CAPACITY DEVELOPMENT
for financial, managerial, and technical capacity

Oklahoma's Capacity Development Program Annual Progress Report to EPA

Water Quality Division
Oklahoma Department of Environmental Quality

1. Introduction

Congress amended the Safe Drinking Water Act (SDWA) in 1996, providing for a variety of initiatives to assist States and public water systems in providing safe drinking water. As amended, the SDWA established capacity development (CD) 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 through which 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 systems' needs. As required in the Capacity Development Strategy Document (Strategy), each State must submit an annual report to the Environmental Protection Agency (EPA). This report measures the efficacy of the Strategy by detailing improvements in the TMF capabilities of that State's public water systems. The annual progress report is available on the Oklahoma Department of Environmental Quality (DEQ) website at http://www.deq.state.ok.us.

The DEQ has the statutory authority to ensure that all water supply systems have adequate TMF capabilities prior to the construction of a public water facility. These capabilities are partially assessed and accomplished via two DEQ directives. One directive derives from OAC 252-626 Public Water Supply Construction Standards, which states that a PWS must receive a "Permit to Construct" from the DEQ prior to initiating construction. Another directive requires all operators of a PWS system to be licensed by the DEQ, according to OAC 252:710 Waterworks and Wastewater Works Operator Certification.

The DEQ CD program relies on the success of its enforcement and compliance programs. These two programs are funded primarily through the Public Water System Supervision program, but also via funds from the Drinking Water State Revolving Fund (DWSRF) loan program. Funding information is detailed in Oklahoma's DWSRF FY 2008 State Program Management Set-Aside Workplan.

2. Enforcement and Compliance Mechanisms

The DEQ maintains a strong enforcement program that particularly addresses systems with multiple violations of the SDWA requirements. Such systems are referred to DEQ enforcement staff for analysis of the circumstances of the violations. A course of action is then implemented to prevent enforcement escalation to the Significant Non-Compliance (SNC) list.

A Notice of Violation (NOV) is the first formal enforcement document issued to facilities when they exceed the MCL or fail to meet DEQ rules or regulations. Violations concern matters such as construction deficiencies, monitoring, or operating procedures. If it is determined that the system cannot likely regain compliance in less than three months, the DEQ PWS District Engineer (DE) prepares a Consent Order (CO). The CO is a mutual agreement between the DEQ and the affected system. The CO cites the system's responsibilities, the deadline for returning to compliance, and the fines that may be levied against the system.

An Administrate Consent Order (ACO) is issued when time is limited and there is a significant health hazard, or the water system refuses to agree to the CO. In an ACO, the DEQ determines what tasks need to be completed and sets deadlines for the completion of these tasks. Both the CO and the ACO stipulate the penalties for failing to meet the required deadlines. Boil Advisories are usually issued to systems that have "acute" or "fecal positive" bacteriological violations. Boil Advisories require immediate notice to all consumers in order to inform the

public of how to make their water safe for human consumption.

3. Advancements in the Capacity Development Program

In January of 2005, the DWSRF Program of the DEQ appointed a CD Coordinator (CDC) to facilitate the efforts of the CD program in Oklahoma. The CDC is responsible for fostering the relationship between the various DEQ drinking water programs in the directive to increase TMF capabilities. For example, the Operator Certification Program addresses technical capabilities by training and licensing water system operators.

The Construction Permitting Program also attends to the technical component of CD by reviewing plans and specifications to build water systems. Their technical review helps determine the adequacy of the source water and the water system infrastructure.

The PWS Enforcement Program also addresses technical capabilities by reviewing engineering reports on proposed construction projects, and by providing technical training to water systems. Their assistance encompasses technical operation and security and addresses managerial capabilities by providing training to water system managers. It is the role of the CDC to coordinate efforts of all drinking water programs to ensure TMF capabilities statewide.

Though this approach results in effecting compliance in a majority of water systems, for some water systems a different approach is indicated. Consequently, several tools are utilized which help to reduce the number of systems that are not in regulatory compliance.

Table 1 lists the tools that DEQ currently uses to ensure adequate TMF capabilities.

Table 1

Capacity Development Tools

Tool	Technical	Managerial	Financial
AWOP	X		
CRG	X	X	X
ORWA	X		
Sanitary Survey	X		
Regional-ization	X	X	X
Source Water Protection	X	X	
Operator Certification	X		

The following summarizes the programs employed to strengthen Oklahoma's CD program.

Operator Certification Program

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 the training to properly treat and monitor drinking water supplied to the public. Through an EPA grant, DEQ has provided the study material, training, and examination fee for operators of non-transient non-community water (NTNC) facilities. The training and examination for NTNC operators are administered by the ORWA through a contract with the DEQ. All NTNC facilities in Oklahoma have current operators.

In addition to the training offered by DEQ, training is available in classroom settings and on the worldwide web. As examples, the ORWA, Rose State College, and the American Water Works Association offer DEQ-approved training classes for environmental professionals.

The DEQ offers written exams, rotating through seven regions of the State annually.

Source Water Assessment Program (SWAP)

The SDWA Amendments requires States to develop and implement a SWAP to analyze existing and potential threats to the quality of the public drinking water throughout the state. The DEQ maintains approval from the EPA to administer the SWAP program.

SWAP assessments include the following information: 1) Delineation of the source water protection area; 2) Inventory of the contaminant source within the area; 3) and, Determination of the susceptibility of the PWS to contamination from the inventoried sources.

Utilizing this information, a water system can more effectively plan the location of its next well. The DEQ updates SWAP assessment data as it is provided and will soon have the ability to update in real time for each water system. These data are provided to DEQ's Environmental Complaints and Local Services Division (ECLS) staff and to individual water systems. Finally, this data is summarized in the water system's annual Consumer Confidence Report.

Figure 1

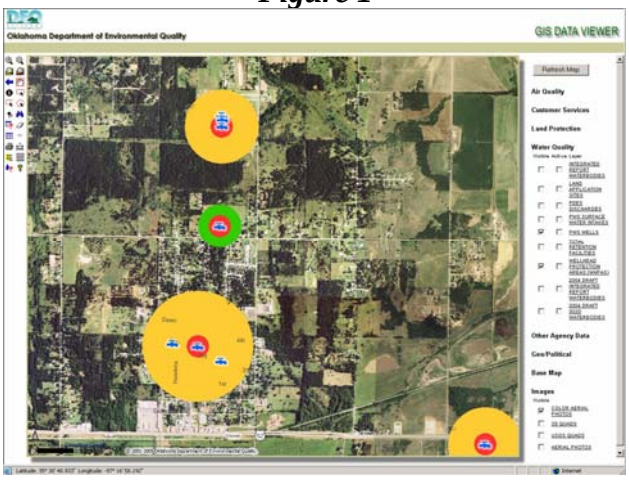

Figure 1 - Sample map indicating location of well and wellhead protection areas.

Figure 1 is an example of the type of map that can be generated for community public water supplies.

Currently, most regulated discharges, wells, surface intakes, and other planning information can be found on our website. This is available through an interactive mapping system that allows the user to view any combination of items on the map. This mapping program is similar to other mapping programs, but differs in that it also presents aerial photographs. A map may be viewed that includes the system's water source (ground or surface) and all known contaminants located within a defined distance from the proposed well site.

Area-Wide Optimization Program (AWOP)

In April of 1999, the DEQ began participating in the EPA Region 6 AWOP pilot. This program is a multi-state effort to optimize particle removal and disinfection capabilities of filtration water treatment plants. The goal of AWOP is to maximize public health protection from disease-causing microbial contaminants by identifying performance problems in the water system. Following the AWOP model is one of the most cost-effective, economical ways a drinking water system can improve their ability to produce safe drinking water. Water systems having the most trouble with their filtration treatment are identified and prioritized in terms of their need for assistance.

The AWOP model consists of four components; namely, status, evaluation, follow-up, and maintenance. As part of the follow-up component strategy of AWOP, Targeted Technical Assistance (TTA) is being implemented. TTA is an approach designed to help water systems comply with the Disinfection By-Products (DBP) Rule, which became effective in 2004. DBP ingestion by humans has been shown to cause cancer and to adversely affect the liver, kidney and central

nervous system. TTA was piloted nationally in Nowata, OK in October of 2004. To-date, TTA has been conducted at twelve water systems in Oklahoma.

The most recent approach being promoted by AWOP in lieu of TTA is performance based training (PBT). PBT is a transfer of priority setting and problem solving skills to plant staff to initiate changes at a water plant.

PBT is conducted over a 12-to-15 month period with up to six systems meeting in a classroom setting each quarter. The goal of PBT is to address unique performance limiting factors to achieve optimized performance (i.e., better than regulations require). PWS DEs facilitate individual plants to keep them on track and working on action items between the training sessions. The DEQ began PBT at 15 water systems in FY07 and will complete this training at the same systems in FY08.

EPA Region 6 and Process Applications, Inc. in Fort Collins, CO, have assisted in the development of the AWOP program. The States of Arkansas, Louisiana, Texas, New Mexico, Iowa and Oklahoma are participants in the EPA Region 6 AWOP group. DEQ continues its involvement in AWOP by attending quarterly regional and national meetings and by participating in and hosting multi-state CPEs.

Since 1997, the DEQ has conducted comprehensive performance evaluations (CPEs) of water systems in the state. The original scope of the CPE was to assist the community and to train engineers in understanding the intricacies of water treatment. A CPE provides analysis of the facility's design capabilities and a system's administrative, operational, and maintenance practices. Once a CPE has been conducted, the participating water system receives a report from the DEQ that outlines factors that may influence the optimization of its treatment operations. From 1997 to the present, DEQ has performed 15 CPEs in Oklahoma.

Drinking Water State Revolving Fund Loan Program

The 1996 SDWA Amendments allowed EPA to make a grant to Oklahoma to fund the DWSRF loan program. This program is dedicated to providing low-interest loans to upgrade public water system infrastructures. It is designed to help those in greatest need based on a priority system that places a primary emphasis on drinking water quality.

From 1998 to the present, the program has entered into binding commitments totaling over $290,000,000 to fund upgrades to 60 water systems.

In addition to funding infrastructure improvements, the program funds the CD, Small System Technical Assistance, and SWAP programs, and partially funds the PWS Program.

***Funding Agency Coordinating Team* (FACT)**

FACT is comprised of state and federal water and wastewater project funding agencies such as the DEQ, the Oklahoma Department of Commerce, the Oklahoma Water Resources Board (OWRB), the Oklahoma City Area Indian Health Service, and the U.S. Department of Agriculture – Rural Development.

FACT meets quarterly to discuss the status of Oklahoma communities identified in the DEQ enforcement list. This gives priority to water systems with the greatest need so they receive funding as quickly as possible. FACT provides a single uniform method for requesting funding and regulatory approvals. 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 1998.

Small System Technical Assistance

In FY07, the DEQ contracted with the Community Resources Group (CRG) and the Oklahoma Rural Water Association (ORWA) to provide TMF assistance to water systems in the state. CRG not only offers technical assistance (TA), but also helps develop the managerial and financial capabilities of water systems. This is accomplished by evaluating rate structures, developing operational and financial recordkeeping and accounting or billing systems. CRG also develops budgets and internal fiscal controls, and assists in the preparation of funding applications.

ORWA provides TA to communities referred by DEQ enforcement or DWSRF staff. Systems receiving assistance must have a population less than 10,000 and be identified by DEQ as a program with specific regulatory deficiencies. Preference is given to those on the current DWSRF Project Priority List.

Sanitary Surveys of Public Water Systems

The DEQ, in cooperation with EPA Region 6, has trained over 70 ECLS field staff in properly conducting a sanitary survey. The ECLS staff is responsible for conducting inspections of public water systems. Using the knowledge gained from the training, ECLS inspects surface water systems quarterly and ground water systems semiannually.

4. Challenges to Oklahoma's Capacity Development Strategy

Many of the systems that have been placed on the SNC list are small groundwater systems with nitrate levels above the allowable level. Management approaches include removing the problem wells, blending the water with water having a lower nitrate concentration, and purchasing water from another water system. If these options will not work, the system must lower the nitrate concentration through treatment. Many of the systems are unable to afford this option and continue to be in violation of the SDWA.

The State of Oklahoma's Public Water Supply Program currently oversees 1,600 active entities that meet the federal definition of a PWS. Of these, 1,297, nearly 79%, reported no MCL violations or TT violations.

Of the 1,600 active PWSs in Oklahoma, two 205 systems are surface water systems, seven 748 are groundwater systems, and 642 are purchase water systems. 1,130 are classified as community water systems (CWS), 110 are classified as NTNC, and 360 are classified as non-community public water systems (NCPWS). These water supplies serve approximately 3.2 million customers; of these, 77% is served by surface water systems or by systems that purchase from surface water systems.

22 PWSs had 44 violations for exceeding the nitrate standard in at least one of their wells during the calendar year of 2006. Five systems had seven nitrate MCL average violations. 96 systems had 120 nitrate monitoring violations. Three systems had six violations for exceeding the MCL for the arsenic standard. There were five systems with ten violations for exceeding the MCL of the inorganic chemical contaminant (IOC) group.

There were no systems in violation for IOC TT. One system had two violations for IOC monitoring. There was one system with 20 volatile organic chemical contaminant (VOC) group MCL violations.

No systems had VOC TT violations. Eight systems had 280 VOC contaminant group monitoring violations. None of the systems had Radionuclide MCL or monitoring violations.

There were 476 violations of the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) MCL by 114 systems. 79 systems had 256 violations of the Stage 1 DBPR TT requirement. 35 systems had 85 monitoring violations for the Stage 1 DBPR.

81 PWSs had 96 Total Coliform Rule violations that indicated a coliform positive sample. 15 mandatory Boil Orders were issued to systems that tested positive for fecal coliform or E-coli. 215 systems had 456 routine monitoring and reporting violations, and 28 systems had 38 repeat monitoring violations; these systems received NOVs. These notification letters do not include the threat of fines; therefore, EPA does not consider them formal enforcement actions.

All surface water PWSs in Oklahoma are required to provide filtration. One of the 205 surface water systems violated the Surface Water Treatment Rule (SWTR) for TT. None of the systems were in violation for SWTR monitoring and reporting. None of the systems had Filter Backwash Recycle Rule violations for TT or monitoring and recordkeeping. There were 61 turbidity TT violations by 28 systems for Interim Enhanced Surface Water Treatment Rule (IESWTR). There were 20 monitoring and reporting violations by five systems.

None of the systems were cited for TT violations for the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). None of the systems were cited for TT violations for the Lead and Copper Rule. Two systems were cited for two monitoring violations for the Lead and Copper Rule. Of the 1,600 PWSs that are required to distribute Consumer Confidence Reports and Public Notices, all distributed the materials by their respective due dates.

The DEQ issued 919 enforcement actions in response to the violations listed in this report. These enforcement actions consisted of 845 NOVs, 57 COs, no ACOs, 15 Boil Advisories, and two Notices of Non-Compliance. A total of 1,172 systems were returned to compliance during the 2006 calendar year.

As per Section I of The State of Oklahoma Capacity Development Strategy, the DEQ ensures that new systems have TMF capacities to provide safe and affordable drinking water. All new systems are referred to the CDC, who then assesses the system's TMF capacity. The CDC then ensures that the system has a properly certified operator, notes the dates of sanitary surveys/inspections, and may make indicated TA referrals. A total of 18 new systems were identified by the DEQ in FY07.

Figure 2 shows the yearly trend in the percentage of systems in Oklahoma reporting no MCL or TT violations.

Figure 2

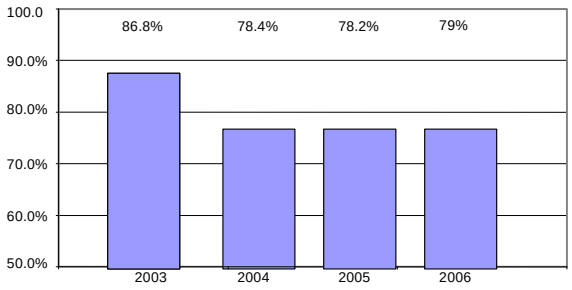

Figure 2 - Percent of Systems Reporting No Violations

6. Awards

Oklahoma City. The American Water Works Association (AWWA) announced on June 25, 2007 that Oklahoma City (OKC) Water and Wastewater Utility won its annual "Best of the Best" Water Taste Test. The event, comprised of North American winners of state and regional water-tasting competitions, was held at the AWWA's Annual Conference and Exposition (ACE07) in Toronto.

The "Best of the Best" Water Taste Test pitted water utilities around North America against one another to determine which utility has the best tasting water. An esteemed judging panel rated each water system on their flavor characteristics.

Monte Hannon, Water Quality Superintendent of the Oklahoma City Water and Wastewater Utility, said, "We're extremely proud to be selected as the winner of the 'Best of the Best' Water Taste Test. We know our competition was very impressive. This honor is a testament to all of our operators and employees who provide Oklahoma City residents with the best quality water available."

Oklahoma City Water and Wastewater previously won the AWWA Southwest Section tasting competition to earn a berth in the event.

ACE07 in Toronto is the 125th annual conference of AWWA and features the largest professional program of its kind.

Bethany. The Oklahoma Chapter of the American Public Works Association presented its *Public Works Project of the Year 2006* to the Bethany Water Treatment Plant. This award is given for excellence in management and administration, recognizing the efforts of many agencies, consultants, contractors, engineers and architects working together. See Figure 3.

The City of Bethany (Bethany) is located in Oklahoma County and serves more than 20,000 customers. Bethany was issued a CO by the DEQ in 2004 for exceeding the MCL of 80 ug/L for total trihalomethanes (TTHM). Bethany contracted to upgrade and expand their plant receiving a low-interest DWSRF loan from the DEQ in the amount of $10,400,000 to fund the project.

The Bethany water treatment plant was increased in capacity from 5.6 million gallons per day (MGD) TO 8.4 MGD. Since the first quarter of 2006, Bethany has maintained a running annual average for TTHM below the regulatory level.

Figure 3

Figure 3 – Bethany APWA Award Ceremony

Cherokee. The EPA DWSRF Awards for Sustainable Public Health Protection recognizes the most innovative and effective DWSRF projects. The City of Cherokee (Cherokee) partnered with the DEQ in an eight year project, completing one of the most effective projects ever financed by DWSRF. In 2006, EPA cited the project's innovative financing, planning, project implementation, and promotion of sustainable infrastructure**.**

With help from DEQ's Small System Technical Assistance program, Cherokee:

- Set up a new laboratory,
- Upgraded recordkeeping methods for better management, and
- Trained water system operators.

Cherokee's objectives were to remove minerals and soften the water, reduce nitrate contamination levels, and provide filtration for *cryptosporidium*, *giardia lamblia,* and viruses. Using pilot studies, it was determined that a reverse osmosis treatment plant would provide the best treatment and produce the best water. See Figure 4.

The following two projects were financed with DWSRF loans:

- Water meters were installed in 2001, enabling the billing for actual water usage and allowing better management of water storage and production. The meter project was financed with a DWSRF loan of $250,000, and
- A reverse osmosis water treatment plant was constructed for Cherokee's groundwater, since the wells were under the direct influence of surface water. This project was financed with a second DWSRF loan of $1,455,000.

The projects were complete July 19, 2006. Cherokee was able to achieve all the objectives and now maintains compliance with the SDWA.

Figure 4

Figure 4 – Cherokee reverse osmosis system

7. Successes

Chandler. Chandler is the county seat of and is situated in central Lincoln County. Chandler's main street is a continuation of historic Highway 66 that crosses the United States.

The water treatment plant provides drinking water for a population totaling 4,698. Using anthracite filtration at the beginning of 2005, the plant was not meeting the TOC removal ratio requirement and was exceeding the limits for TTHM and HAA5.

Starting the second quarter of 2005, Chandler piloted a treatment approach which involved the addition of peroxide, polymer, ferric sulfate and a catalyst. This method was chosen because it touted increase removal of TOC, which would decrease the opportunity for DBP formation. However, chlorine was being added to stop the action of the peroxide. So this approach, with the use of organic polymer and chlorine, may have increased the likelihood of DBP formation.

The data for TOC removal, TTHM, and HAA5 show a large swing when compared to the beginning of the pilot. First quarter 2005 data reported the following:

- TOC removal - 18%
- TTHM 105 µ/L
- HAA5 – 74 µ/L

After the start of the pilot, TOC removal went to a low of 6.8%; TTHM and HAA5 increased to highs of 239 µ/L and 151 µ/L, respectively. As this approach was not correcting the problems, a different direction was taken. See Figure 5.

Figure 5

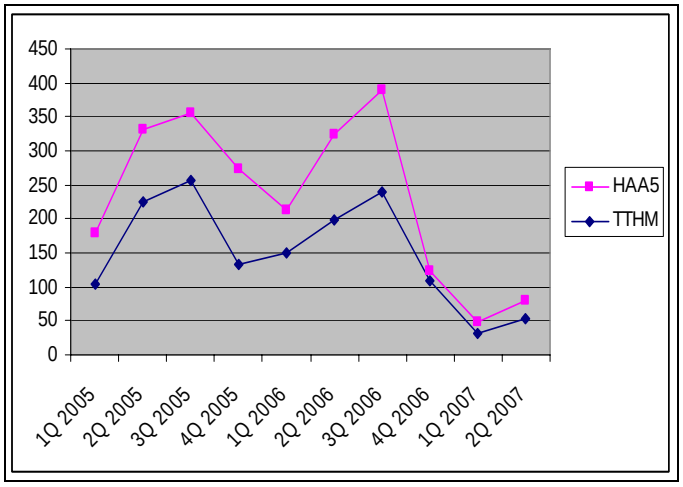

Figure 4 – DBP levels

In August 2006, Chandler purchased a THM+ testing kit and began profiling the system in September. In November, Chandler began monthly SUVA testing, which reported the ratios to be below 2 L/mg-m. This gave the system credit for a ratio of 1.00, which returned the system to regulatory compliance for TOC removal.

To address the DBPs, it was decided to decrease the chlorine being added at the plant and to install a chlorine booster station at the clearwell. This change, in addition to increased flushing and exercising the storage tanks resulted in a dramatic lowering of DBPs.

The most recent data reports that TTHM levels are now at 31 µ/L, and HAA5 levels at 27 µ/L, both of which are at optimized levels. And this was summarized in an article written in a local newspaper, whose caption read, "Chandler's drinking water is best ever."

Rogers County Rural Water District #4 (Rogers 4). Rogers 4 is located in the town of Oologah, which first emerged as an Indian Territory coal mining boom town. Rogers 4 supplies water to a population of 5,606, which include local industries and several purchase water systems in the area.

The water treatment plant used conventional processes originally designed for turbidity removal. The plant consisted of three clarifiers/flocculators, six gravity filters, and three clearwells. Rogers 4 was in violation for inadequate TOC removal and were nearing the MCL for TTHM.

Rogers 4 obtained a low-interest DWSRF loan in the amount of $1,700,000 to fund the proposed changes. The project was granted Categorical Exclusion from formal environmental review, and construction began May 4, 2006.

The improvements included:

- Installation of two 1-MGD Actiflo water treatment units (See Figure 6),
- Rehabilitation of existing filters and clarifiers;
- Installation of a static mixer,
- Upgrades to the chemical feed systems,
- Rehabilitation of instrumentation, control and electrical system, and
- Constructing two (2) backwash ponds.

The new plant achieved 80% TOC removal by using 50 parts per million (PPM) of aluminum chlorohydrate (ACH) as a coagulant. This was well above the required removal rate, thus returning the system to regulatory compliance for TOC removal. [To compare, please note that by using 36 PPM ACH, the removal rate decreased to between 50% and 60%.] TTHMs, HAA5s, and turbidity were also lowered significantly.

Figure 6

Figure 6 – Actiflo plant construction.

8. Summary

The continued success of Oklahoma's CD program is dependent on the efforts of the PWS Enforcement Unit, Operator Certification Unit, DWSRF staff, TA groups, and the various FACT agencies. AWOP, SWAP, and Small System Technical Assistance are programs that will continue to improve the quality of drinking water provided to citizens of Oklahoma. DEQ continues to encourage regionalization while providing loans to help communities that need to upgrade their system to comply with the SDWA.