ORWA, DEQ, and a water system supervisor. The members of the Oklahoma Strategic Alliance all played a part in helping the water system complete their Long Range Sustainability Program.

Photo of members from ORWA, OWRB, DEQ, and the Town of Jet at the Long Range Sustainability Program Awards.

Small, Underserved, and Disadvantaged Communities (Cont.)

In addition to the LRSS Program, DEQ has applied for and been awarded grant funds through the Water Infrastructure Improvements Act (WIIN), Section 2104, funding for FFY19 and FFY21. Funding received for FFY19 has been used to contract with ORWA during SFYs 2021-2023 to provide one on one TMF technical assistance for small, underserved, and disadvantaged communities. These grant funds have provided TMF assistance with a focus on actions that lead to resolution of violations of health-based primary drinking water standards and that significantly improve PWS system efficiency, operation, and fiscal health.

During SFY 2022, 58 water systems benefited from the WIIN 2104 FFY19 grant funds. Technical assistance provided by ORWA included compliance assistance with nitrate, Disinfection By-Products (DBPs), lead and copper as well as help with rate analyses, source water plans, emergency response plans, policy development, asset management plans, board member training, and much more.

DEQ has received funding for FY2021 and have applied for FY 2022 and FY 2023. DEQ will use this grant for infrastructure projects to achieve compliance at small, underserved, and disadvantaged communities and enable them to provide water meeting state and federal regulations. DEQ will combine these grant funds with Drinking Water State Revolving Fund (DWSRF) principal forgiveness funding, which will allow additional oversight in the planning, design, bidding, and construction phases of the projects. DEQ plans to continue using the funds as described.

Using guidance from the Baseline Assessment, tools developed in the LRSS program, and technical assistance by ORWA through the WIIN 2104 grant, significant positive changes have been achieved at Oklahoma's small, underserved, and disadvantaged systems. This approach has several advantages:

- **Targeted TMF Assistance**: Via the recently completed Baseline Assessment, the PWS systems most in need of TMF help are known. Furthermore, the assessment specifies precisely what type of assistance is needed. Using WIIN 2104 funds, DEQ is able to target technical assistance on missing or malfunctioning PWS processes for maximum positive effect.

- **Rapid Deployment**: The LRSS program is completely developed and functional, having been in service for several years. By using the structure and services of the LRSS program, DEQ will be able to immediately begin work at targeted PWS systems, generating positive results quickly.

- **Proven Results**: The LRSS program is a significant part of the technical assistance provided to small Oklahoma PWS systems by the Oklahoma Strategic Alliance. In FY2023, the work of alliance partners has saved over 115.1 million gallons per year of water via water loss reduction, improved small Oklahoma PWS financial operating ratios by 20%, added over $2.971 Million in revenue to PWS budgets (via rate adjustments and efficiency improvements), and helped systems implement numerous policy and procedure improvements.

By using the Baseline Assessment as a roadmap, WIIN 2104 funds for targeted TMF assistance and the LRSS program as tools to arrive at a safe water destination, DEQ has initiated rapid and significant positive changes in the PWS systems that are included in this program. DEQ CDS effectively tailor the provided TMF assistance to focus on resolution of health-based drinking water standards violations that can be corrected via improved operations and system optimization, as well as on improving all aspectsof the system's TMF capacity. CDS measure and report on success in terms of system compliance, capacity development assessment scores, and improvements in PWS system financial conditions (as indicated by fiscal indicators and metrics).

SUMMARY AND FUTURE PLANS

Enhancing the *technical, managerial,* and *financial* capacities of Oklahoma's public water supplies is a group effort. The continued success of the DEQ CD program is dependent on the efforts of the DWSRF Section, PWS Engineering and Enforcement Section, PWS Compliance Section, Operator Certification Section, State Environmental Lab, and the various agencies that represent the FACT and OSA. This cooperative effort is very effective at promoting CD enhancement, but it can possibly be made more effective when efforts are targeted to where they are needed most. To this end, DEQ CD is looking forward to continuing to update the SWP program, enhance AWOP Awards, complete water loss audits and assist in solutions to reduce loss, utilize the results of the state-wide CD baseline assessment to target areas of assistance needed, implement and build the asset management tool, sample for lead at enrolled schools and daycares, and guide the Disadvantaged Communities Program, targeting systems that need the most assistance through on-site help as well as infrastructure funding.

Long-Term expected outcomes for the Capacity Development program include:

1. A trend showing an overall reduction in the number of PWS systems out of compliance with health-based standards.
2. Improved understanding of current and emerging threats to water quality, safe drinking water, public health, and environmental health.
3. Reduced number of accidents, injuries, and safety-related incidents at PWS systems.
4. Completion of a revamped SWP program, including accurate, updated, and easily accessible data, outreach emphasizing the benefits of implementation, information on funding projects to protect source water with a trending increase in SWP plans completed and implemented.
5. Promotion of the AWOP Awards Program to increase awareness and implementation of optimization concepts.
6. Reduction in real and apparent water loss at PWS systems as well as an increased understanding of types of loss and importance of data integrity.
7. A trend showing continued improvement in TMF assessment scores, especially in small, underserved, and disadvantaged communities leading to an improvement in the overall state TMF assessment score.
8. Increased use of asset management planning to improve understanding of asset criticality and enhance sustainability of PWS systems.
9. Continue to promote the lead testing in drinking water in schools and daycare facilities program across the state with an expectation of increased enrollment into the program.
10. Continue to reduce lead exposure from drinking water at schools and daycare facilities by assisting with remediation actions to reduce or eliminate lead.
11. Implement student program to assist with inventory and lead sampling at schools.
12. Improved performance of drinking water systems in small, underserved, and disadvantaged communities.

REFERENCES

Oklahoma Capacity Development Strategy Document SFY22 DWSRF Intended Use Plan

2022 State of Oklahoma Public Water Supply Program Annual Compliance Report