

**Michigan Department of Environmental Quality
Drinking Water and Municipal Assistance Division**

CAPACITY DEVELOPMENT REPORT TO THE GOVERNOR 2017

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Executive Summary

The 1996 Amendments to the federal Safe Drinking Water Act (SDWA) added provisions for each state to develop a Capacity Development Program (CDP). The objective of the CDP is to enhance public health protection by helping water systems develop and maintain the capability, or capacity, they need to deliver a safe, reliable, and adequate supply of drinking water to all customers. Capacity has three components:

- Technical – Physical infrastructure and operational ability
- Managerial – Personnel expertise and institutional and administrative capabilities
- Financial – Monetary resources

The purpose of this document is to report to Governor Rick Snyder the effectiveness of Michigan's capacity development strategy as managed by the Michigan Department of Environmental Quality (MDEQ) for the 2014-2016 time period. Each state risks losing 20 percent of the annual Drinking Water Revolving Fund (DWRF) allotment if it does not submit a report to its Governor by September 30 of every third year or does not make the report available to the public under Section 1420(c)(3) of the SDWA.

Many capacity development-related activities have been conducted and incorporated into Michigan's drinking water program since its inception in 1913 and later integrated into the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399). In addition to establishing health-based standards, Act 399 also includes requirements for water well isolation, system reliability, operator certification, standards of construction, and system planning. As a result, the strategy to help systems maintain technical, managerial, and financial (TMF) capacity is a reflection of our long-standing tradition of technical assistance, with the recent addition of a capacity assessment component.

With few exceptions, the strategy is effective. New public water systems are demonstrating adequate capacity before they begin serving water to the public, and existing systems are continuing to enhance and maintain capacity. A strong emphasis on assistance has moved systems toward enhanced capacity.

Systems with adequate TMF capacity are able to maintain high rates of compliance with health-based standards. Additionally, systems use a multibarrier approach to providing safe water to the public, which begins with securing a safe source, such as groundwater from a confined aquifer, and then protecting that source from contamination. The multibarrier approach continues with proper construction of water wells, pumps, treatment plants, and distribution systems. Finally, well-trained, certified operators perform proper oversight (operation and maintenance) and conduct routine monitoring to ensure that these multiple barriers continue to function.

Systems are also taking advantage of programs to enhance their TMF capacity. These programs help systems stay in compliance with existing requirements, prepare systems to comply with upcoming requirements, and help operators and local officials better manage their systems. These programs include:

- DWRF: The 1996 Amendments to the SDWA provide low-interest loans for repairs or enhancements to help water systems comply with the SDWA. To date, the DWRF has

committed over \$949 million in low-interest loans for 288 projects to construct, upgrade, and replace infrastructure.

- Relationship with MDEQ District staff: Water system operators maintain a relationship with district staff who are the primary contact with water systems for capacity development. A prime objective of the district staff is to provide excellent customer service, from the construction permit process through regulatory oversight, and continual assessment and assistance for the duration of a system's operation.
- Source Water Protection: More systems are taking steps to protect their drinking water sources.
 - Federal funding for Wellhead Protection Programs (WHPP) is available through the DWRP for systems using groundwater. Under the sponsorship of the MDEQ, Michigan State University's Department of Civil and Environmental Engineering recently developed an innovative modeling tool for mapping Michigan's Wellhead Protection Areas (WHPA). The Michigan Groundwater Management Tool (MGMT) makes systematic and intelligent use of statewide groundwater-related data to develop a WHPA. The MDEQ uses the MGMT to delineate WHPAs at no cost. Before the MGMT, the cost for producing a traditional WHPA was an average of \$36,000 to the public water system. The MGMT has provided nearly 2,600 provisional WHPAs in the state.
 - Beginning in Fiscal Year (FY) 2015, the MDEQ also provides a surface water intake protection grant to assist in the development and implementation of a plan to protect surface water sources used for public drinking water.
- Operator Certification and Training: Act 399 requires a certified operator to be available at all community and nontransient noncommunity water systems. These operators must maintain their certification by earning continuing education credits. As a result, new training courses are developed based on operator feedback and district staff input and in response to new regulations with which water systems must comply.
- Asset Management: In an effort to ensure water supplies are effectively planning for long-term needs, new rules were promulgated requiring community water supplies (CWS) serving more than 1,000 people to implement an asset management plan by January 1, 2018. Plans must include an inventory of assets, level of service goals, capital improvement plans identifying 5- and 20-year needs, and other information.
- Other programs available to systems include financial assessments and technical assistance provider services.

New regulations continue to challenge water systems. The United States Environmental Protection Agency (USEPA) promulgated regulations to expand requirements on systems that disinfect. The Stage 2 Disinfection Byproducts Rule builds on existing rules and requires systems to further evaluate their distribution systems. Systems were required to identify locations with high disinfection byproduct concentrations and sample these sites to determine compliance at each location. For the first time, many consecutive systems were required to monitor disinfection byproducts.

The Revised Total Coliform Rule (RTCR), which took effect in 2016, requires all public water systems vulnerable to microbial contamination to identify and fix problems through an

assessment and corrective action process. Even before the RTCR took effect, a find and fix approach was routinely employed by the MDEQ and local health departments (LHD); however the RTCR further mandates these efforts. The RTCR also establishes more stringent criteria for noncommunity water systems (NCWS) to qualify for and stay on reduced monitoring, which may provide an incentive for improved water system operation.

The impact of the RTCR on resources is most significant to Michigan's NCWS Program. There are approximately 9,500 NCWSs in Michigan. Among the 50 states, Michigan and Wisconsin have the largest number of NCWSs in the country. Michigan's NCWS Program is administered by LHDs under contract with the MDEQ. All of the LHDs have seen increased workload demands under the RTCR without additional financial compensation for the work.

The continuing endeavors of water systems to maintain TMF capacity will help them meet the challenges of these new regulations. This report is available on the MDEQ's Website at <http://www.michigan.gov/drinkingwater>, at the DWMAD's district offices, and to the public in paper format, on request.

List of Acronyms

ABE	Advisory Board of Examiners
ACO	Administrative Consent Order
Act 399	Michigan Safe Drinking Water Act, 1976 PA 399, as amended
ARRA	American Recovery and Reinvestment Act of 2009
AWWA	American Water Works Association
CCR	Consumer Confidence Reports
CDP	Capacity Development Program
CWS	Community Water Systems
DWMAD	Drinking Water and Municipal Assistance Division
DWRF	Drinking Water Revolving Fund
ERP	Emergency Response Plan
FAP	Financial Action Plan
FY	Fiscal Year
LHD	Local Health Departments
MDEQ	Michigan Department of Environmental Quality
MGMT	Michigan Groundwater Management Tool
MOR	Monthly Operation Reports
NCWS	Noncommunity Water Systems
NTNCWS	Nontransient Noncommunity Water Systems
OTCP	Operator Training and Certification Program
RCAP	Rural Community Assistance Program
RTCR	Revised Total Coliform Rule
SDWA	Federal Safe Drinking Water Act
SME	Subject Matter Experts
SWIPP	Surface Water Intake Protection Program
SWPP	Source Water Protection Program
TMF	Technical, Managerial, and Financial
TNCWS	Transient Noncommunity Water Systems
USEPA	United States Environmental Protection Agency
WHPA	Wellhead Protection Area
WHPP	Wellhead Protection Program

1.0 Introduction

This report examines the effectiveness of the strategy, progress toward improving capacity, and tools used to help improve capacity.

1.1 Capacity Development Program (CDP) Overview

Water system capacity is the ability to plan for, achieve, and maintain compliance with drinking water requirements. Capacity has three components:

- Technical – Physical infrastructure and operational ability
- Managerial – Personnel expertise and institutional and administrative capabilities
- Financial – Monetary resources

Michigan's capacity development strategy is to help community water systems (CWS) and noncommunity water systems (NCWS) achieve and maintain technical, managerial, and financial (TMF) capacity by adding a capacity assessment component to the Public Water System Supervision Program. The strategy is an ongoing process to:

- Assess systems' capacity or "capability."
- Prioritize systems most in need of assistance.
- Determine the best means of assistance.
- Provide assistance or refer systems to other capacity assistance or technical assistance providers.
- Measure improvements in TMF capacity during subsequent assessments.

The CDP is implemented by the MDEQ, Drinking Water and Municipal Assistance Division (DWMAD), through amendments to the Michigan Safe Drinking Water Act, 1976 PA 399, as amended (Act 399); by application of CDP policies and guidance documents; and through cooperation and/or partnerships with other agencies.

The CDP focuses on both new systems and existing systems. The new systems program ensures systems have sufficient capacity prior to commencing operation, and the existing systems program works to achieve, maintain, and enhance capacity. These two programs are detailed in two documents and were approved by the USEPA in 2000.

1.1.1 New Systems

New Community Water System Capacity Guideline Document, May 1, 2000. New systems must demonstrate TMF capacity before serving water to the public. The new systems program relies on two control points: construction permits and final inspection. Generally, a construction permit is issued based on the technical capacity of the proposed system. For CWS, the financial and managerial capacity requirements may still be pending while the system is under construction. Approval to commence operation is only granted after a final inspection when the CWS has demonstrated capacity in all three areas.

For nontransient noncommunity water systems (NTNCWS), the DWMAD has delegated the authority to the local health departments (LHD) to review, approve, and issue construction permits. When these water systems begin the permit application process, the LHD helps them outline their financial and managerial capacity. Prior to receiving approval to commence operation, the NTNCWS must submit a financial plan and a managerial plan that includes an emergency response plan and designation of a certified operator.

1.1.2 Existing Systems

Capacity Development Strategy for Existing Public Water Systems, August 1, 2000. The existing system strategy relies primarily on the capacity assistance component of the drinking water program, which the DWMAD has traditionally referred to as technical assistance. Through routine system evaluations, also known as sanitary surveys or capacity assessments, DWMAD staff identify which systems need capacity assistance and prioritize assistance subject to available resources. The DWMAD will not request a financial capacity assessment of an existing water system unless violations, deficiencies, or other factors indicate the system lacks technical or managerial capacity. For CWS, capacity assistance is provided through DWMAD staff or through other technical assistance providers to help communities build TMF capacity. For NCWS, the DWMAD delegated the authority to the LHD to assess capacity and to provide assistance. If capacity assistance is not accepted or effective, Michigan practices a program of progressive enforcement.

1.2 Involved Parties

The CDP encompasses the efforts of water systems, the MDEQ, technical assistance providers, and other organizations and agencies that affect the capabilities of water systems including:

- MDEQ, DWMAD, Community Water Supply Section
- MDEQ, DWMAD, Revolving Loan Section
- MDEQ, DWMAD, Environmental Health Section
- MDEQ, DWMAD, Enforcement Staff
- LHDs
- Michigan Finance Authority
- Technical Assistance Providers such as:
 - Michigan Section, American Water Works Association (AWWA)
 - Michigan Rural Water Association
 - Rural Community Assistance Program (RCAP)
 - United States Department of Agriculture, Rural Development, Rural Utilities Service

2.0 Effectiveness of the Capacity Development Strategy

Many capacity development-related activities have been conducted and incorporated into Michigan's drinking water program since its inception in 1913 and later integrated into Act 399. In addition to establishing health-based standards, Act 399 also includes requirements for well isolation, system reliability, operator certification, standards of construction, and system planning. As a result, the strategy to help systems maintain TMF capacity is a reflection of our long-standing tradition of technical assistance, with the recent addition of a capacity assessment component.

With few exceptions, the strategy is effective. New public water systems are demonstrating adequate capacity before they begin serving water to the public, and existing systems are continuing to enhance and maintain capacity. A strong emphasis on capacity assistance has moved systems toward enhanced capacity.

2.1 New Systems

New systems must demonstrate TMF capacity before serving water to the public. As a result, they are better able to remain in compliance with health-based standards and monitoring requirements. When violations occur, they are usually minor monitoring violations. District staff report that new systems that have complied with capacity development requirements are well developed from start-up and perform at a higher level than some older systems. These new systems use modern technology, competent engineering support, and acceptable management. Prior to a formalized CDP, district staff only required adequate technical capacity before a construction permit was issued.

2.1.1 Community Water Systems (CWS)

Proposed CWS are primarily new residential developments such as subdivisions, apartment complexes, and elderly care facilities. District staff interacts with developers and their engineering consultant to complete the capacity assessments before approval is granted to serve water to the public. Most developers who phase their projects understand that it is more cost effective to install a system meeting CWS requirements at the beginning of the project instead of upgrading the water system when they expand. In addition to the traditional technical assessment, these new CWS must complete financial and managerial assessments. The financial capacity assessment requires some thought about future operations and costs. The managerial capacity assessment requires an operations plan, a certified operator, and a sampling site plan, as well as other plans, to ensure the system has adequate managerial oversight and organization before commencing operation.

A system that simply increases the number of customers without having to alter or construct water system infrastructure is not considered a new system. However, the following existing systems are considered new and are subject to capacity development policies:

- Systems that did not meet the definition of a CWS at start-up, but are designed to one day meet the definition.
- Systems that are not currently a CWS, but propose to extend the water system to serve additional customers, thereby growing to become a CWS. These systems are usually privately-owned, residential subdivisions that were previously exempt from CWS requirements due to their small size.

Many times, a new developer begins to expand a subdivision or the original developer returns to complete a final phase after many years. These systems pose the greatest challenge because they often expand before fully complying with capacity development requirements and because the control point of a final inspection before commencing operation no longer exists.

2.1.2 Nontransient Noncommunity Water Systems (NTNCWS)

Due to the financial and managerial capacity requirements now placed on new NTNCWS, these systems have a qualified operator and a higher level of awareness of the responsibilities of supplying water to the public. These systems begin operation with an emergency response plan already in place—a valuable tool during emergencies.

2.2 Existing Systems

Existing systems are achieving and maintaining TMF capacity as demonstrated by their compliance, as discussed in section 3.1, and their efforts to manage their systems effectively with qualified and educated staff to meet the needs of their customers. Compliance rates are a result of several factors, including:

- District staff interaction with systems.
- Financial assistance in the form of loans and grants.
- Financial management assistance.
- Source water protection and water system security programs.
- Operator training and certification.
- Compliance and enforcement interaction via letters, phone calls, site visits, and administrative fines.
- Support of Websites for MDEQ district staff, LHDs, and water systems.
- Policy updates, guides, fact sheets, templates, and forms provided to district staff, LHDs, and systems.

Many of these factors will be discussed in Section 4.

3.0 Progress Toward Improving TMF Capacity

Systems with adequate TMF capacity maintain high rates of compliance with health-based standards, monitoring, reporting, and other capacity requirements, which is one measure of success of the CDP. A multibarrier approach to providing safe water is more difficult to measure, but it is an integral part of ensuring water systems have sufficient TMF capacity. Through the construction permit and sanitary survey process, district staff helps to ensure systems obtain a safe source and continue to provide safe drinking water.

3.1 Compliance Rates

Comparing compliance data from one year to the next is difficult because of the rapidly increasing number and complexity of rules and requirements each year. With new regulations

that have had a disproportionate impact on small systems, the number of systems in compliance may not tell the true story of improved capacity.

Small systems make up the majority of systems in Michigan as well as the majority of systems in noncompliance. However, the majority of the population served by CWS is supplied by larger systems that generally comply with requirements. To put compliance data into perspective, it may be useful to compare the percent of population served by CWS that are in compliance with health-based standards and monitoring and reporting requirements.

The following table summarizes compliance in Michigan with health-based drinking water standards and with monitoring and reporting requirements compared to the goals shared with the USEPA for calendar years (CY) 2014 to 2016:

Compliance with Health-Based Standards	<i>Goal</i>	<i>CY 2014</i>	<i>CY 2015</i>	<i>CY 2016</i>
Percent of people served by CWS meeting all health-based standards	95	99.2	97.7	98.9
Percent of NTNCWS meeting all health-based standards	95	95.5	97.0	98.6
Percent of Transient NCWS (TNCWS) meeting all health-based standards	95	97.7	97.1	99.7
Compliance with Monitoring and Reporting Requirements	<i>Goal</i>			
Percent of people served by CWS without significant violations ¹	95	95.4	92.6	91.7
Percent of CWS without significant violations	90	93.4	86.3	85.8
Percent of NTNCWS without significant violations for acute health risks ²	95	94.8	94.5	96.8
Percent of NTNCWS without significant violations for chronic health risks	90	94.6	85.9	85.3

¹ Significant monitoring violations are generally defined as any major monitoring violation. A major monitoring violation, with rare exceptions, occurs when no samples were taken or no results were reported.

² Acute health risks mean those contaminants that have serious adverse effects on human health as a result of short-term exposure.

Compliance with health-based standards remains high. However, there was a decrease in the percent of systems without monitoring violations during FYs 2015 and 2016. This decrease is due in part to new and expanded monitoring requirements, including the Stage 2 Disinfection and Disinfection Byproducts Rule and the Revised Total Coliform Rule. Expanded requirements mean more opportunities for violations to occur. As water supplies adjust to new regulations, a decrease in violations is expected.

Compliance with monitoring requirements is considered a measure of success. However, the failure to collect a sample is not necessarily a direct public health threat because Michigan's drinking water program does not automatically assume the absence of a sample creates a public health threat, as discussed in the following section. A missed sample from a properly constructed water system having a satisfactory history of safe samples is a concern, but not a direct threat to public health.

3.2 *Multibarrier Approach*

The multibarrier approach to providing safe drinking water begins with securing a safe source, such as a confined aquifer, and protecting that source from contamination. It continues with proper construction of water wells, pumps, treatment plants, and distribution systems. Proper oversight and monitoring by trained personnel provides confirmation that the multiple barriers are functioning and the integrity of the water system is maintained.

Act 399 provides public health protection through requirements on construction of wells, surface water intakes, treatment facilities, and distribution systems. Construction permits require an engineering review and a sound basis of design that incorporates reliability and redundancy. Some aspects of management and operations are also regulated. A cross connection control program must be developed and implemented to eliminate and prevent potential pathways for contaminants to enter the water system. A system must also conduct a study of water supply requirements and update it every five years. A general plan, or layout and description of the water system and its service area, must be submitted. This plan now requires systems which intend to provide fire protection to include a hydraulic analysis showing pressures under peak demands; an inventory of main size, material, and age; and maps showing existing and future boundaries. Finally, an emergency response plan (ERP) must be developed. These long-standing requirements are key to achieving and maintaining capacity. Compliance with these requirements is part of the continual sanitary survey or evaluation process by district staff.

The DWMAD is encouraging systems, particularly new systems, to consider both short- and long-term needs and expected growth as they determine their water capacity requirements and develop their general plans and ERPs. Beginning in January 2016, all municipal systems were required to complete 5- and 20-year capital improvement plans. This asset management approach is expected to enhance their capacity to manage their assets at the lowest possible cost.

The 1996 amendments to the SDWA required states to assess all source waters used for drinking water. All of Michigan's nearly 18,000 sources were assessed in 2003 to identify areas that supply public drinking water, to evaluate the susceptibility of those water systems to contamination, and to inform the public of the results. After the heavy investment in the assessment process, efforts have been made to move from assessment to protection. Water systems are encouraged to protect their sources through voluntary programs discussed in section 4, Tools Used to Improve TMF Capacity.

Finally, oversight of the water system by qualified operators helps to ensure all the elements of the waterworks system are functioning. Each CWS and NTNCWS, and certain TNCWS, must be under the responsible charge of an operator certified by the MDEQ. Larger systems are also required to designate a certified backup operator. Certification is renewable through continued education credits obtained through training approved by the MDEQ.

4.0 Tools Used to Improve TMF Capacity

This section discusses some of the tools used to enhance system TMF capacity, achieve and maintain compliance with requirements, prepare for new regulations, and better manage water systems.

4.1 Drinking Water Revolving Fund (DWRF)

The 1996 amendments to the federal Safe Drinking Water Act (SDWA) authorized the creation of a revolving fund to provide low-interest loans for repairs or enhancements to help water systems comply with the SDWA. This fund is similar to the State Revolving Fund created to assist water pollution control projects. Many of the capacity development provisions of the SDWA are funded through the DWRF allotment.

Prior to the creation of the DWRF, project financing for CWS was left largely to the local unit of government or to individuals investing in their own systems. The DWRF provides a source of infrastructure financing. To date, the DWRF has committed over \$949 million in low-interest

loans for 288 infrastructure projects. Of the 288 projects with committed funds, 260 have been completed, and the loan payments are revolving back into the fund. Some systems receive commitments from the DWRF, but may not be ready to proceed with the project until they are able to assure the revenues will be generated to repay the loan. In these cases, the system remains on the priority list for the next year.

The American Recovery and Reinvestment Act of 2009 (ARRA) was signed into law on February 17, 2009. Included in the ARRA was an additional \$2 billion in capitalization for DWRF administered by the states, of which Michigan received \$67,454,000. These funds provided Michigan with the ability to tender more loans through the DWRF and provided additional subsidy (principal forgiveness for 40 percent of a project's cost). To date, 26 of the 28 ARRA-funded projects have been completed.

The following table summarizes the loan commitments for FY 2014 to FY 2016:

DWRF Loan Commitments by FY			
	2014	2015	2016
Number of Projects Committed	13	12	7
Commitments of Funds (\$M)	\$51.06	\$48.41	\$35.89
Number of Green Qualifying Projects	6	7	7

Commitments include projects to increase systems' capacity to reliably provide an adequate supply of water. Many of the projects involve replacing aging distribution infrastructure. For example:

- The city of Pontiac (Oakland County) was awarded DWRF funding to install and replace over 11,000 residential water meters and upgrade to an advanced metering infrastructure reading system. These upgrades will result in more accurate and efficient meters that will save the system money and time.
- The village of Northport is using DWRF funds for system-wide improvements including a new production well; replacement of aging, unreliable water main prone to breaks and leakage; and upgrading system controls with a new System Control and Data Acquisition (SCADA) connection.
- The village of Benzonia is undergoing a project to replace an aging well with a new production well; cleaning and recoating the village's water storage tank; water main improvements to aid reliability; and improved system operation through installation of a web-based SCADA server.
- The Great Lakes Water Authority and the city of Detroit are using funds to conduct extensive water main upgrades due to old age and disrepair.

Michigan's drinking water program relies heavily on proper water system design and construction to prevent jeopardizing the safety of both the source and finished water. To that end, priority of DWRF projects favors communities that are participating in a Source Water Protection Program (SWPP), which is discussed in section 4.4.

4.2 District and Local Health Department (LHD) Staff

Water system operators develop a relationship with district staff who are the primary contact for capacity development. The CWS are served by DWMAD staff in one of eight district offices, and NCWS are served by staff from one of 44 LHDs under contract with the DWMAD. A primary objective of district staff is to provide excellent customer service from the construction permit process for new infrastructure through the continual assessment and oversight process during operation.

Assistance or consultation during site visits has been the preferred method to maintain system compliance. District staff serve as both capacity assistance providers as well as regulators. When assistance is not accepted or effective, staff initiate enforcement actions.

Capacity of systems is assessed through the sanitary survey process. District staff detail their findings and recommendations in a letter to the system, which may include a list of items to address and deadlines to meet. Options for capacity assistance may also be offered, such as contacting a technical assistance provider. Sanitary survey letters help systems understand the severity of the deficiencies and importance of acting on the recommendations. For CWS, the sanitary survey includes an overall evaluation to indicate no deficiencies, minimal deficiencies, or significant deficiencies exist.

The following table summarizes sanitary surveys, visits, and timeliness of construction permits issued for CWS:

CWS Sanitary Surveys, Visits, and Construction Permits			
	FY 2014	FY 2015	FY 2016
Number of Sanitary Surveys Conducted	476	451	376
Percent with no deficiencies	56	61	60
Percent with minimal deficiencies	44	38	39
Percent with significant deficiencies	1	1	1
Number of Visits	1745	1852	1708
Number of Construction Permits Issued	888	931	1043
Average number of days to issue water main construction permits	10.0	10.7	13.7

The data reflect the following:

- The number of CWS sanitary surveys completed during FY 2016 decreased slightly due to significant staff turnover and re-training.
- The number of CWS construction permits has increased as the economy recovers from the economic recession.
- While the number of days for water main permit issuance remains low, there was a slight increase in FY 2016. This increase is likely due to both the increase in permit applications and significant staff turnover and re-training.

Deficient systems receive priority for assistance. Ratings are based on compliance with health-based standards, monitoring requirements, qualified operator requirements, and requirements in Act 399 for TMF sufficiency, such as well construction, general and emergency response plans, and financial requirements for privately-owned systems.

Two DWMAD policies and procedures help district staff effectively use sanitary surveys and address water system deficiencies. The sanitary survey policy confirms the requirements for surveys to be conducted every three years; however, a reduced survey frequency may apply if certain criteria are met. In addition, surveys may be performed more frequently if significant deficiencies exist or corrective action is necessary. The significant deficiency policy was developed to help staff identify a significant deficiency and set forth steps to resolve the deficiencies. These policies help staff provide greater oversight to those deficiencies and also help CWS return to compliance or obtain an improved rating in the next survey.

Staff have found that a one-time capacity assistance meeting is often sufficient to keep systems in compliance. In other situations, the district engineer spends more time with the system operators to help solve more complicated concerns or refers the system to other capacity assistance providers. At times, water system operators want to comply, but lack the financial resources or support from community leaders to make necessary changes. When capacity assistance is met with resistance, enforcement notices are used to outline the consequences of failing to correct deficiencies. These letters may offer one more opportunity to meet with staff to arrive at a mutually agreed upon compliance schedule.

In some cases, district staff may meet with community leaders or attend municipal meetings to discuss the benefits of agreeing to a course of action with a compliance schedule that allows them time to address their problems without further enforcement or penalties.

System operators and managers have many other opportunities to interact with district staff outside the capacity assessment arena. District staff attend, participate, and present at periodic regional operator meetings to discuss upcoming regulations and regional issues and to network with operators and managers. District staff also serve as instructors at operator training workshops, serve as subject matter experts (SME) for operator certification examinations, and present training at professional meetings. When a system begins to develop a project plan to apply for a DWRP loan, district staff consult with the system and work with its consulting engineer to ensure the project plan addresses system priorities.

As previously mentioned, oversight of NCWS is provided by 44 LHDs under contract with the DWMAD. The NCWS staff maintains communication with each of the 44 LHDs during the year. This communication occurs during the formal quarterly reviews and annual evaluations of each of the 44 LHD's work in achieving and maintaining water system compliance. Training of LHD staff is conducted extensively during these visits to inform, explain, and discuss new and updated program issues and procedures. NCWS staff also hosts an annual two-day LHD conference/training event, attended by nearly all LHDs. The NCWS staff periodically updates a handbook for LHDs and distributes it to LHD staff. This handbook includes policies, procedures, guidance, templates, and forms to implement the drinking water program. The NCWS staff also presents topics at groundwater, other environmental health conferences, and training webinars.

4.3 Financial Assessments

Both new and existing systems have opportunities to achieve and maintain financial capacity. Financial capacity assessments are not required of existing systems unless serious deficiencies in technical or managerial capacity exist. However, voluntary participation in financial assessments continued.

4.3.1 New Systems

New systems must demonstrate financial capacity before serving water to the public. In the NCWS Program, the system may receive help from the LHD during the permit application process to develop a financial plan. They must submit a financial plan, including a budget, to the LHD in order to receive approval to commence operation. In the CWS Program, systems submit their financial plan and supporting documents to the MDEQ for review and approval during the construction permit stage. Systems may complete their financial plan during the construction phase of the water system, but must receive approval prior to the final inspection to commence operation of the water system.

4.3.2 Existing Systems

To help existing CWS improve financial capacity, the DWMAD conducted financial assessments of systems that serve a population of less than 10,000 that could benefit from and agreed to an assessment. An analyst in the DWMAD revolving loan program assesses the selected communities' existing financial health and develops Financial Action Plans (FAP). The assessment is a review of financial documents and an on-site meeting with system representatives. An FAP is a tailor-made comprehensive plan to strengthen the system's financial situation based on the assessment. Short- and long-range goals are identified in the FAP followed by a step-by-step process to reach the goals. Useful tools to help complete the steps are included with the FAP, such as a sample water use and rate ordinance and a service agreement checklist. The assessment is not designed to provide funding; however, financing options are discussed at the on-site meeting. Further information on obtaining funding is provided with the FAP, such as forms to help apply to the DWRF. The system is expected to carry out the FAP, and the DWMAD is available to assist when requested. The FAP is intended to also be a guide for district staff. An outline of a typical assessment report is included in the Appendix. From FY 2014 to FY 2016, seven CWS underwent financial assessments.

Another tool to help systems with financial and managerial capacity through asset management is the *Check Up Program for Small Systems*. This no-cost software program released by the USEPA can help small systems develop an asset management plan.

4.4 Source Protection

Systems are continuing to take steps to protect their drinking water sources. The SDWA established rules for funding Wellhead Protection Programs (WHPP) and Surface Water Intake Protection Programs (SWIPP) through the DWRF. The SDWA did not provide funding specifically for implementation of SWIPPs for surface water sources. Authority has been obtained to provide grants for communities to protect their surface water intake areas through the DWRF capacity development set aside funds, which is later described in section 4.4.2.

4.4.1 Source Water Assessments to Protection

The SDWA required that all of Michigan's 18,000 CWS and NCWS drinking water sources be assessed in 2003. Potential sources of contamination were inventoried, and susceptibility to contamination was determined by the combined efforts of the DWMAD and local, state, and national agencies. A project to update the CWS assessments is underway. The NCWS and LHD staff, which oversee these systems, have been provided a self-assessment form to identify risks to their source water and identify actions they can take to reduce those risks.

4.4.2 Source Water Protection Program (SWPP)

A Wellhead Protection Program (WHPP) is a SWPP for water systems that rely on water wells and it assists communities in protecting their groundwater sources. A goal of a WHPP is to minimize the potential for contamination by identifying and protecting the area that contributes to water supply wells and avoids costly groundwater cleanups. Of the 436 municipal systems in Michigan using groundwater as their water supply, 209 are involved in some aspect of wellhead protection, such as performing a delineation, inventorying the potential sources of contamination, and planning for emergencies. Of those 209 systems, 155 have completed all the steps and have an approved WHPP or have met the substantial implementation standard. As a result, 54 percent of the population that obtains drinking water from groundwater is in communities taking action to protect their sources. Additionally, 69 privately-owned water systems have achieved substantial implementation by having an updated source water assessment with no issues identified. Municipalities are encouraged to apply for a WHPP grant using a 50 percent local and 50 percent state match to fund activities involved in protecting their wellheads and updating their approved programs.

The DWMAD, through a contract with Michigan State University's Department of Civil and Environmental Engineering, developed the Michigan Groundwater Management Tool (MGMT). The MGMT can scientifically map wellhead protection areas for public water supply wells using information from existing statewide databases such as Wellogic, Map Image Viewer, and the Groundwater Inventory Mapping Project. The Wellhead Protection Area (WHPA) is the surface and subsurface area contributing groundwater to the well. Michigan's WHPP defines the WHPA with a ten-year time-of-travel. This provides a reasonable length of time to respond to environmental problems within the WHPA while providing an area that can be reasonably managed. The MGMT has developed comparably accurate predictions of spatially-detailed and representative groundwater flow patterns and WHPAs. Most of these MGMT delineations closely parallel traditionally developed WHPAs, which cost an average of \$36,000.

The DWMAD, Community Water Supply Section, has redefined "Substantial Implementation," allowing smaller systems to obtain this source water protection status. Nonmunicipal water systems can obtain substantial implementation by using a self-assessment to identify specific risks to their drinking water sources. Once risks have been identified, corrective actions can be put in place to reduce risk of contamination. This allows these systems to obtain substantial implementation since they have limited control of their WHPA as compared to municipal systems that may have local control by land use planning and ordinances. At least 893 CWS and 895 NTNCWS systems had provisional delineations completed by the MGMT.

The SWIPP is the surface water counterpart to the WHPP. Under this program, communities develop partnerships with surrounding communities to identify and take action to protect the area around the intake and the watershed that impacts it. To date, ten communities have completed a SWIPP. A SWIPP grant program which began in FY 2015, has stimulated protection activities for municipalities that utilize surface water as their source for drinking water. This has helped fund five new intake protection plans.

To further protect surface water intakes, the DWMAD worked with federal and local governmental agencies to install a continuous, real-time water quality monitoring network in the St. Clair River, Lake St. Clair, and the Detroit River. Thirteen drinking water treatment facilities are equipped with a range of analytical devices. In addition, the Great Lakes Water Authority and the cities of Monroe and Marysville have recently installed phycocyanin probes due to their vulnerability of microcystin produced by blue-green algae. The monitoring system includes data

transmission, data visualization, automated notification/alarm service, and data archiving. Nearly instantaneous communication is key to protecting surface water intakes because of the rapid rate of flow and corresponding changes in water quality compared to groundwater rates. Funding for this monitoring network helped purchase the equipment; however, local communities must pay to continue operation and maintenance of this equipment.

4.5 *Operator Training and Certification*

Due to amendments to Act 399, a properly certified operator must be available at all CWS, all NTNCWS, and certain TNCWS. These operators maintain their certification by meeting continuing education requirements through training offered in a variety of venues.

4.5.1 Operator Training and Certification Program (OTCP)

The DWMAD, OTCP, provides numerous training courses each year. The OTCP certifies over 200 organizations and training providers that offer other opportunities for continuing education, including online courses. Operators certified in distribution systems must provide oversight at over 1,400 CWS and approximately 1,300 NTNCWS. Operators certified in treatment systems must provide oversight at CWS and NCWS that employ treatment.

A CWS occasionally finds itself without a certified operator, usually due to unanticipated operator turnover, retirements, and the like. District staff work with each of these water systems to pursue an interim certified operator while also pursuing a permanent replacement. There is continual turnover of certified operators in NCWS, and the effort to retain certified operators at these small systems is an ongoing process.

Major OTCP activities from FY 2014 to FY 2016 include:

- Training opportunities available for small community and nontransient, noncommunity operators to meet renewal requirements for their certifications.
- Streamlined the operator certification renewal process.
- Utilized subject matter experts (SME) to validate new questions for licensing examinations. The SME include water system operators holding licenses of the highest level in their category. During FY 2015 and FY 2016, new questions related to the Revised Total Coliform Rule were created and validated for inclusion in exams.
- Maintenance and promotion of a Web-based application allowing certified operators to view pertinent information regarding their certifications such as certificate renewal status, the list of courses completed, and other information.
- Provide online list of all courses approved by the Advisory Board of Examiners (ABE) to assist drinking water personnel in accessing available training in order to maintain certification.
- Maintenance of a Web-based database allowing DWMAD technical staff access to readily confirm a certified operator's status.
- Web-based search capabilities to manage and track certification and continuing education status of all staff associated with a specific water system.

- Development and administration of all exams, twice annually, using Scantron scored questions, validated by SMEs.

4.5.2 Small System Training

For the past several years, DWMAD staff has conducted training specifically for small CWS and awarded continuing education credits to operators who participated. Many attendees are operators employed by more than one system or may also work at NTNCWS, so this targeted training is improving the operation and maintenance of many more systems than the number of operators attending. General topics covered included new regulatory requirements, monitoring and reporting, and operational issues. Specific topics change each year, and over the past three years have included hydropneumatics tank inspection and maintenance; completing cross connection plans and inspections; well maintenance; distribution mains, with hands-on leak detection equipment demos; implementation of the Lead and Copper Rule; the new Revised Total Coliform Rule; and a Consumer Confidence Reports (CCR) refresher. The training is offered at three sites around the state. Registration at the three sites totaled 106 individuals in 2014; 111 in 2015; and 98 in 2016. These represent many more water systems, as several of the attendees represent multiple community water supplies.

During 2015, the MDEQ hosted several MGMT/Source Water Protection Workshops around the state to educate water supplies on delineations generated by MGMT (the tool discussed in Section 4.4.2 above) and other publicly-available information on their water supply well(s), such as source water assessment scores and well logs. Supplies were presented with ways to use available information to better manage source water protection efforts. This training was offered to all CWS and NTNCWS.

Training of LHD staff is conducted to inform, explain, and discuss new and updated program issues and procedures. This training occurs in many ways, including formal educational events and during the program evaluation process. In FYs 2014, 2015, and 2016, 80-100 LHD staff attended an annual two-day training conference hosted by the MDEQ. Sanitary survey training was recently received by 35 LHD staff. In FY 2016, 78 operators were trained in topics such as ground water and drinking water wells, dealing with arsenic in drinking water, coliform bacteria and nitrate issues, and chemical monitoring.

The start of the RTCR in April 2016 was preceded by extensive training of NCWS owners and operators. Introduction to the new requirements was presented by the MDEQ to 693 individuals at 16 venues around the state. LHDs also held their own training for owners and operators, and prepared and distributed educational resources to provide as much information as possible in advance of this significant change in bacteriologic routine monitoring and in follow-up procedures when test results are positive for coliform.

The Michigan Environmental Health Association hosts an Annual Education Conference that typically has over 200 participants, some of whom are Level 5 operators.

The NCWS staff maintained a comprehensive study guide for individuals pursuing certification to operate an NCWS. It may also be useful for operators of other small CWS. Topics range from regulatory authority through source protection and system construction to monitoring and operation oversight. The guide is available on the Internet.

4.6 *Security*

The MDEQ is responsive to various federal programs and the security and emergency response needs of the public water systems. Planning, training, and coordinating are all a part of the effort to emphasize emergency management for all natural and man-made incidents. DWMAD staff participate on the steering committee for the Michigan Water/Wastewater Agency Response Network (MiWARN), a group that encourages mutual aid between utilities during emergencies, as well as the Association of State Drinking Water Administrator's Security and Resilience Committee.

Security table top exercises were completed in 2014, with most strongly agreeing that they were beneficial. In 2015 the DWMAD participated in a radiological drill designed to determine the impact of a nuclear accident on surrounding drinking water. Planning for additional drills and exercises took place in 2016.

District staff will continue to be involved in safety and security enhancements through the construction permit process and the operation of new systems as well as during inspections.

4.7 *Enforcement*

Evaluations and compliance information becomes the basis for enforcement. When systems fail to return to compliance, escalated enforcement, including Administrative Consent Orders (ACO) and MDEQ orders, can be initiated.

Before escalated enforcement is used, many systems are encouraged to return to compliance before they are assessed fines for violations. Michigan's administrative fines policy for monitoring and reporting violations helps enforce timely contaminant monitoring and submittal of results; monthly operation reports (MOR) for systems that employ treatment; and issuance and submittal of the Consumer Confidence Report (CCR).

When a fine is not applicable or does not prevent further violations, the DWMAD may pursue escalated enforcement, which may include an ACO. Program staff may first attempt targeted technical assistance to return systems to compliance or prepare them for upcoming requirements, especially when options are particularly expensive or when acceptable alternatives are not readily available. As a result, 41 drinking water cases received further enforcement action from FY 2014 through FY 2016. This includes 26 ACOs, ten enforcement notices, three criminal referrals, and two referrals to the Attorney General.

A majority of these cases were referred for escalation based on system inadequacies such as lack of sufficient capacity, water treatment plant deficiencies, or violations of active consent orders. During FY 2014 through FY 2016, efforts were also made to pursue, through escalated enforcement, several water supplies chronically delinquent in payment of water supply fees.

Meeting the revised arsenic standard continues to be particularly difficult for a few small water systems that do not treat their water and have raised insufficient funds to install treatment to remove arsenic. A few of these cases have been referred to enforcement for failure to meet the deadlines and terms of the ACO. The few NTNCWS, that have not implemented a permanent solution, continue serving bottled water to remove the public health threat under an agreement with the DWMAD.

Privately-owned new CWS are subject to additional requirements to ensure they are able to provide an adequate supply of drinking water. Proposed systems must stipulate to certain

conditions such as: obtain a local government's refusal to accept ownership of the system; establish an escrow account available to the DWMAD for immediate repair or maintenance of the system; provide contact information of operation personnel; and agree to seek MDEQ approval before transferring ownership. The stipulation ensures private owners understand their responsibilities prior to establishing the water system. The DWMAD has increased the minimum required escrow amount to \$10,000.00, while also eliminating the requirement for new water system owners to enter into an ACO with the MDEQ.

4.8 Robust Information Sharing Network

The DWMAD, the USEPA, and others have identified that current Information Technology (IT) used by the DWMAD is outdated. The DWMAD has identified improvements that will directly and immediately increase water system capacity such as: an online dashboard for systems to view real time monitoring schedules and compliance; an online application and permitting system to ensure complete plan submittals; secure uploading of required documents such as monthly operational reports; and direct, electronic submission of water sample results by laboratories to the State database. Development of these applications will increase water system compliance with the regulations, reduce reporting violations, and increase efficiencies for everyone.

The DWMAD is actively pursuing IT development requests to make these outcomes a reality. The goal is to have funding in place to move forward with significant technology improvements in FY 2019.

4.9 Summary

Every three years, the DWMAD must report to the Governor on the effectiveness of the CDP. This program is effective as evidenced by the high rates of compliance with drinking water standards.

Public water systems use a multibarrier approach to provide safe water. This approach begins with securing a safe source and continues with constructing quality infrastructure using a sound basis of design. This multibarrier approach is maintained by qualified personnel properly operating the system and routinely monitoring to confirm that the multibarriers are, indeed, functioning and the integrity of the water system is maintained on a continuous basis.

Program staff periodically assesses the capacity of water systems through sanitary surveys and serves as a primary resource as systems address capacity issues. Programs available to systems include the DWRF, SWPP, operator training, financial assessments, and technical assistance provider services.

New regulations, aging infrastructure, emerging contaminants, and other issues will continue to challenge water systems. Continuing endeavors to maintain TMF capacity will help to meet these challenges.

Recent high-profile water system events in Michigan and around the county serve to highlight the importance of effective capacity development. Ensuring public water supplies maintain robust technical, financial, and managerial capability is an essential component of public health protection. Government, water supply owners and operators, and citizens alike must continue to invest in activities and programs that help water supplies succeed in providing safe and reliable drinking water to their customers.

This report is available to the public, on request, at the DWMAD's district offices, or on the MDEQ Website at <http://www.michigan.gov/deqwater>. Click on Drinking Water, Community Water Supply, and then Capacity Development Reports.

Appendix: Outline of a Typical Financial Assessment and Financial Action Plan (FAP)

Financial Assessment

Introduction: Population, location, transportation routes, and community characteristics; description of the water system and major projects or concerns such as expansion, securing loans, and meeting new drinking water standards; and major financial shortfall such as the need for a rate methodology.

Requested Information: Budget, last two years of audited records, water use and water rate ordinances, latest rate ordinance or resolution, recent rate or feasibility study, and contract or service agreements with outside customers.

Submitted Information: Supply usually does not provide all the information requested.

Analysis: Summary or highlights of each of the documents provided by the supply.

On-site Meeting: Date and attendees; and list of items discussed, such as the financial concerns, the billing method, and major recent projects.

FAP

Goal One: Develop the financial capability to fund present and future needs.

Task 1: Develop a capital improvement projects plan.

- Step 1: List anticipated water projects.
- Step 2: Estimate the cost of each project to be funded.
- Step 3: Project the anticipated date the project is to begin.
- Step 4: Calculate the dollar amount necessary to be set aside annually.
- Step 5: Establish a line item in the budget for capital improvement expenditures.

Task 2: Develop and implement a rate setting methodology.

- Step 1: Identify water system expenses.
- Step 2: Identify replacement expenses and fund the replacement account.

Goal Two: Establish the legal and managerial capability to protect the water system.

Task 1: Develop a penalties section in the water ordinance.

Task 2: Adopt the amendment to the ordinance.

Tools Included With FAP

Sample resolution, sample water use and rate ordinance, service agreement checklist, DWRf informational brochure, DWRf project plan preparation guide, securing a DWRf loan fact sheet, and a fixed variable allocation spreadsheet to prepare the budget and determine water rates.