Federal Safe Drinking Water Act
Report to Governor Martin O'Malley
on

MARYLAND'S CAPACITY DEVELOPMENT PROGRAM
for
PUBLIC DRINKING WATER SYSTEMS

Department of the Environment
Water Supply Program

September 2011

Martin O'Malley
Governor

Anthony G. Brown
Lt. Governor

Robert M. Summers
Secretary

Introduction

Ensuring safe and adequate drinking water supplies for Maryland citizens is a primary goal of the Maryland Department of the Environment (MDE). MDE undertakes numerous programs and activities to ensure that public drinking water systems are built, maintained, and operated in a manner that the water produced by these systems is safe, and that adequate supplies are available to meet all current and future needs. The 1996 Safe Drinking Water Act (SDWA) Amendments created a program to strengthen the managerial, technical and financial capacity of water systems to reliably deliver safe drinking water. State programs must have two main components: (1) legal authority to ensure that new water systems have sufficient technical, managerial, and financial capacity to meet drinking water standards; and (2) a strategy to identify and assist existing water systems needing improvements in managerial, technical, or financial capacity or aid to comply with standards. Maryland's strategy for improving public drinking water system capacity was approved by the Environmental Protection Agency (EPA) in 2001.

This triennial report on the efficacy of Maryland's capacity development strategy for public drinking water systems has been prepared for the Governor's office in accordance with Section 1420 (c)(3) of the SDWA. The effectiveness of Maryland's capacity development strategy is measured through analysis of the progress that has been made toward improving the technical, managerial, and financial capacity of water systems in the state.

Reports on public water system capacity development were previously submitted to the Governor's office in September 2002, September 2005, and September 2008. This report documents capacity development progress and evaluates the effectiveness of the State's capacity development strategy as reflected by data collected through Calendar Year 2010. This report will be made available to Maryland citizens through MDE's website.

Background

A public water system is any facility that serves 25 or more individuals for more than 60 days per year. Community water systems (CWS), one of three categories of public drinking water systems, serve year-round residential consumers. Non-transient non-community (NTNCWS) water systems serve recurring consumers, such as in a school or daycare setting and transient non-community (TNCWS) water systems serve different consumers each day, such as in a campground or restaurant. Over 86% of Maryland's population, approximately 4.9 million people, is served by a community water system.

The capacity of a public water system is the system's ability to consistently produce and deliver water that meets all the national primary drinking water regulations. The assessment of a water system's capacity takes into account three interdependent elements: the technical, managerial, and financial capabilities of water systems to provide safe and adequate drinking water. Technical capacity refers to the physical infrastructure of the public water system (the adequacy of the source water, wells, water intakes, treatment, storage, and distribution), as well as the ability of system personnel to apply technical knowledge. Managerial capacity includes ownership accountability, staffing and organization, and effective relationships with consumers

and regulatory agencies. Financial capacity refers to the financial resources of the water system, including credit worthiness, fiscal controls and the ability to generate sufficient revenue.

Drinking Water Statistics				
	2010	2007	2004	2001
Population of Maryland	5,773,552	5,618,344	5,558,058	5,296,486
Individuals served by community water systems	4,989,406	4,844,668	4,846,923	4,438,335
Percent of population served by community water systems	86%	86%	87%	84%
Percent of population served by individual wells	14%	14%	13%	16%
Number of public water systems	3,432	3,533	3,692	3,816
Number of community water systems (CWS)	473	486	502	503
Number of non-community non- transient community water systems (NTNCWS)	550	559	576	568
Number of transient non-community water systems (TNCWS)	2,409	2,488	2,614	2,745
Number of systems using surface water	59	69	66	64
Number of systems using only ground water	3,373	3,464	3,626	3,752

Table 1

Implementation of the SDWA in Maryland is the responsibility of the Water Supply Program (WSP), located within the Maryland Department of the Environment (MDE). In 2001, the Water Supply developed a strategy to improve capacity in Maryland water systems. The strategy was approved by the U.S. Environmental Protection agency, and focused capacity development efforts on directing appropriate training and technical assistance toward operators and managers of existing systems. Using various sources of information, including a system self-assessment, compliance results, and onsite interactions with water suppliers, MDE identified areas where training was most needed to improve the ability of systems to sustainably supply safe drinking water to their customers. Through collaborative relationships with various training organizations, training was targeted toward these areas of greatest need.

Over time, however, issues have arisen which are not fully addressed by the 2001 Strategy. For example, in 2002 Maryland experienced severe drought conditions that highlighted the need for comprehensive assessment and response activities related to drought. In addition, recent estimations of growth potential and water availability indicate that a number of Maryland communities could experience water shortages unless steps are taken to better understand the hydrologic system and to carefully plan for future water needs. As a result, in 2009 MDE revised the Capacity Development Strategy for Existing Systems to provide for enhancement of activities related to ensuring adequate and sustainable water supplies for Maryland public water systems.

The revised strategy continues to identify and promote appropriate training and technical assistance efforts for water systems as a primary component of Maryland's capacity development efforts. The new approach adds to the existing program by enhancing the State's drought management program, conducting hydrologic studies of both the Fractured Rock and Coastal Plain regions of the State, assisting water systems with developing and implementing capacity management plans and Water Resource Elements for their comprehensive plans, and promoting water systems' use of water conservation technologies.

Challenges

A number of factors present challenges for capacity development in Maryland water systems. The vast majority of Maryland water systems are very small. Smaller water systems have limited resources for maintaining and improving their infrastructure, for proper maintenance and operation of the system, or for retaining qualified water system operators. Additionally, for some communities there has been inadequate planning for the rapid population growth that has occurred over the past two decades. More than 155,000 additional citizens relied on Maryland's community water systems in 2010, than did so in 2007. In some cases, water supplies are not adequate to meet projected needs. The increasing number and complexity of drinking water regulations creates additional challenges for all water systems to remain in compliance. Since 2001, new regulations have been promulgated for arsenic, radionuclides, disinfection by-products, surface water treatment, and ground water treatment. These new regulations often require new infrastructure, and also require that water system operators increase their knowledge about complex treatment processes as well as numerous reporting requirements. Relatively low salary levels along with a shrinking pool of qualified workers have made it increasingly difficult for water systems to attract and retain competent operators.

The Effectiveness of Maryland's Strategy

The capacity development strategy established criteria to evaluate water systems' capacity and the effectiveness of the strategy. Information gathered from program databases, sanitary survey inspection records, and surveys of public water systems are used to identify performance areas that have improved, and areas where additional capacity development efforts are needed. WSP will target future training programs and technical assistance activities to the areas of greatest need. Data collected for each evaluation criteria is summarized below.

Maryland's extensive Public Drinking Water Information System database includes information about water system compliance with water quality standards as well as monitoring and reporting requirements. This database also retains information about water system operators, emergency plans, and information from routine sanitary survey inspections conducted at each system.

A sanitary survey is an on-site inspection of a water system which includes an inspection of the sources, the water treatment plant, the storage and distribution systems, and a review of water quality tests and operating and maintenance procedures. During Sanitary Survey inspections, WSP staff provide guidance and review standard operating procedures, emergency plans, and other technical and managerial documentation. In addition to improving the technical capacity of the water system, the sanitary survey is often used as a tool for initiating improvements in managerial and financial capacity. The frequency of sanitary surveys ranges from approximately once per year to once every five years, depending on the size and type of system, and whether the source is ground water or surface water.

During sanitary survey inspections, staff may identify deficiencies that are not regulatory violations, but nevertheless have potential public health impact, and provide an indication of problems with technical capacity. WSP staff work with water systems to help them correct deficiencies and improve their capacity to provide safe and adequate water to their customers.

A "self-assessment" survey was circulated to all water systems in 2001, and again in 2007. Survey questions were formulated by a workgroup of representatives from local, state and federal public agencies and private industry to solicit information about the technical, managerial and financial capacity of Maryland's public water systems. It should be noted that while efforts were made by MDE to obtain close to a 100% response to the 2001 survey, budget restraints prohibited a similar outreach effort for the 2007 survey. The response rate for the 2007 survey was about 52%.

Data Source	Measure of Capacity		2010	2007	2004	2001
	Technical:					
Historical SNC list[1]	Number of SNC systems (CWS & NTNC)		50 systems	37 systems	26 systems	51 systems
Compliance Data[2]	Lead and copper violations (CWS & NTNC)		13%	<13%	<10%	13%
Sanitary Survey[3]	Percentage of systems with certified operators	Community systems	86%	86%	91%	80%
		Nontransient noncommunity systems	69%	74%	76%	40%
Self-Assessment Survey[4]	Systems that can meet future 10 year demand with current sources and treatment		N/A	58%	N/A	72%
Sanitary Survey[3]	Percentage of major non-regulatory deficiencies resolved		81%	90%	79%	67%
	Financial:					
Self-Assessment Survey[4]	The last time water rates were changed (CWS)		N/A	Average Years: 1	N/A	Average Years: 4
Self-Assessment Survey[4]	Systems that have financial records reviewed at least annually by an independent financial auditor		N/A	78%	N/A	53%
	Managerial:					
Self-Assessment Survey4	CWS respondents aware of whether additional treatment or equipment will be required because of SDWA regulations that will come into effect within the next few years (i.e. ground water rule, LT2ESWTR, DBP2)		N/A	45%	N/A	30%
Self-Assessment Survey[1]	Percentage of systems with service connections metered	Residential	N/A	60%	N/A	25%
		Commercial	N/A	50%	N/A	4%
Self-Assessment Survey [4]	Systems that can meet average daily demand with largest source out of service		N/A	64%	N/A	52%
Sanitary Survey[3]	Percentage of CWS systems with emergency plan of operation.		77%	75%	75%	43%

Table 2

[1] EPA prepares a list of Historical Significant Noncompliers (SNC) every three years. The most recent list was prepared in 2009.

[2] Data from MDE's Public Drinking Water Information System database.

[3] MDE staff conduct sanitary surveys of public water systems on a regular basis. Frequency ranges from more than once a year to once every five years. Current federal requirement is a minimum of one sanitary survey per system every five years for groundwater systems and one every three years for surface water systems.

[4] Self-assessment surveys were conducted in 2001 and 2007. This table includes a selection of answers to questions from that survey. Surveys will be conducted every six years.

Technical Measures

1. **Number of SNC systems (CWS & NTNC).** Every three years, EPA produces a list of systems with a history of significant noncompliance (SNC). A system is considered to be in SNC if it has violated one or more National Primary Drinking Water Regulations in any three quarters within the last three years. The 2009 Historical SNC list included 50 systems. New regulations frequently result in increased violations for systems, as they struggle to learn new requirements, identify funding to address infrastructure needs, and meet other challenges. The WSP provides information to water suppliers about available training opportunities, and provides presenters for training events around the State. MDE will continue to focus training efforts on ensuring that all systems are apprised of the requirements of new regulations.

2. **Lead and copper violations (CWS & NTNC).** Complex monitoring and treatment technique requirements for lead and copper present a particularly vexing problem for small water systems. Systems are required to monitor on a schedule established by the WSP. The number of systems that must sample varies widely from year to year. As a result, more violations occur in some years than in others. The Water Supply Program will continue to focus on reducing the number of violations by providing technical assistance and training. In addition, formal enforcement actions are being taken and penalties assessed for systems in significant noncompliance.

3. **Percentage of systems with certified operators.** Regulations require all community and non-transient non-community water systems to have State-certified operators. Through Maryland's certification program, water system employees are evaluated, trained and certified to operate water systems based on the complexity of the water treatment plant (WTP). Having a knowledgeable operator is critical to ensuring that water systems provide safe drinking water and meet federal and State requirements.

   One hundred percent of systems that serve 500 or more persons employ certified operators. In order to increase the number of small systems with certified operators, WSP has provided funding to the Maryland Rural Water Association (MRWA) and the Maryland Center for Environmental Training (MCET) to develop and implement training programs geared specifically to operators of small ground water systems. These classes continue to be offered at convenient locations throughout the State, and are free of charge to operators of systems that serve fewer than 3,300 persons. In addition, MDE reimburses operators for the costs of obtaining and maintaining their certifications, and for the costs of examinations. In 2010, MDE initiated a program to allow operators to take online exams at specified locations in the State. With this program, operators have the flexibility to take their examinations at convenient times and locations. In addition, the operators are provided immediate feedback about their test results.

4. **Systems that can meet future 10-year demand with current sources and treatment.** The number of systems that reported they will be able to meet future demand decreased since 2001. This is likely a reflection of two factors: first, water systems are more aware of their needs and capabilities than they previously were, and second there continues to be considerable growth pressure on some water supplies. In 2006, MDE developed guidance for community water systems on assessing their system capacity and planning for future needs. Water capacity can be limited by a number of factors, including the capacity of the water treatment plant or the wastewater treatment plant, limits established by the system's water appropriation permit, and/or the actual availability of a sustainable water supply. The WSP has been working individually with a number of water systems whose water use is close to their capacity limits to assist them in identifying new sources, upgrading their infrastructure, or reducing demand in order to ensure that the systems will be able to provide sufficient water to meet projected demand. During FFY 2011, WSP contracted with a consultant to assist Maryland communities to develop Capacity Management Plans. This project is expected to be final in December 2012.

5. **Percentage of major non-regulatory deficiencies resolved.** During sanitary survey inspections deficiencies that do not constitute regulatory violations but may nevertheless have a significant public health impact are often identified. Deficiencies are characterized as major, moderate, and minor based on the significance to health or comfort of the system's customers and the frequency at which the problems are likely to occur. Examples of possible major deficiencies include extremely low pressure in the distribution system on a routine basis, a storage tank with a leak or a well that is likely to be flooded. The newly-adopted Groundwater Rule establishes specific requirements for systems with significant deficiencies. WSP field engineers work individually with systems to assist them in addressing deficiencies, and enforcement actions are taken when necessary. Eighty-one percent of all major deficiencies have been resolved in FFY 2011.

Managerial Measures:

1. **CWS respondents aware of whether additional treatment or equipment will be required because of SDWA regulations that will come into effect within the next few years (i.e. ground water rule, LT2ESWTR, DBP2).** Responses indicate that more managers are aware of how upcoming regulations will affect their operations now than in 2001. In 2001, only 30% of systems knew whether or not they would need additional treatment as a result of upcoming regulations, compared to 45% in the 2007 survey. MDE has focused efforts on educating water systems about upcoming regulations or new requirements that impact them. For example, WSP individually contacted each system that was expected to be impacted by new surface water treatment and disinfection byproduct regulations. MDE will continue to target educational efforts toward ensuring that water system managers and operators are aware of upcoming changes to federal and State laws and regulations. During FFY 2010, the Maryland Center for Environmental Training began offering a new training class for superintendents of small water systems, which is expected to help small water systems become more informed about regulatory and reporting requirements. With funding from MDE, this program is offered free of charge to operators of systems that serve 3,300 or fewer persons.

2. **Percentage of systems with service connections metered.** Metering is a fundamental tool for managing water use at a community water system. Many smaller systems do not have service connection metering that measures the amount of water used by each customer. Individual metering provides the customer with information about how much water they use, and allows the water system to charge more when the customer uses excessive amounts of water. Additionally, water systems can use metering to identify water losses occurring from distribution system leaks, theft, or other unauthorized uses. About 60% of the systems that responded to the 2007 survey reported that 100% of their customers are metered. This percentage is expected to continue to increase as water demand escalates.

3. **Systems that can meet average daily demand with largest source out of service.** This is a critical factor for ensuring the reliability of a water system. About 64% of the systems that responded to the 2007 survey reported that they can meet average daily demand with their largest source out of service. WSP field engineers work individually with water systems to encourage and assist them to improve their reliability. Construction permit requirements for new systems require that community water systems serving 100 or more dwelling units be able to meet daily demand without their largest source. MDE will continue to encourage water systems to provide sufficient backup capabilities for their water supplies.

4. **Percentage of CWS systems with emergency plan of operation.** An emergency response plan is a document that organizes a community water system's response to various possible emergencies such as power outage or water contamination. It usually includes telephone and contact numbers for key personnel including water system managers, chemical suppliers, equipment manufacturers, well drillers, alternative water suppliers, and MDE. Plans for specific emergencies such as security attacks and microbiological contamination can also be included. WSP has focused a considerable amount of energy into providing guidance and technical assistance to water systems regarding this need. During sanitary survey inspections, field engineers encourage water systems to develop emergency plans, and provide technical assistance as needed. Currently, 77% of community water systems have an emergency plan of operation. WSP will continue to work with systems to encourage appropriate emergency planning.

Financial Measures

1. **The last time water rates were changed (CWS).** Frequent review and adjustments of water rates allows systems to cover rising water system costs, and provide adequate set aside funds for future system improvement. The results of the most recent self-assessment survey indicate that, with costs rising, water systems are adjusting their rates more frequently than in the past. WSP has supported training efforts to educate water systems about the importance of establishing appropriate rate structures. Responses to the 2007 survey indicated that the water systems had revised their rates on average within one year, compared with about four years for the 2001 survey.

2. **Systems that have financial records reviewed at least annually by an independent financial auditor.** Independent audit of a system's financial records is sound financial

practice. The 2007 survey found the percentage of systems that have their financial records reviewed annually increased from 53% in 2001 to 78%.

Next Steps

MDE has taken or plans to take a number of steps to further improve water system capacity.

- Continue working with training organizations to identify training needs and target training classes to areas of greatest need.
- Enhance system awareness of available training by working with the training providers, continuing annual mailings and developing website information.
- Target technical assistance to systems in significant non-compliance.
- Continue to review and provide comments to counties regarding their water and sewerage plans.
- Provide technical assistance and review comments to local governments regarding their Water Resource Element submittals and assist local governments with other planning efforts as appropriate.
- Continue involvement in the Area Wide Optimization Program (AWOP) and evaluate long-term turbidity trends of surface water filtration plants.
- Continue routine Comprehensive Performance Evaluations for water systems.
- Continue to implement requirements of new federal regulations.
- Work with the contracted consultant to assist water systems in developing capacity management plans.
- Continue working with USGS and MGS to study Maryland's Coastal Plain and Fractured Rock water supplies.
- Continue monitoring hydrologic conditions and routinely update MDE's drought web pages.

Conclusion

Maintaining technical, financial, and managerial capacity continues to present challenges for Maryland water systems. The increasing number and complexity of regulations pose particular challenges for small systems, which include the majority of public drinking water systems in the State. The Maryland Department of Environment's Water Supply Program continues to focus technical assistance and training efforts towards these small systems, and works with systems to find long-term solutions to their compliance problems and capacity deficiencies.

Appendix A

CAPACITY DEVELOPMENT CASE STUDIES

Maryland's statewide capacity development strategy focuses on working with public water systems to address their violations with short and long-term solutions. The WSP encourages consolidation to correct capacity and non-compliance problems. As regulatory requirements continue to become more numerous and complex, it is becoming increasingly more difficult for smaller, independent systems to maintain compliance. Whether two or more small systems merge into one larger system, or a large system extends its service area to a smaller one, consolidation affords systems the advantage of having a greater pool of resources to provide a safer and more reliable water supply. The case studies in Appendix A provide some insight into the ways in which the Water Supply Program continually works with water systems to improve their technical, managerial, and financial capacity.

Anne Arundel County – Sylvan Shores – Sylvan Shores is a small community with 248 homes, located 6 miles outside of the City of Annapolis. The privately-owned water system included one working well, an aging and ineffective iron removal treatment system, a 10,000 gallon hydropneumatic tank that was inadequately sized and in very poor condition, and a failing distribution system. During a routine sanitary survey in January 2010, the WSP field engineer identified significant deficiencies. The water system applied for funding from MDE, however MDE expressed concern that they may not have the technical, managerial and financial capacity to properly operate and manage the water system. The Water Supply Program initiated discussions and meetings with the County with a goal of facilitating the County extending service and taking over ownership and operation of the private water system. Following a public meeting, members of the community voted to connect to the Anne Arundel County Broad Creek water system. MDE provided SRF funding to the County to upgrade the Sylvan Shores distribution system and provide a permanent interconnection by the end of 2012. In the meantime, the community is provided water from Anne Arundel County through a temporary connection to a fire hydrant on the Broad Creek water system.

Charles County – Many small privately-owned community water systems in Charles County are experiencing serious problems with aging infrastructure (storage and distribution), and a few have petitioned the County for assistance. The Water Supply Program notified the privately-owned Jenkins Lane water system (population 110) in August 2010, that the tank condition was a significant sanitary deficiency. As a result, a contingency plan was developed with the County to allow an emergency connection. In June 2011, the emergency connection to the County system was needed when Jenkins Lane's Patapsco aquifer well and 50 year old storage tank deteriorated to the point where they were no longer usable. MDE provided funding to the County in 2011 to upgrade the Jenkins Lane distribution system for permanent connection. Project completion is expected sometime next year. Also in 2011, the County-owned Strawberry Hills (population 1,511) requested funding, which MDE provided, to permanently connect to the Bryans Road system. Project completion is expected by November 2011. Both projects reduce impacts on the declining Patapsco aquifer and are in line with the County's aquifer management strategy. In addition, deficiencies in technical, managerial and financial capacity of these small water systems are eliminated with connection to County-owned water systems.

Washington County – Town of Boonsboro – In certain areas in Washington County, the karst geology provides a direct conduit for microbial contamination of some springs and wells. These wells are considered to be groundwater under the direct influence of surface water. Water supplies are vulnerable to contaminants from the ground surface, including microorganisms typically associated with surface water such as *Cryptosporidium* and *Giardia*. This public health concern has been demonstrated by raw water sampling of several public water systems, as well as dye trace studies performed by MDE's Science Services Administration, which indicated certain water supplies were directly affected by water from sinkholes, streams, and septic systems.

In 2005, the Water Supply Program requested that the Town of Boonsboro extend their water line to such an affected area. A number of private homes and small public systems were located in this area, as well as the Scenic View Mobile Home Park, which serves 23 homes. The well serving the Scenic View Mobile Home Park was determined to be under the direct influence of surface water, and the system was out of compliance with the requirement to install appropriate treatment. In April 2006, to help promote the project, MDE staff assisted in coordinating several public meetings with the County Health Department, affected property owners, and Town Board members. The project stalled several times due to public protest regarding annexation, financial, and construction issues. However, by 2007, the Town had committed to the project, and MDE awarded funding in January 2008. Construction of the eight inch line began in 2009 and was finalized by the end of the year.

The new water line now provides public water from the Town of Boonsboro to 51 residential connections, 10 business connections (including two public water systems, Yellow House and Boonsboro Family Worship Center), and the 23 connections within the Scenic View Mobile Home Park. Washington County required all affected properties to have disconnected their private well and connected to the Boonsboro line.

Wicomico County – City of Salisbury - The Water Supply Program has repeatedly communicated to the City, through correspondence, sanitary survey reports, and water and sewer plan comments, that additional storage capacity was needed to meet industry standards. On at least two occasions in the last five years, the City has instituted voluntary water restrictions when water main breaks depleted the stored water supply. With the completion of a new one million gallon capacity ground storage tank at the Paleo water treatment plant in September 2010, the City of Salisbury made great progress in resolving the long-standing storage capacity deficit. Also, in July 2011, an emergency interconnection was completed, which will allow the City of Salisbury and the Town of Fruitland to provide water to one another in an emergency. In addition, there are plans to construct a second elevated storage tank on the south side of the City of Salisbury in the next year.