2017 Governor's Report

Capacity Development

Technical - Managerial - Financial

Public Drinking Water Branch

September 2017

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Executive Summary

This 2017 report to the Governor on the Missouri Department of Natural Resources' Public Drinking Water Capacity Development Program describes the efficacy of the program and progress made in improving the technical, managerial and financial capacity (TMF) of the state's drinking water systems. The Capacity Development Program continues to implement strategies to assist public drinking water systems in improving financial, managerial and operational practices, infrastructure condition, and technical knowledge in order to consistently and sustainably provide safe drinking water. In addition, this report fulfills the state's obligation, under section 1420(c)(3) of the Safe Drinking Water Act, to report the status of the Missouri's Capacity Development Program to the Governor every three years.

The Capacity Development Program continues to focus on enhancing assistance-provider contracts and the department's role in providing assistance to drinking water systems, along with collaborating with other agencies, educating stakeholders about pending new regulations and increasing the awareness of the value of safe and sustainable drinking water. The department contracts with assistance providers, known as circuit riders, to help drinking water system owners and operators meet regulatory requirements and sustainability needs. The circuit riders reach hundreds of systems each year providing various types of assistance, including: explaining regulatory requirements, developing policy and bylaws, assessing water rates, strategic planning, managing assets, locating leaks in water lines, addressing water loss, system flushing, and metering programs. As one example of the benefits provided by these services, the leak detection efforts over the last three state fiscal years identified 195 leaks, saving drinking water systems more than 63 million gallons of finished water per month.

Since 2014, approximately $2.9 million in grant dollars were awarded for engineering services, with $1.77 million awarded for development of engineering reports and $1.15 million awarded for development of plans and specifications. These grants were distributed among 86 community water systems to assist with implementing TMF changes and making infrastructure improvements. An additional $689,273 in assistance has been offered to 44 public water systems through source water protection and abandoned well plugging grants. Finally, a voucher program provided $767,980 to systems to encourage continuing education for certified operators of systems.

Innovations

The department has implemented some new ideas within the last three years to more effectively and efficiently ensure safe drinking water for all Missourians:

Operator Certification: The department continues to highlight the career of being an operator of a drinking water or wastewater system. In 2012 and 2013, the department actively promoted a program from the Missouri Department of Economic Development called "Show Me Heroes," which assisted in the employment of eligible veterans. In 2017, the department is partnering with the Missouri Department of Corrections to host a wastewater treatment multi-day pre-certification training course for inmates in an institution with its own wastewater treatment plant. Having the training and hands-on experience can lead to expanded job opportunities upon release. This has the potential to expand into a similar drinking water distribution course being offered.

Data integrity: The department continues to evaluate internal processes to determine where improvements can be made with respect to data integrity and information sharing. The department has successfully implemented a communication effort to improve reporting accuracy and effectiveness for system bacteriological sampling points and corresponding data. The data management system, OpenElis, prepopulates each system's information for bacteriological sampling, which has decreased violations for lack of sampling and the number of samples with an unidentified sampling location.

Integration of Technical, Financial, and Managerial Capacities: To increase system knowledge of technical, managerial and financial capacity principles, circuit rider efforts have focused on water loss and water rate assessments. By linking water loss to revenue, systems learn about the technical aspects of locating and repairing a water leak, the managerial importance of documentation and budget keeping, and the financial benefit of reduced water loss.

TMF survey: The TMF survey is a tool the department uses to assess the state's TMF capacity of systems to help prioritize assistance through circuit riders. In 2016, the department offered the TMF survey online for the first time. A total of 107 surveys (19 percent) were submitted electronically. As a result, the number of survey responses received by the department increased to 38 percent. The department will continue to pursue electronic means to increase survey response rates and enhance staff efficiency.

Template development: The department developed an Operation and Maintenance Plan template and Source Water Protection Plan template for drinking water systems. The templates will continue to be improved and used to educate systems about the benefits of documented procedures, as well as to assist systems in developing their own documentation.

Missouri's Capacity Development Strategy

The Missouri Department of Natural Resources' Water Protection Program, Public Drinking Water Branch is pleased to present the 2017 Capacity Development Report on the efficacy of the state's Capacity Development Strategy to Missouri's 56th Governor, Eric R. Greitens.

In accordance with Section 1420(c) of the Safe Drinking Water Act, Missouri is required to develop and implement a capacity development strategy to assist systems in acquiring and maintaining TMF capacity. The act also requires Missouri to submit a report on the strategy every three years to the Governor, and make it available to the public. This report fulfills that requirement and is available on the department's website, dnr.mo.gov. The next report will be due in 2020.

Public Water System: *A system with at least 15 service connections or a system serving at least 25 individuals daily at least 60 days out of the year.*

Missouri recognizes that providing safe and reliable drinking water is an essential component to protecting human health, promoting social wellbeing, and stimulating economic development. Missouri's strategy was prepared in 1999, with stakeholder input, and approved by the U. S. Environmental Protection Agency (EPA) in 2000. Developing and implementing the strategy allows Missouri to receive the full allotment of Drinking Water State Revolving Fund capitalization grant funds from EPA. The funds are used to provide low-interest capital improvement loans to systems and to fund public drinking water protection efforts in Missouri, including capacity development activities. These activities include assistance with rate setting, compliance, leak detection, operator training and other services through circuit riders. These activities align with the department's core mission by providing measurable outcomes with respect to compliance assistance. As a result, Missouri's implementation activities have varied over the years, ensuring our strategy remains effective and efficient.

Technical Capacity: *The water system meets standards of engineering and structural integrity necessary to serve customer needs. Technically capable water systems are constructed, operated, and maintained according to accepted quality standards.*

Managerial Capacity: *The water system's management structure is capable of providing proper stewardship of the system. Governing boards or authorities are actively involved in oversight of system operations.*

Financial Capacity: *The water system can raise and properly manage the money it needs to operate efficiently over the long term.*

Missouri's Capacity Development Strategy Core Elements

1. *Improve water system knowledge of current and future rules and regulations.*
2. *Improve communication and trust among all partners.*
3. *Educate Missouri citizens on the importance of safe drinking water.*
4. *Encourage partnerships between agencies and systems.*
5. *Improve interagency and intra-agency communication for TMF capacity related programs.*
6. *Coordinate financial resources.*
7. *Continue rate setting and financial management training for small systems.*
8. *Increase planning in rural areas.*
9. *Develop and provide board member training and TMF capacity materials and training to public drinking water system decision makers.*
10. *Continue to collect baseline data to measure the success of TMF capacity activities.*

Strategy Implementation and Efficacy

From fiscal year 2015 to 2017, Missouri had approximately 1,422 community systems, 217 nontransient noncommunity systems, and 1,098 transient systems. Missouri's strategy is primarily focused on community and nontransient noncommunity systems. In order to assist with acquiring and maintaining TMF capacity, the department implemented the following strategy activities from fiscal year 2015 through fiscal year 2017.

Community Water System: *A public water system which serves at least 15 service connections and is operated on a year round basis or regularly serves at least 25 residents on a year-round basis*

Nontransient Noncommunity Water System: *A public water system that is not a community water system and that regularly serves at least 25 of the same persons over six months per year*

Transient Noncommunity Water System: *A public water system that is not a community water system, which has at least 15 service connections or regularly serves an average of at least 25 individuals daily at 60 days out of the year.*

Permit to Dispense

In accordance with the Safe Drinking Water Act, Missouri ensures that all community and nontransient noncommunity systems commencing operation after Oct. 1, 1999, demonstrate TMF capacity with respect to the national drinking water regulations. In order to meet this federal requirement, new community and nontransient noncommunity systems complete a TMF checklist. The TMF checklist is reviewed by department staff prior to issuing a permit to dispense. During the reporting period, the department issued a total of 589 permits to dispense. Out of those, 24 permits to dispense were issued to new community water systems and noncommunity systems requiring the demonstration of TMF capacity. In addition engineering staff are also responsible for reviewing and issuing

construction authorization permits. During the reporting period the department issued a total of 949 construction authorization permits.

Permits are only valid for the continuing operating authority to which the permit was issued. Systems are required to notify the department prior to transferring ownership of the system to a new organization, entity or person. During the reporting period, the department issued 44 permit transfers to community water systems and eight permits transfers to nontransient noncommunity systems.

Continuing Operating Authority: *The permanent organization, entity, or person identified on the permit to dispense water who is responsible for the management, operation, replacement, maintenance and modernization of the public water system*

Drinking Water Grants

Permits and Engineering

The department provides financial assistance to small communities in the form of Engineering Report Services Grants (ERSG). The primary purpose of this grant program is to assist community water systems in obtaining an engineering report as a first step toward implementing TMF changes. Depending on the system's needs, recommended changes may include restructuring, regionalization, operational changes, treatment changes, infrastructure improvements, or other technical, financial, or managerial improvements. During the reporting period, the department awarded $1.77 million in ERSG to 67 systems.

In 2015 and 2016, the department also provided financial assistance to small communities in the form of Phase 2 Plans and Specification Grants. The purpose of this grant program is to assist small communities in obtaining engineering plans and specifications for infrastructure improvement projects following the submission of an engineering report. As a result, small communities are able to move quickly towards initiating infrastructure improvements. During the reporting period, the department awarded $1.15 million in Phase 2 grants to 19 systems.

Source Water Protection

Since 2006, the department has provided financial assistance towards properly plugging 126 abandoned wells.

Grants awarded through this program can be used by primary community systems to promote source water protection awareness and education or to develop and implement on-the-ground best practices to minimize or eliminate additional contamination of drinking water sources. Recent successful projects include agricultural best management demonstrations, abandoned well plugging, and facility security improvements in source water areas. During the reporting period, the department awarded grants to 23 systems, totaling $519,186 in assistance towards source water protection activities.

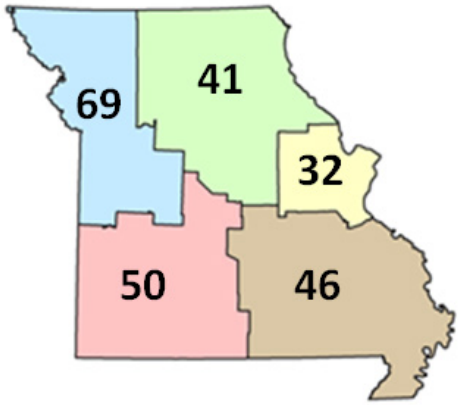
Grants awarded through this program can be used by any groundwater-based primary water system to properly plug abandoned water wells that exist within the system's source water or

service area. Missouri's groundwater resources are high-quality and provide affordable, safe drinking water to more than 2.4 million residents. With an estimated 500,000 abandoned water wells across the state, the risk of contamination to these vital resources is significant and potentially costly. During the reporting period, the department awarded grants to 21 systems for a total of $170,087 in assistance for well plugging activities.

Operator Certification

Missouri currently has 1,641 water systems that require a certified operator. In an effort to continually improve the operator certification compliance rate in the state, vouchers and pre-certification classes are offered to encourage training and certification. As a result, the number of systems without properly certified operators has dropped significantly from 378 systems, reported in fiscal year 2009, to 36 systems as of July 2017 (2.2 percent of all systems requiring a certified operator). To assist operators with training and certification fees, the department has a program that issues vouchers to approximately 1,500 community and nontransient noncommunity drinking water systems that serve populations of 3,300 or less. Vouchers can be used to pay for operator certification fees and eligible drinking water training fees. During the reporting period, a total of $767,980 worth of vouchers were processed, with 4,460 vouchers used for training and 1,236 vouchers used for certification fees.

The department's regional office staff provided 238 pre-certification and renewal hour classes over the reporting period to a total of 5,440 attendees. The department is partnering with the Missouri Department of Corrections to host a wastewater treatment multi-day pre-certification training course in an institution in the coming fiscal year. This may expand into a similar drinking water distribution course being offered. In addition, the department contracted with Missouri Rural Water Association (MRWA) to provide 15 single-day renewal hour classes and five multi-day precertification classes.



Number of pre-certification and renewal hour classes held by region.

Missouri Geological Survey

Improperly constructed and poorly sited water wells can result in unnecessary long term expenditures for a system and, in some cases, potential contamination of the aquifer. The department's branch staff coordinates with the Missouri Geological Survey (MGS) to ensure public water supply wells are designed and constructed in accordance with state standards. Often times, this is the first step in assisting a groundwater system in acquiring and maintaining TMF capacity. The process begins with the regional office performing a site survey for the proposed well location. The information collected during the survey is used by MGS staff to provide the system with well-specific construction details (i.e. estimated casing depth, estimated total

depth, estimated yield, grout setting time, geologic hazards, and isolation radius for potential contaminants) before any drilling cost are incurred. During the reporting period, MGS issued 85 estimated casing depth letters to community and nontransient noncommunity systems.

System Evaluation

Comprehensive Performance Evaluation
A Comprehensive Performance Evaluation is a thorough review and analysis of a water treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's performance. During the reporting period, three evaluations were performed. Two were performed in the cities of Lexington and Marceline, which use surface water treatment filtration systems. The other was performed at the city of Butler, which uses a surface water treatment membrane system. These evaluations resulted in improved documentation for operational procedures for surface water systems.

Area-Wide Optimization Program
The Area-Wide Optimization Program (AWOP) is designed to assist surface water systems working towards optimizing their existing treatment process in an effort to increase public health protection.

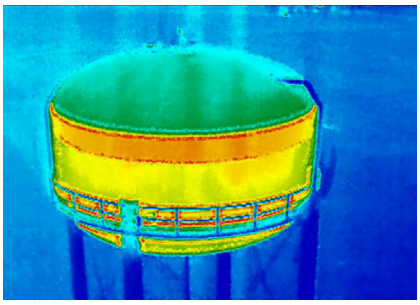
The goals of AWOP are to:
- Introduce the water systems to the program
- Encourage partnerships between the department and systems to resolve treatment issues that arise
- Increase communication between system operators and department engineers
- Develop guidance materials for system operators to assist with online monitoring equipment
- Conduct comprehensive performance evaluations of surface water systems to assist and promote resolution of current treatment issues

The department's branch staff has been visiting surface water systems since 2014 to introduce the AWOP concept and encourage operators to engage with the department's AWOP team. Since 2015, the AWOP team has focused on researching surface water system online monitoring equipment. AWOP visits were also used as an opportunity for regional office staff to expand their working knowledge of surface water systems, online monitoring equipment, and data integrity analysis. The AWOP team completed the data-gathering phase in 2017, visiting all 75 surface water systems across the state.

Water Storage Tank Inspections with an Unmanned Aircraft System
Water storage tanks are one of the most vulnerable areas of a water distribution system, with respect to keeping and maintaining sanitary conditions. The most vulnerable areas (hatches, vents, overflows) cannot be seen from the ground and are often inaccessible. Tanks can be dangerous to climb and many water systems do not have qualified or insured personnel to climb them. Also, state inspectors are prohibited from climbing towers and tanks. These finished water

storage facilities play an important role in protecting the distribution system, and ultimately public health, from contamination. The integrity of these facilities is of the utmost importance, however the cost and difficulty associated with conducting an inspection of an elevated storage tank can deter some water systems from performing their due diligence.

As a result, the department and University of Missouri – Columbia have developed a safe, low-cost aerial method for tank inspections. The method uses a small unmanned aircraft system to identify obvious sanitary defects without the risk of department personnel safety. To date, the University of Missouri has performed 27 flights and identified numerous potential sanitary defects, including unlocked hatches, damaged vent screens, problems with tank overflows, damaged electrical conduit and junction boxes, holes in the tank roof and improper hatch construction. These defects have the potential to allow insects, birds, bird droppings, rainwater or individuals into the tanks.



The aircraft is also equipped with an infrared camera. This camera is used to evaluate the tank's exterior coating and identify the presence of thermal stratification. If left untreated, water stratification can lead to bacterial issues within a system's finished water supply.

Although this technology has proven successful, it should not replace comprehensive internal and external inspection of water storage facilities on a regular basis by trained experts in the storage tank industry. The reason being, sanitary defects on the inside of a tank cannot be viewed without removing the shroud or opening the manway hatch.

Disinfection Byproducts

The department continues to contract with the University of Missouri – Columbia Research Center regarding the formation of disinfection by-products (DBPs) at small community water systems with Stage 2 compliance issues. The formation of disinfection by-products is complicated and specific to the characteristics of each raw water source, treatment plant configuration and overall water plant operational practices. During the reporting period, nine systems participated in the DBP monitoring and compliance study. Each system received a detailed engineering evaluation and recommendations.

The Missouri University of Science and Technology (Missouri S&T) continues to provide contracted services for the department, studying emerging water contaminants and disinfection byproducts. Missouri S&T has studied a cross section of Missouri systems (sources including rivers, lakes, deep consolidated wells, and shallow alluvial wells) for drinking water contaminant levels, including nanoparticles, cyanotoxins, perchlorate, pharmaceuticals and personal care

products, and nitrosamines. The levels monitored were used to establish the level of concern for each group of contaminants within our drinking water. The occurrence levels of the monitored contaminants were detected to be relatively low and of little concern. Missouri S&T has also researched possible alternative treatment options for systems identified by the department.

DBP compliance issues affect both primary and consecutive systems. In 2017, in an effort to assist consecutive systems experiencing DBP compliance issues, the department arranged for mediation meetings between primary and consecutive systems. The mediation meetings provided an opportunity for primary and consecutive systems to discuss DBP-related issues and collaborate on potential solutions

Primary public water system: *A public water system that obtains its source of water directly from a well, infiltration gallery, lake, reservoir, river, spring, or stream.*

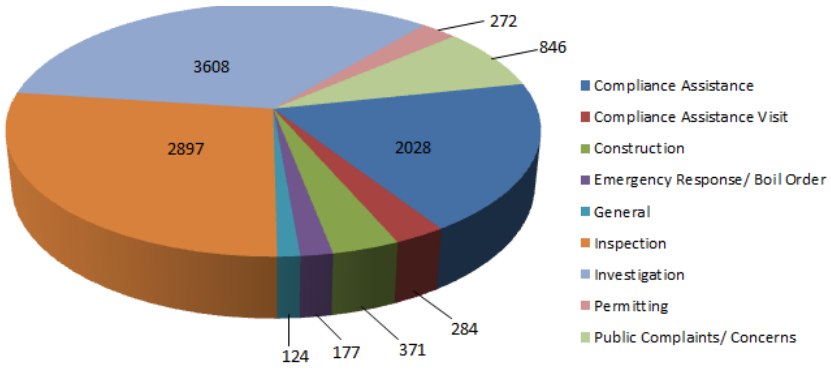
Consecutive system: *A public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution systems of one or more consecutive systems.*

Regional Office

The department's regional office personnel provide assistance to regulated systems to help them achieve and maintain compliance with applicable laws and regulations. Regional office efforts include assistance with permitting, monitoring, record keeping, and reporting. In addition, regional office personnel provide recommendations on system operations and potential cost saving measures. Most importantly, systems are encouraged to ask questions increasing communication and transparency between the regional office and regulated party.

To ensure consistency among inspections and investigations across regions, trainings are provided to staff in the form of case studies, field inspections, and engineering level inspections. A total of five cross-training inspection exercises were held within the last three years, with 74 department staff attending. Typically, this process includes staff accompanying an experienced inspector from their region as well as participating in at least one inspection with an experienced inspector from another region.

Total Number of Efforts Fiscal Year 2015-2017



In addition to cross-training events, the department periodically holds in-depth technical trainings for department staff. During the past three years, the department held three backflow prevention trainings and two ultraviolet disinfection trainings. The backflow prevention trainings

focused on prevention devices and regulatory requirements. The ultraviolet disinfection trainings provided department staff with an opportunity to learn about the technological advancements being implemented in Missouri.

Bradley Ledbetter, *the Drinking Water Unit Chief for the Southeast Regional Office (SERO), was the department's May 2017 Employee of the Month. Ledbetter was nominated for his outstanding customer service responding to lead contaminated drinking water at a public drinking water system near Potosi in Washington County.*

Under Ledbetter's leadership, the regional office provided support to the public water system and its customers by taking additional samples, giving technical support and keeping citizens updated on the progress. Ledbetter and his staff worked nights delivering informational flyers and updates to the citizens affected by the dangers of the contamination.

"The Department of Natural Resources is only able to achieve its mission through the high level of service put forth by Mr. Ledbetter and other dedicated employees," concluded Jackson Bostic, SERO regional director.

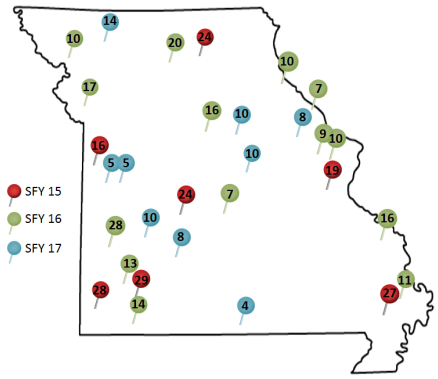
Compliance Assistance and Enforcement

As the primacy agency in Missouri, the department has been delegated by the EPA the primary enforcement responsibility for enforcing the requirements of the Safe Drinking Water Act. The department identifies all violations and works through informal assistance to resolve violations and return the system to compliance. When a system is found to be in significant noncompliance, the department is responsible to assist them with returning to compliance quickly. If compliance cannot be achieved through assistance efforts, a formal action may be necessary. Of the significant non-compliers, 62 percent were returned to compliance through informal assistance efforts, including technical assistance and bilateral compliance agreements. The department has achieved over a 90 percent success rate in avoiding formal enforcement actions with the use of bilateral compliance agreements. Other enforcement tools are used in the few instances where significant violations persist despite efforts to resolve them.

The department partnered with the Midwest Assistance Program (MAP) in FY17 under the EPA Training and Technical Assistance Grant to assist systems which had four or more outstanding public notice violations. A total of 109 public notice violations were resolved from 21 systems. By partnering with MAP, 3 systems in significant noncompliance were resolved.

Water Management Training Contract

The department contracted with Missouri Rural Water Association to provide water management training workshops to system decision makers, including board and council members. The workshops are designed to improve decision-maker knowledge and involvement in drinking water system management and operations. Workshop topics include water system regulations, board member roles and responsibilities, asset management, utility rates, and project financing. During the reporting period, MRWA conducted 30 water management training workshops, reaching 429 decision-makers representing 160 systems (approximately10 percent of community and nontransient noncommunity systems).



Location of water management training workshops across the state

Circuit Rider Contract

The department contracted with MRWA to provide technical experts, also known as circuit riders, to assist water systems. Assistance efforts during the reporting period included: water loss, rate setting, operator certification training, planning, and compliance assistance. During the reporting period, circuit riders provided 1,338 assistance efforts to 616 systems, which is more than 35 percent of Missouri's community and nontransient noncommunity systems. It should be noted that each assistance visit often addresses multiple topics.

In the last three fiscal years, 152 systems received rate assistance. Rate assistance helps water utility personnel and management understand the necessity of rate adjustment in order to ensure revenues cover the expenditures of the system. Systems assisted with rate studies are also advised on budgeting, asset inventory and management, and strategic planning. Circuit riders have also presented the rate findings to system board and councils upon request by the system.

Due to the high level of system interest and request for leak detection, the department provided more water loss and leak detection efforts than any other circuit rider assistance type. Water loss and leak detection visits help systems identify nonrevenue water, including real or physical losses of water as well as apparent losses (water consumed but not accounted for). Identifying and reducing nonrevenue water is a major component to achieving and maintaining TMF capacity. During the reporting period, circuit rider efforts identified 195 water leaks with an estimated total loss of 63 million gallons per month of nonrevenue treated drinking water.

Missouri's water loss efforts have been recognized at the national level, as the EPA requested Missouri's Capacity Development Coordinator, Danielle West, to present the state's leak detection program on a national webinar January 24, 2017.

In 2016, 89 percent of leaks located were repaired, which was a drastic increase from 35 percent reported in 2015. This increase is most likely due to the urgent nature of the leaks detected as well as an increased effort by circuit riders to follow-up with each system having received a water loss and leak detection visit.

Estimated Monthly Revenue Gained by Leak Location and Repair Efforts

The circuit riders also provided systems assistance during the historic flooding event, which swept Missouri in early May 2017. A total of five assistance visits were provided by circuit riders during this emergency and included water loss and leak detection, main location and repair, and restoration of water supply.

Technical Assistance Providers

The department has partnered with external technical assistance providers under the EPA Training and Technical Assistance for Small Systems Grant to determine priority topics for trainings on technical assistance programs.

The department partnered with MAP to assist systems in achieving and maintaining compliance with the Safe Drinking Water Act. As a result, in 2017, MAP assisted 21 systems in resolving 109 public notice violations. In addition, MAP also provided compliance assistance, operations and maintenance development, asset management, funding, and construction authorization assistance to four water systems in Missouri. Finally, MAP partnered with the American Water Works Association to provide a workshop for small system compliance.

The department partnered with the Environmental Financial Center (EFC) to perform two technical assistance projects. One project worked with 745 rural communities on assessing Missouri's water infrastructure and sustainability affordability. The other project is ongoing and involves assisting a small, rural water system in creating a capital improvement plan. The EFC has also provided workshops annually for the past three years to 65 attendees covering small water system rates and financing, leadership through decision making and communication, and asset management.

MRWA has provided both technical assistance to water systems and training workshops. In the last year, MRWA performed 35 technical assistance visits to 25 systems to assist with disinfection byproducts, jar testing, groundwater treatment, violations, distribution water quality, and treatment (including issues due to flooding). MRWA also provided 60 workshops to 1,041 attendees covering a wide range of drinking water topics: reducing disinfection byproducts, regulations update, chemical applications, optimizing chloramine treatment, fluoridation, control

valves, high-density polyethylene fusion, hydrant maintenance and pipeline repair, managing water system assets, effective utility management, sustainable management for rural and small systems, operator virtual toolbox, and water math refresher.

Continued and Future Strategy Implementation

In accordance with section 1420(c) of the Safe Drinking Water Act, the department will continue to implement the state's capacity development strategy. Future implementation of the strategy will focus on compliance assistance as it pertains to technical, managerial, and financial capacity. In doing so, the department will enhance internal and external knowledge of drinking water regulations and capacity development assistance efforts. The department will continue to pursue mechanisms to enhance the state's implementation of the strategy, reduce compliance related issues, and improve customer satisfaction.