North Carolina
Capacity Development Report
For
Public Water Systems

Calendar Year 2014

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Public Water Supply Section
N.C. Division of Water Resources
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Contents

LIST OF COMMON TERMS

Capacity	Technical, managerial and financial capability to meet Safe Drinking Water Act requirements
DWP	Drinking Water Protection
DWSRF	Drinking Water State Revolving Fund
EPA	U.S. Environmental Protection Agency
MCL	Maximum contaminant level
NTNC	Non-transient Non-community water system
PWS Section	N.C. Public Water Supply Section
SDWA	Safe Drinking Water Act
SDWIS	Safe Drinking Water Information System (database)
TNC	Transient non-community water system
UNC	University of North Carolina at Chapel Hill

1.0 Introduction

The primary objective of the North Carolina Public Water Supply (PWS) Section is to ensure that water delivered by public water systems is safe for consumption and does not pose a danger to public health. This is accomplished through compliance oversight through the *North Carolina Drinking Water Act* and the federal *Safe Drinking Water Act*, which are represented in 15A NCAC 18C, the *Rules Governing Public Water Systems* (*Rules*) and available online at: http://www.ncwater.org/?page=5#Rules, Regulations & General Statutes Specific to Public Water Systems. A public water system is a water provider that delivers water for human consumption to at least 15 service connections, or regularly serves an average of at least 25 individuals for at least 60 days of the year.

The PWS Section serves the public interest and assists public water systems through a multi-faceted approach that includes:

- Enforcement of water sample monitoring requirements and evaluation of analytical results,
- Review and approval of engineering infrastructure plans and specifications,
- Comprehensive site visits performed by regional office staff,
- Development of programs to encourage and support local drinking water protection activities,
- Examination and professional certification of water system operators, and
- Other initiatives designed to facilitate compliance with the *Rules*.

1.1 Definition of Capacity

The 1996 *Safe Drinking Water Act Amendments* obligated states to ensure that all new community water systems and non-transient non-community (NTNC) water systems, beginning operation after Oct. 1, 1999, demonstrate technical, managerial and financial capacity. In response, the North Carolina PWS Section developed a Capacity Development Program to meet the state's specific needs. The goal of the Capacity Development Program is to require technical, managerial and financial planning of new and existing community and NTNC water systems that will improve systems' service and sustainability. Therefore, "capacity," as used in this report, refers to the technical, managerial and financial capabilities of a water system to comply with the provisions of the *Safe Drinking Water Act*.

The U.S. Environmental Protection Agency (EPA) required the PWS Section to develop milestones as part of its Capacity Development Program. The milestones were published by the PWS Section in the *Public Water System Capacity Development Guidance Document* (March 2000), and they are available online at www.ncwater.org/?page=81. The milestones primarily include tracking the number of projects that have completed the engineering infrastructure approval and certification requirements. Chapter 3 of this report discusses these milestones.

The milestones, while valuable and reflective of the increase in capacity of water systems in North Carolina, do not provide a comprehensive view of overall capacity gains across the state, nor do they reflect the combined efforts of PWS Section employees in the central and regional offices to improve water systems' capacities. A more comprehensive view of the PWS Section's dedication to water system capacity is realized when the milestones are considered in conjunction with:

- Improvements in compliance trends (Chapter 2),
- Assistance provided to water systems by regional office staff (Chapter 4),
- Assistance provided to water systems by the Compliance Services Branch (Chapter 5),
- Support provided to the Division of Water Infrastructure (Chapter 6),
- Statewide drinking water protection programs (Chapter 7), and
- Examination and certification of competent water system operators by the N.C. Operators Certification Program (Chapter 8).

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2.0 Assessing Water System Capacity through Compliance with Drinking Water Rules

Systems are required to monitor water samples for regulated contaminants identified by the EPA as being harmful to human health if ingested. Water systems collect water samples according to EPA-mandated monitoring schedules, and compare sample results to contaminant-specific maximum contaminant levels. Systems base the locations and frequency of required samples on the population served, water system type, and source water type. In accordance with EPA requirements, the PWS Section issues a notice of violation (NOV) for each missed or incorrectly collected sample, which are considered "monitoring violations." The EPA also requires that systems with contaminants detected above the maximum contaminant level (MCL) receive an NOV for each exceeding contaminant. These violations are referred to as "MCL violations."

The PWS Section uses monitoring and MCL compliance rates as indicators of water system capacity. An evaluation of the water system capacity includes: the percentage of noncompliant systems, the population served by compliant systems, the performance of new public water systems and the performance of systems that have been active since the beginning of the Capacity Development Program. These factors determine if overall compliance rates and capacity are increasing.

In early 2015, the PWS Section conducted a systematic review of how violations are summarized and identified and revised violation descriptions to reflect updated rule definitions. Following this review, data generation was migrated to a new software platform . As a result, historical compliance data included in this section has been recalculated and differs slightly from what was included in previous capacity development reports. Historical trends remain unchanged.

2.1 Overall Compliance Rates of Water Systems

Figure 1 provides compliance information for public water systems in North Carolina regarding federal and state drinking water regulations. Data from 1999 are included as the baseline for comparison since the Capacity Development Program began in 2000. The percentage of systems receiving monitoring NOVs has decreased significantly since 1999, while the percentage of systems receiving MCL NOVs has remained relatively stable. These results are significant considering federal requirements have become more stringent during the same period and that increasing numbers of systems are completing all their monitoring requirements.

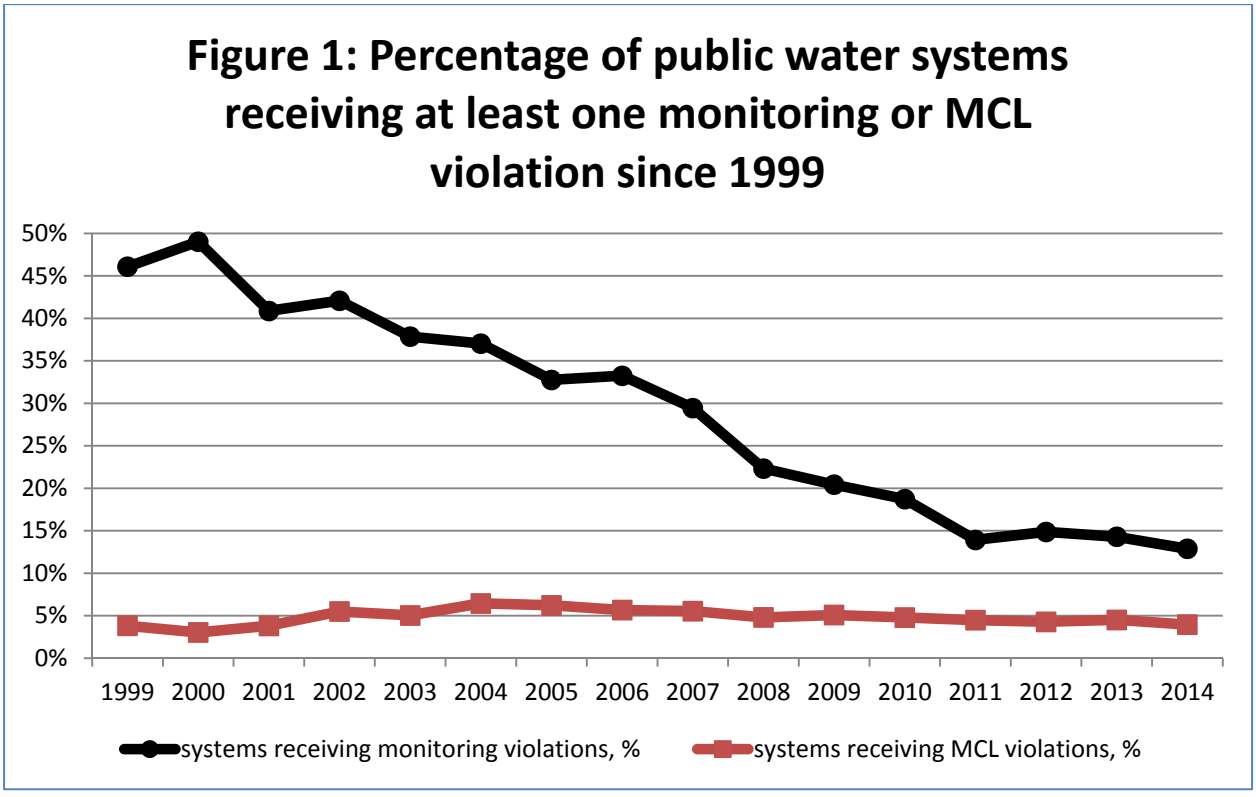


Table 1 (page 5) shows the number of water systems and water systems with at least one MCL or monitoring violation received in a calendar year. Calendar year 1999 is included as the baseline year, followed by data from recent years. Systems are categorized by type and size of population served. Table 1 also shows the percentage of systems that received an NOV as compared to the total number of active water systems within each system category.

Monitoring violations occur when a water system fails to collect a required sample or complete analytical tests within the required monitoring period. A typical system monitors at least monthly and has a large number of required tests. A water system missing a single analytical test during the course of a year would appear on the table as having a monitoring violation.

MCL violations indicate the number of systems with at least one contaminant exceeding permissible levels during the given year. A typical system has many opportunities to test during the course of one year. Most systems receiving bacteriological MCL violations return to compliance by the next compliance period. A public water system receiving at least one violation during the year will appear on this table.

2.2 Population Served by Compliant Community Water Systems

Another method of evaluating capacity and compliance is to examine the number of people served by compliant public water systems. Figure 2 (page 6) demonstrates the population served by compliant community water systems as a percentage of the total community water system service population. Large water systems serve greater percentages of the population than smaller systems, and even one violation received by a large system disproportionately decreases overall population compliance percentages. For example, the largest water system in North Carolina received one monitoring violation in 2004 and one MCL violation in 2005. As new rules are implemented the PWS Section expects to see an adjustment period of increased violations. One example of this adjustment occurred in 2004 when the Disinfection Byproducts Rule expanded to almost every community system. See Appendix A for a schedule of new rule implementation.

In 2015, systems with no MCL violations served approximately 95 percent of the state's community water system service population, and systems with no monitoring violations served 89 percent of the service population. Water systems that received more than one MCL violation served approximately 2.5 percent of the population. Three community systems, comprising .05 percent of the population, received MCL violations for acute contaminants. Acute contaminants differ from chronic contaminants because they can cause an immediate health risk.

2.3 New System Performance

The PWS Section evaluates performance of new public water systems by tracking compliance rates following their initial date of operation. Table 2 (page 7) compares new and "found" system performance to the performance of all systems during the period from 2012 through 2014. Found systems started operations without the knowledge or approval of the PWS Section and were discovered by regional office staff while conducting fieldwork. Found systems did not complete the plan review process and thus have not completed the capacity development milestones. These systems are often improperly constructed and system owners have little or no understanding of compliance requirements. The PWS Section staff work with these systems to prepare them for compliance oversight. These data show that new community, NTNC and transient water systems exhibit better compliance with monitoring requirements than found systems.

Table 3 (page 8) shows the beginning year of new systems and the historic compliance trends of those systems that have remained active. In general, these systems exhibit improving compliance rates as time increases, meaning that the longer a system is in operation, the better able it is to comply with state and federal regulations. This implies that the planning inherent in the capacity development process and the technical assistance delivered by the PWS Section during the process can help improve the compliance of new water systems .

Table 1: The Number of Public Water Systems with Maximum Contaminant Level (MCL) and Monitoring (MR) Violations

Calendar Year	Population	Community					Non-transient non-community					Transient non-community					Totals				
		Systems	MCL	%	MR	%	Systems	MCL	%	MR	%	Systems	MCL	%	MR	%	Systems	MCL	%	MR	%
1999	< 500	1700	44	3%	483	28%	541	23	4%	174	32%	6038	265	4%	3322	55%	8279	332	4%	3979	48%
(baseline)	500 - 9,999	555	9	2%	154	28%	132	1	1%	28	21%	87		0%	34	39%	774	10	1%	216	28%
	10,000 - 49,999	92	4	4%	15	16%											92	4	4%	15	16%
	>= 50,000	24	1	4%	2	8%											24	1	4%	2	8%
	Totals	**2371**	**58**	**2%**	**654**	**28%**	**673**	**24**	**4%**	**202**	**30%**	**6125**	**265**	**4%**	**3356**	**55%**	**9169**	**347**	**4%**	**4212**	**46%**
2011	< 500	1493	38	3%	159	11%	353	6	2%	51	14%	3717	183	5%	594	16%	5563	227	4%	804	14%
	500 - 9,999	490	44	9%	50	10%	70	2	3%	7	10%	55	2	4%	8	15%	615	48	8%	65	11%
	10,000 - 49,999	103	6	6%	6	6%											103	6	6%	6	6%
	>= 50,000	29		0%	2	7%											29	0	0%	2	7%
	Totals	**2115**	**88**	**4%**	**217**	**10%**	**423**	**8**	**2%**	**58**	**14%**	**3772**	**185**	**5%**	**602**	**16%**	**6310**	**281**	**4%**	**877**	**14%**
2012	< 500	1464	27	2%	159	11%	346	8	2%	47	14%	3648	190	5%	632	17%	5458	225	4%	838	15%
	500 - 9,999	485	32	7%	54	11%	62			9	15%	56	4	7%	10	18%	603	36	6%	73	12%
	10,000 - 49,999	103	4	4%	7	7%											103	4	4%	7	7%
	>= 50,000	29		0%	1	3%											29	0	0%	1	3%
	Totals	**2081**	**63**	**3%**	**221**	**11%**	**408**	**8**	**2%**	**56**	**14%**	**3704**	**194**	**5%**	**642**	**17%**	**6193**	**265**	**4%**	**919**	**15%**
2013	< 500	1453	40	3%	155	11%	340	12	4%	42	12%	3557	178	5%	568	16%	5350	230	4%	765	14%
	500 - 9,999	479	29	6%	68	14%	58	1	2%	7	12%	59	7	12%	11	19%	596	37	6%	86	14%
	10,000 - 49,999	105	5	5%	13	12%											105	5	5%	13	12%
	>= 50,000	29	2	7%	5	17%											29	2	7%	5	17%
	Totals	**2066**	**76**	**4%**	**241**	**12%**	**398**	**13**	**3%**	**49**	**12%**	**3616**	**185**	**5%**	**579**	**16%**	**6080**	**274**	**5%**	**869**	**14%**
2014	< 500	1431	32	2%	114	8%	326	7	2%	41	13%	3461	153	4%	521	15%	5218	192	4%	676	13%
	500 - 9,999	479	31	6%	61	13%	59	2	3%	10	17%	56	3	5%	5	9%	594	36	6%	76	13%
	10,000 - 49,999	105	5	5%	10	10%											105	5	5%	10	10%
	>= 50,000	29	2	7%	4	14%											29	2	7%	4	14%
	Totals	**2044**	**70**	**3%**	**189**	**9%**	**385**	**9**	**2%**	**51**	**13%**	**3517**	**156**	**4%**	**526**	**15%**	**5946**	**235**	**4%**	**766**	**13%**

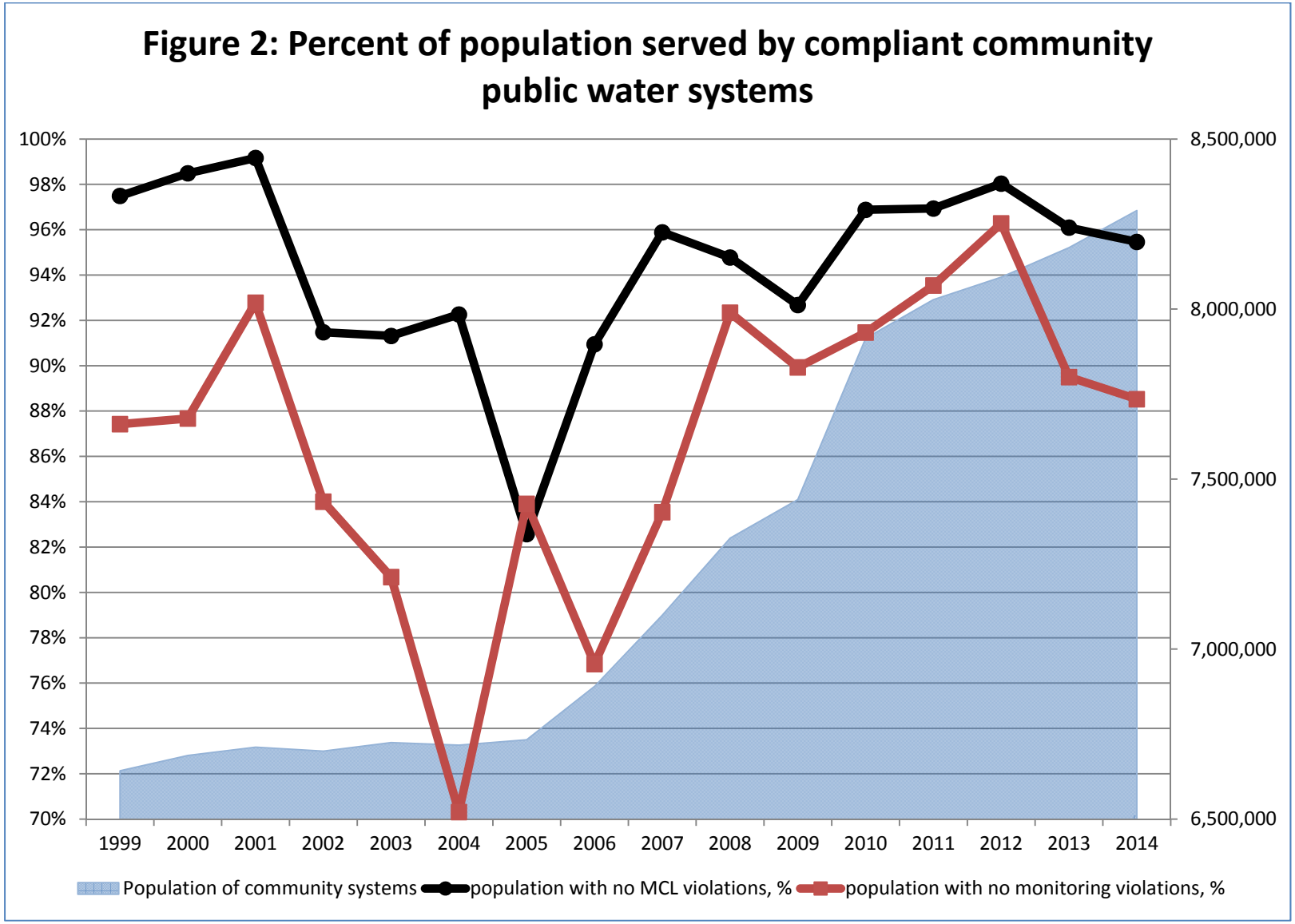


Figure 2: Percent of population served by compliant community public water systems
100%
98%
96%
94%
92%
90%
88%
86%
84%
82%
80%
78%
76%
74%
72%
70%
8,500,000
8,000,000
7,500,000
7,000,000
6,500,000
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
Population of community systems
population with no MCL violations, %
population with no monitoring violations, %

Table 2: Comparison of Public Water Systems Beginning Operation Between 2012 to 2014 and All Active Public Water Systems During the Last Three Years With Contaminant and Monitoring Violations

System Begins (Years)	Compliance Period (Years)	Community						Non-transient non-community						Transient non-community						TOTALS					
		Systems	SS*	MCL	%	MR	%	Systems	SS	MCL	%	MR	%	Systems	SS	MCL	%	MR	%	Systems	SS	MCL	%	MR	%
All Systems 2012-2014	2012-2014	2,097	71%	197	9%	531	25%	413	86%	31	8%	146	35%	3,759	99%	558	15%	1,395	37%	6,269	88%	786	13%	2,072	33%
New Systems that completed the Capacity Development requirements 2012-2014	2012-2014	12	58%	1	8%	3	25%	3	100%	0	0%	0	0%	0	0%	0	0%	0	0%	15	67%	1	7%	3	20%
Found Systems [β] 2012-2014	2012-2014	18	89%	1	6%	6	33%	11	73%	1	9%	7	64%	108	97%	17	16%	54	50%	141	91%	19	20%	67	49%

* *Small Systems (SS)* indicates percent of systems that serve less than 500 persons and operated during the indicated year.

[β] *Found Systems* indicates the number of public water systems identified during this three-year period that were not previously on the PWS Section inventory list. It is anticipated that the number of found systems will increase as PWS Section staff perform more inspections.

Table 3: The Number of Public Water Systems Beginning Operation Between 2007 and 2014 with Contaminant and Monitoring Violations

System Begins (Year)	Compliance Period (Year) †	Community						Non-transient non-community						Transient non-community						TOTALS					
		Systems	SS*	MCL	%	MR	%	Systems	SS	MCL	%	MR	%	Systems	SS	MCL	%	MR	%	Systems	SS	MCL	%	MR	%
2007	2007	27	93%	3	11%	7	26%	10	70%	1	10%	2	20%	55	100%	2	4%	28	60%	92	95%	6	7%	37	40%
	2008	27	93%	6	22%	4	15%	10	70%	0	0%	5	50%	53	100%	1	2%	20	49%	90	94%	7	8%	29	32%
	2009	27	93%	7	26%	3	11%	9	67%	0	0%	2	22%	51	100%	3	6%	17	19%	87	94%	10	11%	22	25%
	2010	27	93%	5	19%	3	11%	8	63%	0	0%	1	13%	47	100%	1	2%	12	18%	82	94%	6	7%	16	20%
	2011	26	88%	3	12%	3	12%	8	63%	0	0%	0	0%	46	100%	1	2%	9	12%	80	93%	4	5%	12	15%
	2012	22	91%	2	9%	1	5%	8	63%	0	0%	1	13%	44	100%	2	5%	9	15%	74	93%	4	5%	11	15%
	2013	22	91%	3	14%	0	0%	8	63%	0	0%	1	13%	40	100%	1	3%	6	13%	70	93%	4	6%	7	10%
	2014	21	90%	2	10%	0	0%	7	57%	0	0%	0	0%	37	100%	3	8%	5	7%	65	92%	5	8%	5	8%
2008	2008	20	90%	0	0%	3	15%	5	100%	0	0%	0	0%	48	100%	2	4%	21	50%	73	97%	2	3%	24	33%
	2009	19	89%	1	5%	1	5%	5	100%	0	0%	2	40%	46	100%	4	9%	16	38%	70	97%	5	7%	19	27%
	2010	19	84%	1	5%	1	5%	5	100%	0	0%	2	40%	43	100%	0	0%	6	34%	67	96%	1	1%	9	13%
	2011	19	84%	1	5%	1	5%	4	100%	0	0%	2	50%	42	100%	3	7%	8	26%	65	95%	4	6%	11	17%
	2012	19	84%	2	11%	1	5%	4	100%	0	0%	0	0%	40	100%	3	8%	8	75%	63	95%	5	8%	9	14%
	2013	19	79%	2	11%	1	5%	4	100%	0	0%	2	50%	37	95%	3	8%	5	21%	60	90%	5	8%	8	13%
	2014	16	75%	1	6%	0	0%	3	100%	0	0%	1	33%	37	95%	0	0%	6	15%	56	89%	1	2%	7	13%
2009	2009	7	100%	0	0%	2	29%	5	100%	0	0%	1	20%	51	100%	2	4%	23	44%	63	100%	2	3%	26	41%
	2010	7	100%	1	14%	0	0%	4	100%	0	0%	1	25%	51	100%	3	6%	16	38%	62	100%	4	6%	17	27%
	2011	7	86%	1	14%	0	0%	4	100%	0	0%	2	50%	48	100%	2	4%	11	16%	59	98%	3	5%	13	22%
	2012	7	86%	0	0%	0	0%	3	100%	0	0%	1	33%	47	100%	3	6%	11	19%	57	98%	3	5%	12	21%
	2013	7	86%	1	14%	2	29%	3	100%	0	0%	0	0%	46	100%	3	7%	9	20%	56	98%	4	7%	11	20%
	2014	6	50%	0	0%	1	17%	3	100%	0	0%	0	0%	44	100%	2	5%	12	13%	53	94%	2	4%	13	25%
2010	2010	26	85%	0	0%	8	31%	12	75%	1	8%	3	25%	63	100%	1	2%	27	54%	101	93%	2	2%	38	38%
	2011	26	85%	0	0%	3	12%	11	73%	0	0%	3	27%	63	100%	3	5%	14	34%	100	93%	3	3%	20	20%
	2012	25	84%	0	0%	1	4%	9	67%	0	0%	1	11%	56	100%	0	0%	7	23%	90	92%	0	0%	9	10%
	2013	23	87%	0	0%	3	13%	9	67%	0	0%	0	0%	54	100%	2	4%	6	23%	86	93%	2	2%	9	10%
	2014	22	86%	1	5%	2	9%	7	71%	0	0%	0	0%	53	100%	1	2%	8	20%	82	94%	2	2%	10	12%
2011	2011	13	100%	0	0%	3	23%	6	100%	0	0%	1	17%	59	98%	6	10%	23	44%	78	97%	6	8%	27	35%
	2012	12	100%	0	0%	2	17%	6	100%	0	0%	1	17%	57	98%	6	11%	14	22%	75	97%	6	8%	17	23%
	2013	12	100%	0	0%	0	0%	6	100%	0	0%	1	17%	51	100%	3	6%	7	14%	69	99%	3	4%	8	12%
	2014	12	100%	0	0%	0	0%	6	100%	0	0%	0	0%	49	100%	2	4%	3	11%	67	99%	2	3%	3	4%
2012	2012	14	71%	0	0%	4	29%	9	89%	0	0%	4	44%	44	98%	4	9%	21	39%	67	91%	4	6%	29	43%
	2013	14	71%	2	14%	0	0%	9	89%	1	11%	4	44%	44	98%	7	16%	11	24%	67	91%	10	15%	15	22%
	2014	14	71%	0	0%	0	0%	9	89%	1	11%	2	22%	38	97%	3	8%	7	14%	61	90%	4	7%	9	15%
2013	2013	12	83%	0	0%	3	25%	3	67%	0	0%	1	33%	28	93%	4	14%	13	50%	43	88%	4	9%	17	40%
	2014	12	83%	0	0%	2	17%	3	67%	0	0%	2	67%	28	89%	1	4%	9	25%	43	88%	1	2%	13	30%
2014	2014	4	75%	0	0%	2	50%	2	50%	0	0%	0	0%	25	100%	2	8%	7	50%	31	94%	2	6%	9	29%

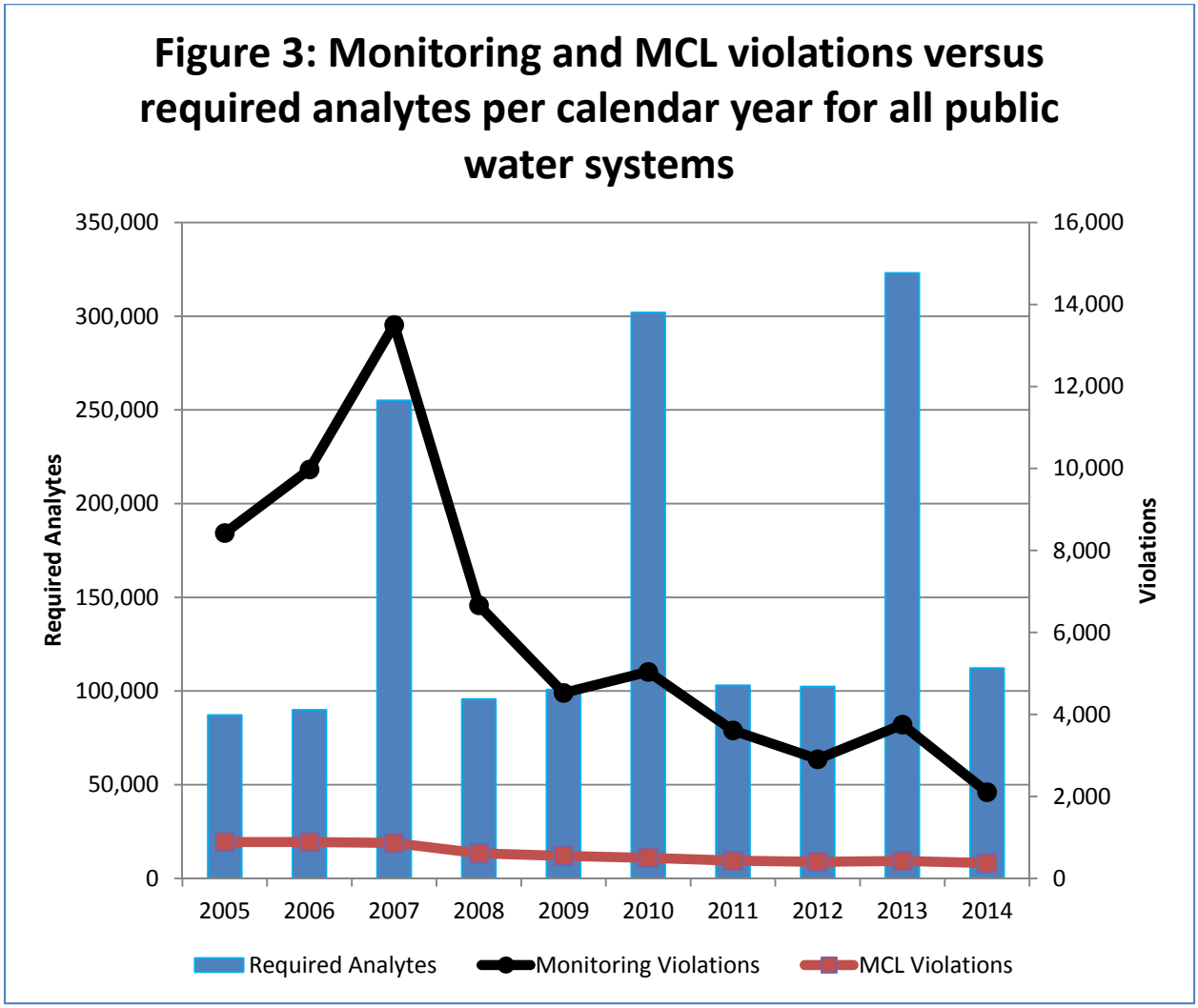
* *Small Systems (SS)* indicates percent of systems that serve less than 500 persons and operated during the indicated year.

† *Compliance Period (Year)* summarizes the number of new systems that remain active and their compliance for each subsequent compliance period. For example, in 2014, only 21 of the 27 community systems that began operation in 2007 were still active.

2.4 Violations versus Required Contaminant Sampling Events

The PWS Section analyzed contaminant monitoring schedules from 2005 through 2014 with respect to the total number of analytes, since many contaminant schedules include multiple analytes. Each analyte is a chemical compound, element or specific biological group required for analysis under state and federal rules, and omission of a single analyte results in a violation. Staff compared the number of analytes required for analysis to the number of monitoring and MCL violations issued for each calendar year during 2005 through 2014.

Figure 3 shows the total number of required analytes as bars (referenced by the scale on the left axis) versus the number of monitoring and MCL violations as lines (referenced by the scale on the right axis) issued to water systems during each calendar year. This figure shows that despite the substantial number of analytes required for analysis, the number of violations has decreased markedly since 2005. Many federal drinking water rules require three-year cyclical sampling to be performed and reported by the end of the three-year compliance periods ending in 2007, 2010, 2013, etc. The large increases of required analytes in 2007, 2010 and 2013 are due to these three-year compliance periods. Triennial samples that were not collected in 2007 resulted in the large spike in monitoring violations. The 2010 and 2013 data do not show a similar spike, which implies that activities performed by regional office staff, outreach efforts by central office staff, PWS Section-hosted trainings and other programs had a positive effect on monitoring compliance. Note that MCL violations dropped from 889 to 375 during the 10-year period.



3.0 Assessing Capacity through Capacity Development Program Objectives

The August 2000 report, "North Carolina's Capacity Development Strategy for Existing Public Water Systems," identified indicators to evaluate the progress of the Capacity Development Program. Below is an excerpt from this report.

> The primary component of North Carolina's Capacity Development Program is an evaluation of technical, managerial and financial capacity during the planning stages of new construction, expansion or system alteration. Therefore, a key indicator of water system capacity is compliance with the requirements specified in Section .0300 of the *Rules Governing Public Water Systems*. Specifically, the PWS Section uses existing databases to track the following information:
>
> - Number of public water systems with approved plans and specifications,
> - Number of public water systems with a completed water system management plan (WSMP),
> - Number of public water system projects with a submitted engineer's certification that documents the system is constructed in accordance with approved plans and specifications,
> - Number of public water system projects with an applicant certification that documents the system has an operation and maintenance plan and an emergency management plan
> - Number of public water systems that have an appropriate certified operator in responsible charge.
>
> The above information, in addition to compliance information, is used to measure improvements in capacity.
>
> In addition, the PWS Section tracks the number of water supply intakes with state-approved source water protection plans and/or source water assessments as a measure of improved capacity.

Supporting activities for capacity development include compliance and enforcement, source water protection planning and related activities that encourage local participation in drinking water protection activities. The PWS Section continues to explore ways in which information from these activities can enhance the capacity of regulated water systems.

3.1 Increases in Systems Completing Capacity Development Measures

Table 4 (page 11) is a summary of the numbers of systems that have completed the specific Capacity Development Program activities identified in Section 3.0. This table provides the percent completed compared to the total community and non-transient non-community systems.

By program definition, systems that complete the measures depicted in Table 4 increase their capacity. The systems represented in Table 4, with plans approved, have water infrastructure designed in accordance with applicable rules that help to ensure the water is treated and distributed safely. Systems covered by valid WSMPs have acknowledged their water system policies and have certified that their anticipated budget allows the system to remain viable over time. Systems with applicant certifications for projects have operation and maintenance protocols and emergency management plans. These are used for upkeep of the water system and can be applied during water-related emergencies. Systems with final approval have completed all the capacity development measures for at least one project.

Table 4: Capacity Development Measures

10/1/99 through:	Total Number of Community and Non-transient non-community Systems	Systems with Plans Submitted		Systems with Plans Approved		Systems Covered by Complete Water System Management Plans‡		Systems with Engineer's Certification		Systems with O&M and EM Plans*		Systems with Final Approval**	
		#	%	#	%	#	%	#	%	#	%	#	%
Dec. 31, 2004	3,045	1,212	39.8	1,012	33.2	1,419	46.1	718	23.6	439	14.4	428	14.1
Dec. 31, 2005	2,776	1,310	47.2	1,118	40.3	1,501	52.3	839	30.2	538	19.4	549	19.8
Dec. 31, 2006	2,749	1,399	50.9	1,210	44.0	1,551	54.6	939	34.2	711	25.9	727	26.4
Dec. 31, 2007	2,705	1,477	54.6	1,291	47.7	1,573	56.2	1,076	39.8	995	36.8	954	35.3
Dec. 31, 2008	2,649	1,564	58.9	1,366	51.5	1,597	59.9	1,173	44.2	1,104	41.6	1,077	40.6
Dec. 31, 2009	2,549	1,644	63.2	1,445	55.6	1,584	60.6	1,310	50.4	1,255	48.3	1,247	47.9
Dec. 31, 2010	2,592	1,701	65.6	1,503	57.9	1,616	61.9	1,385	53.4	1,336	51.5	1,328	51.2
Dec. 31, 2011	2,546	1,744	68.5	1,554	61.0	1,622	63.4	1,450	57.0	1,406	55.2	1,398	54.9
Dec. 31, 2012	2,496	1,788	71.6	1,600	64.1	1,627	65.1	1,503	60.2	1,453	58.2	1,452	58.2
Dec. 31, 2013	2,471	1,829	74.0	1,645	66.6	1,640	66.2	1,555	62.9	1,506	60.9	1,508	61.0
Dec. 31, 2014	2,429	1,858	76.5	1,667	68.6	1,632	67.2	1,584	65.2	1,544	63.6	1,539	63.4

*Tank rehabilitation projects do not require an Applicant Certification or a WSMP. A water system may receive final approval for a tank rehabilitation project based on a valid engineer's certification only.

**It is important to note that not all projects are built during the same year that plans are approved and that an authorization to construct is issued. An authorization to construct is valid for a period of two years. Some projects that receive this authorization are not constructed.

‡ The number of systems covered by complete WSMPs has been updated to include multiple systems under single ownership with a master WSMP.

"*Systems with Plans Submitted*" means the number of systems with at least one set of engineering plans and specifications submitted for review during the indicated period.

"*Systems with Plans Approved*" means the number of systems with at least one set of engineering plans and specifications reviewed and approved during the indicated period.

"*Systems with Water System Management Plan Complete*" means the number of systems with at least one WSMP completed during the indicated period.

"*Systems with Engineer's Certification*" means the number of systems having at least one engineer's certification during the indicated period in which a project was constructed according to approved plans and specifications.

"*Systems with O&M and EM Plans"* means the number of systems having at least one applicant certification during the indicated period that a project had an operation and maintenance plan and an emergency management plan.

"*Systems with Final Approval"* means the number of systems meeting all our capacity development requirements during the indicated period and for which a permit to operate was issued.

The Capacity Development Program assures that an increasing number of public water systems have evaluated their capacity in accordance with the program's objectives as discussed in Section 3.0. From Oct. 1, 1999 through the end of 2014, approximately 1,860 systems submitted 27,369 projects for review; 1,539 systems achieved final approval status for 18,994 projects. The PWS Section sends written correspondence on a monthly basis to systems that have projects approaching their "authorization to construct" deadline and for which no engineer's certification or applicant certification have been received. This correspondence informs the system to submit the required documentation, request an extension of the authorization to construct, or withdraw the application if the project will not be constructed. As of Dec. 31, 2014, approximately 1,960 systems were covered by a WSMP self-assessment deemed satisfactory by the PWS Section. Note that one WSMP may include multiple systems under single ownership.

The PWS Section has received an average of approximately 1,600 plans per year since the inception of the Capacity Development Program. The PWS Section either approves the plans or issues comments for plans that do not meet minimum rule requirements. The PWS Section does not approve all plans submitted. Approximately 7% of plans are withdrawn by the applicant or recycled by the PWS Section due to the applicant's lack of response to comments after an extended period. The PWS Section sends reminder letters to applicants and provides an opportunity to respond to comments prior to recycling the project.

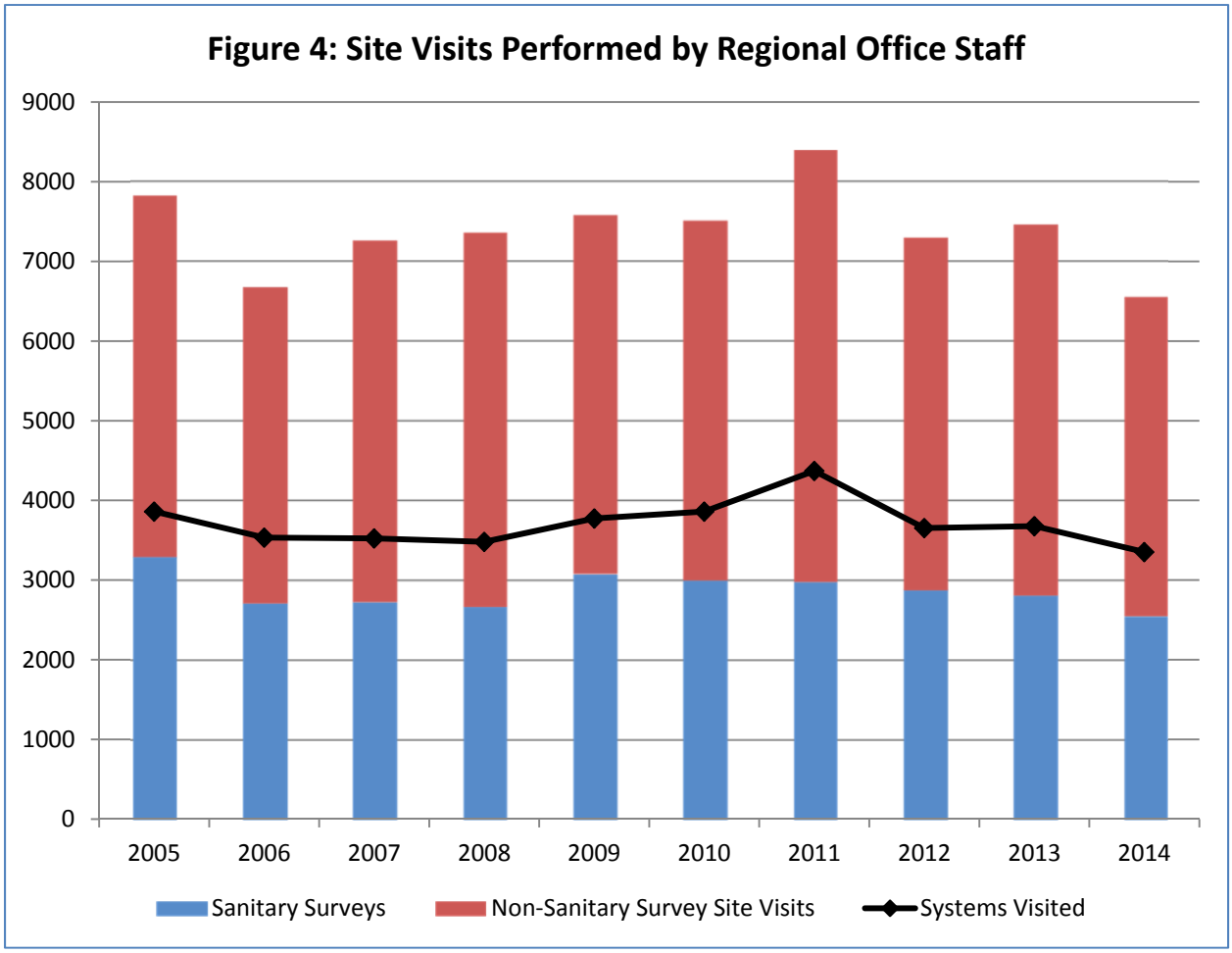
Completion of the Capacity Development Program requirements indicates that a public water system has completed both operation and maintenance plans and emergency management plans. These plans are valuable tools for the proper maintenance of the water system and provide incentive for the system to prepare for emergency and disaster events. With this requirement, the PWS Section has built a strong foundation regarding recent security concerns and federal requirements for vulnerability assessments and disaster preparedness for public water systems. A potential weakness, however, may be the lack of a requirement to update the plans on a set frequency.

4.0 The PWS Section Regional Offices

The PWS Section regional offices play a vital role in supporting and maintaining water system capacity throughout the state. Regional office staff provide services that are crucial to increasing water system capacity through better compliance with sampling and engineering infrastructure requirements. Regional office staff also provide input to improve system management, operations and operator compliance.

4.1 Site Visits

The seven regional offices provide support primarily through direct interaction with water systems. The most common reasons for visits are to perform sanitary surveys, provide technical assistance, perform informal and construction inspections, perform investigations regarding violations or complaints and to provide compliance assistance. As seen in Figure 4, the PWS Section regional office staff performed approximately 6,557 visits to water systems in 2014, of which 2,553 were sanitary surveys. The solid line depicts the number of systems visited annually and the stacked columns depict the number and type of visits performed per year.



Many site visits focus on customer service and provide assistance regarding technical and regulatory concerns. PWS Section regional staff often make several visits to a given system during the course of the year to help solve site-specific problems. Of the 3,352 water systems visited in 2014, 1,402 were community systems, which serve nearly 7.7 million consumers.

4.1.1 Sanitary Surveys

The sanitary survey is the most comprehensive site visit the regional offices perform. Sanitary surveys are EPA-mandated site visits performed by field staff to identify deficiencies in technical and managerial capacity. The PWS staff evaluate the following aspects of a water system during the sanitary survey:

- Source water,
- Water treatment,
- Distribution system,
- Finished water storage,
- System pumps,
- Monitoring and reporting data verification,
- Management and operations, and
- Operator compliance.

During the sanitary survey, the PWS Section staff member inspects the water system for approximately 190 potential deficiencies that can exist within the aspects listed above. The deficiency classifications range from significant deficiencies to minor deficiencies to recommendations. All significant and minor deficiencies are rule-based, whereas recommendations represent preferred practice. The regional staff assists water systems by providing technical assistance to correct any deficiencies that exist. Technical and managerial capacity issues are identified and corrected, because of these surveys. Additionally, the PWS Section regional staff is able to recommend improvements that have the potential to benefit the water system and improve capacity.

The PWS staff perform sanitary surveys at the minimum frequency of surface systems once a year, community well systems every three years, and non-community systems every five years.

4.1.2 Non-Sanitary Survey Site Visits

In addition to sanitary surveys, regional office staff perform other types of visits to water systems. Described below are the most common types of non-sanitary survey site visits.

- *Technical Assistance* – Staff provide assistance with technical issues that require industry knowledge and expertise. Examples of technical assistance visits include evaluating leaks, well water pump and storage issues, treatment adjustments, and cross connection control.
- *Informal System Inspection* – These inspections vary in scope and can include updating ownership information, testing residual disinfectant concentration, collecting new well information, reviewing rules with the owner or operator to facilitate compliance and other tasks.
- *Construction Inspection* – Staff periodically inspect projects under construction to confirm they are constructed in accordance with the approved plans and specifications. Any non-approvable variations noted during construction will have the opportunity to be corrected prior to completion of the project, which helps ensure that approved projects can be placed into service as quickly as possible.
- *Investigation* – Staff may choose to perform an investigation when a water system receives a violation or if a customer has issued a complaint regarding water service or quality. In the event of a coliform violation, regional staff may help collect samples to determine if the coliform contamination has been abated. PWS Section staff provide instruction if the water remains positive for coliform. Regional staff provide training to water system representatives for response to other violations. If there are customer complaints, regional staff communicate with the complainant and may collect and analyze water samples if warranted.
- *Compliance Assistance* – Regional staff provide education and materials to water system representatives to facilitate a return to compliance.

Visits performed by regional office staff help systems improve compliance with sampling and engineering infrastructure requirements, as well as with management, operations and operator compliance concerns.

5.0 The PWS Section Compliance Services Branch

The PWS Section has developed several initiatives that promote improvement of system compliance. The initiatives also improve the issuance and tracking of enforcement activities as well as the overall administration of the PWS Section's compliance program. The following initiatives were implemented:

- Provided system-specific regulatory and engineering consultation for systems intending to perform pilot studies, implement treatment changes or improve compliance with drinking water regulations;
- Worked with programmers on the development and testing of Lab Data Submittal (LDS) software and completed the implementation of electronic submittal of laboratory data for all drinking water contaminant groups; also updated the LDS User Manual; electronic submittal of laboratory data greatly reduced labor intensive manual data entries and increased compliance determination efficiency;
- Conducted training for a large laboratory on rules and data submission;
- Started preparing for the implementation of the Revised Total Coliform Rule (RTCR); activities included development of forms, guidance, SOPs and performance of numerous rule presentations to water system owner/operators, environmental consultants, and laboratory representatives; also assisted in the design of training materials and in the organization of the RTCR seminar performed by EPA staff;
- Completed rule-making for the Revised Total Coliform Rule; the Rule became effective in North Carolina on July 1, 2015;
- Provided full user acceptance testing of the RTCR functionalities in SDWIS 3.3 and provided direct feedback to SAIC;
- Worked with EPA contractors on development of SDWIS Prime; participated in EPA webinars and provided feedback, testing and user requirements;
- Implemented the use of an automated phone call system to remind systems of their upcoming compliance deadlines; calls have been used to remind systems of their upcoming CCR, Public Notification and Lead Consumer Notice deadlines and for monitoring requirements for the Total Coliform Rule and Lead and Copper Rule.

In addition to these initiatives, the Compliance Services Program continues to:

- Send letters and sample schedules explaining monitoring requirements to all new community and non-transient non-community water systems;
- Notify existing systems of increased or decreased monitoring requirements;
- Send unsatisfactory analyses back to laboratories and supply copies to the North Carolina Laboratory Certification Program;
- Send lists of candidates for monitoring violations to regional staff and laboratories in order to reduce the number of notices of violation sent to systems that sampled but did not have results submitted to the PWS Section;
- Include required forms for public notification as attachments to violation letters and provide other attachments, as necessary, such as public education and lead consumer notice templates and forms for performing lead and copper calculations and corrosion control studies;
- Issue penalties for monitoring violations and issue administrative orders for new MCL and treatment technique violations;
- Inform the Children's Environmental Health Program within DHHS of individual sample results that exceed the lead action level so that they can follow-up with the local health department and/or residents accordingly;
- Clarify and revise enforcement letters (notices of violation, administrative orders and administrative penalties) and use standardized templates for their ease of preparation;
- Improve the tracking and follow-up of contaminant violations by carefully reviewing remedial plans submitted by water systems;
- Incorporate remedial plans and public notices into enforcement proceedings;
- Coordinate the review of treatment change proposals with the Plan Review Unit and regional offices to determine potential impact on compliance schedules for contaminant groups such as lead and copper and disinfection byproducts;

- Modify queries to identify unaddressed violations for cleaning up and consequently reducing the number of water systems on the EPA enforcement targeting tool (ETT) priority list;
- Modify queries to identify violations that qualify to be returned to compliance (SOXed) and work with the programmer to SOX violations on a batch scale process;
- Modify queries to resolve errors prior to the quarterly FED-REP submittals in a continued effort to improve our data quality submitted to EPA;
- Continue the process of sending water systems "impending monitoring violations" for TCR and other contaminant group violations and began sending email notifications regarding other pending violations to provide better customer communication and improve compliance;
- Send "Reminder" emails to water systems regarding their upcoming compliance deadlines; and
- Step up enforcement on systems with prolonged MCL violations which included "Last Chance" letters followed up with penalties, as necessary.

6.0 PWS Section Support for Water System Infrastructure Funding

The Department of Environmental Quality, through the Drinking Water State Revolving Fund (DWSRF), has increased the capacity of water systems by providing funding mechanisms for capital improvement projects. DWSRF funding is available through low-interest and principal forgiveness loans. The DWSRF Program moved to the new Division of Water Infrastructure (DWI) effective July 1, 2013. The PWS Section and the DWSRF Program cooperate to ensure that funding enhances the capacity of public water systems.

The PWS Section's role in funding is to:

- Provide input to DWSRF prioritization;
- Determine technical and managerial capacity of applicants for funding;
- Provide additional system specific input to the DWSRF program on request;
- Provide data for DWSRF reporting;
- Participate in the DWSRF Needs Survey by delivering requests and providing technical assistance to water systems; and
- Utilize the 2%, 10% and 15 % set asides to support capacity development activities as described in the DWSRF Intended Use Plan.

The DWSRF role is discussed further in Section 9.1 of this document.

7.0 Drinking Water Protection

The PWS Section, through the N.C. Drinking Water Protection Program, offers services to assist in the protection of local drinking water sources. This program is non-regulatory. Water systems may voluntarily participate to improve their current and long-term capacity by implementing proactive steps to reduce potential contamination. The program offers technical assessments of the state's more than 9,000 drinking water sources, and it maintains financial incentives through a network of collaborating state agencies.

7.1 N.C. Drinking Water Protection Program

The PWS Section continued to improve and implement North Carolina's Drinking Water Protection (DWP) Program during the reporting period. The DWP Program evaluates the susceptibility to contamination and initiates protective strategies for the state's public drinking water resources. It is the only statewide program with an exclusive concentration on proactive drinking water source protection. Activities include delineation and assessment of drinking water sources, wellhead and surface water protection, coordination with other state agencies, and initiation of new programs designed to encourage local DWP Program efforts. These activities encourage public water systems to protect their water sources, supporting a multi-barrier approach to drinking water protection. Systems that maintain drinking water sources that are less susceptible to contamination may achieve greater financial and technical capacity because fewer resources may be expended for water treatment.

Partnership arrangements with other agencies and programs are a major component of the PWS Section's drinking water protection strategy. Specifically, other agencies integrate DWP Program data into their agendas and funding priorities. The DWP Program maintains relationships with agencies that fund agricultural best management

practices (BMPs), stormwater BMPs, land conservation, and stream restoration projects. Additionally, the N.C. DWP Program continued to facilitate a statewide collaborative (formed in December 2011) that includes representatives from university programs, government agencies, non-profit organizations, professional associations, and regional councils of government. This diverse and semi-autonomous group has agreed to provide expertise and resources to implement strategies that encourage DWP activities.

The DWP Program continued to improve the functionality of its geographic information system mapping applications, which exist to assist local governments, water system owners, volunteer organizations and other agencies with information vital to protect drinking water. Susceptibility ratings and associated assessment results are critical components of this data and are summarized in reports made available via the PWS Section's geographic information application, currently offline. Additionally, agencies enlisting drinking water protection as a priority item within their own environmental programs use the PWS Section's geographic information system locator to help locate and prioritize environmental projects. To see the GIS locator, go to: http://map.ncdenr.org/pws.

The N.C. DWP Program promotes and provides technical expertise to assist communities with local source water protection planning. The program uses a successful seven-step process across the state to protect both ground and surface water sources. To date, the PWS Section has approved eight local surface water protection (SWP) plans, which serve to protect drinking water for approximately 282,000 people. The source water protection planning process empowers local stakeholders to define and achieve long-term, proactive drinking water protection goals.

In 2014, state legislation (House Bill 894) was passed mandating SWP Planning. Due to their existing voluntary SWP planning process, the DWP Program was assigned the task of implementing the legislation. The regulation mandates the development and implementation of SWP plans for public water systems treating and furnishing water from surface supplies. A voluntary stakeholder team of over 70 professionals was assembled to provide guidance and recommendations regarding standardized SWP planning formats and to help identify mandatory provisions of implementation. The team will also critique draft rule language. Current stakeholders represent professional associations, non-profit organizations, councils of government, local government and local utilities, state and federal agencies, and industry representatives.

7.2 N.C. Wellhead Protection Program

The SDWA Amendments of 1986 established requirements for states to develop Wellhead Protection (WHP) programs. Congress intended these programs to be a key part of a national groundwater protection strategy, which prevents contamination of groundwater used for public drinking water. North Carolina's EPA-approved WHP Program is part of this national strategy. The WHP Program is a pollution prevention and management program designed to protect groundwater sources of public drinking water supply. Public water systems that choose to participate in the program develop and submit a local WHP plan to the PWS Section for review and approval.

In North Carolina, development of a local WHP plan is voluntary and viewed as a valuable supplement to existing state groundwater protection programs. The PWS Section's WHP Program is for public water systems that decide to provide added protection to their local groundwater supplies. Upon implementation, the local WHP plan reduces the susceptibility of wells to contaminants. The reduction of susceptibility to contamination increases the capacity for water systems to provide compliant drinking water by reducing the need to install costly treatment options to remove contaminants.

The PWS Section approved 15 WHP plans comprising 20 water systems during the current reporting period. Of these plans, six were renewals of previously approved plans. At the end of the current reporting period, there were 138 active WHP plans covering 155 PWS systems with 903 public water supply wells serving approximately 935,000 people. The PWS Section expects these plans will assist in reducing the susceptibility of these sources of public drinking water to contamination.

In addition to the review of completed WHP plan submittals, the WHP Program reviewed draft wellhead protection area (WHPA) delineations submitted by public water systems in the early stages of plan development. This allows the systems to receive tentative approval of their WHPAs prior to proceeding with development of the remaining plan components (*i.e.*, potential contamination source inventory, management plan, etc.), which could be impacted by changes to the WHPAs.

The WHP Program continued to provide support to the state's Source Water Assessment Program (SWAP) and the Drinking Water Protection Program. Program support included review of work products and analysis relevant to delineation and assessment activities participation in the Source Water Collaborative, as well as assisting in the generation of SWAP reports.

8.0 Operators Certification Program

The N.C. Water Treatment Facility Operators Certification Board has authority to oversee the examination of water system operators and the certification of their competency to operate drinking water system facilities. The NC Operator Certification Program, located within the Public Water Supply Section of the Division of Water Resources, provides support to serve the Board and implement its policies. Program staff perform a variety of functions that include: administering statewide examinations, approving continuing education opportunities, managing database and state records, providing training and outreach, depositing fee receipts, participating in the enforcement of Rules Governing Water Treatment Facility Operators (Title 15A Subchapter 18D), and coordinating an annual renewal process. North Carolina currently has approximately 5,400 certified water system operators with more than 7,000 active certifications.

The NC Operator Certification Program continues to increase the capacity of public water systems by influencing the technical training and increasing the competency of public water system operators. In 2014, changes were initiated to improve business efficiency and to expand customer services to the state's certified operator community. For example, the Operator Certification Program has initiated the development of new software for an online "portal" to access personal information from the operator database web-based mechanism to accept electronic fee payments, and completion of an on-site training facility to offer computerized examinations and educational opportunities. Additionally, the program is currently developing a series of training modules to help operators better prepare for examinations.

9.0 Partnerships

The PWS Section engages in voluntary and contractual partnerships to enhance capacity development efforts in North Carolina. Cooperation with the Division of Water Infrastructure (DWI) ensures that federal funds help increase capacity for public water systems. Participation with U.S. EPA's Area-Wide Optimization Program and contracts with the N.C. Rural Water Association and the UNC School of Government Environmental Finance Center serve to augment the already substantial efforts put forth by the PWS Section.

9.1 Drinking Water State Revolving Fund

The Drinking Water State Revolving Fund is administered by DWI, a sister division to the Division of Water Resources within the North Carolina Department of Environmental Quality. Water systems apply to the DWSRF Program for water infrastructure funding. The DWI prioritizes the applications and funds the highest priority projects. The DWSRF Program increases capacity for water systems by promoting the following short-term objectives:

- Provide loans to reduce acute health risks;
- Provide loans to enable water systems with the adequate capacity to consolidate non-viable water systems;
- Provide funding for preventative and efficiency measures, such as replacement of aging infrastructure; and
- Provide technical assistance for small systems.

The DWSRF Program also increases capacity for water systems by promoting the following long-term objectives:

- Increase the percent of population served by safe public water systems;
- Increase the safety of public water systems;
- Promote safe and affordable drinking water by reducing costs associated with capital improvements;
- Assist water systems to remain compliant with increasingly complex rules under the *Safe Drinking Water Act*; and
- Ensure technical integrity of the proposed water system improvements, advocate self-sufficiency, protect water resources from new pollution sources and promote sustainability.

As of the end of Fiscal Year 2015, approximately $582 million of DWSRF Program funds were committed to systems in the form of low-interest and principal forgiveness loans. The DWSRF Program continually increases its ability to provide low-interest loans to water systems through federal capitalization grants, the required 20 percent state match and the repayment-funding stream of revolving loans.

9.1.1 Failing System Loans

Some systems, especially small systems, lack the resources to consistently provide safe drinking water to the public as the *Safe Drinking Water Act* requires, resulting in long-term noncompliance. Principal forgiveness loans are available to water systems having adequate capacity that take over such a failing system. In most cases, the project includes connecting the failing system to the rescuing system and replacing the distribution system in the failing system. Currently, the DWSRF Program is working to consolidate two non-viable public water systems serving about 350 consumers. Completion of these consolidation projects will give these consumers access to water systems with greater capacity. By these efforts, the DWSRF Program has previously consolidated 24 failing systems since the program's inception in 2004.

9.2 Area-Wide Optimization Program

The Area-Wide Optimization Program, or AWOP, is a joint program between the EPA and the states. EPA developed the program to help water systems meet increasingly stringent regulations and achieve higher levels of water quality. The PWS Section has participated in AWOP since 2000 and works cooperatively with water systems to use existing equipment and treatment processes to improve or optimize water quality.

A typical scenario under AWOP is for PWS Section employees, AWOP participants from other states, representatives from the EPA, and the water system operators to optimize the water treatment processes of a water system that has volunteered to host the AWOP activities. These activities enhance capacity by optimizing the capabilities of the volunteering water system while allowing all AWOP participants to share and increase their knowledge of water treatment.

In 2014, AWOP team members were involved in many outreach activities at water systems throughout the state. North Carolina AWOP staff coordinated a distribution comprehensive performance evaluation (CPE) in Mount Airy, NC and participated in CPEs in other states. Staff also assisted the town of Yanceyville with an abbreviated CPE-like event focusing on disinfection byproducts.

The PWS Section has awarded 42 water treatment facilities the 2014 AWOP Award for optimized treatment. PWS Section regional staff present these awards in the presence of the governing body of the water system. The PWS Section awards water systems each year that demonstrate outstanding turbidity and microbial removal and for meeting performance goals that are more stringent than the state and federal drinking water standards. Water systems meet these goals by increased surveillance, by reducing treatment fluctuations and by maintaining excellent coagulation and filter performance. By reaching this level of optimized performance, employees of these water systems have demonstrated their dedication to provide their customers with the best possible drinking water quality. Providing public recognition of these awards builds elected officials' support with the utility staff activities and may help expand the number of participating systems.

9.3 UNC School of Government Environmental Finance Center

The PWS Section, through partnership with the UNC School of Government's Environmental Finance Center, has assisted in the establishment and strengthening of partnerships and collaboration between water systems, maintaining sustainable finances and rate setting. The Environmental Finance Center updated deliverables from previous contracts and executed new projects.

The Environmental Finance Center is currently working with the PWS Section on the following projects:

- Assessing the managerial capacity of water systems in North Carolina and ranking systems in terms of their managerial capacity needs;
- Training to assist water systems with managerial capacity needs; and
- Assessing the feasibility of water system management partnerships.

The projects under development will assist water systems with financial planning and enable the PWS Section to increase the financial capacity of water systems in North Carolina.

9.4 N.C. Rural Water Association

The PWS Section has a contractual agreement with the N.C. Rural Water Association for circuit riders to provide technical assistance to water systems that serve less than 10,000 people. A circuit rider receives system referrals from the PWS Section and requests for assistance from other sources. During the reporting period, the circuit riders completed 871 contacts to systems with issues such as compliance and treatment, operation and maintenance, water loss and leak detection, management techniques and emergency response. Circuit riders conduct initial visits to referred water systems to explain monitoring requirements and to enhance the systems' ability to meet all regulatory requirements.

10.0 Conclusion

Water system compliance has increased significantly since the PWS Section started implementing the capacity development strategies discussed in this report. During this time, implementation of several federal drinking water rules occurred. This initiated additional sampling requirements and new MCLs, resulting in a more complex regulatory environment for water systems. The PWS Section continues to add new initiatives to improve compliance. Compliance with sample collection and monitoring requirements has increased from 55 percent of systems in 1999 to 87 percent of systems in 2014. Compliance with MCLs has remained roughly constant during the period.

The PWS Section focuses the intent of all activities to increase water system compliance and the protection of public health. Some of these include:

- Regional office site visits,
- Central office-sponsored trainings and outreach activities,
- Review and approval of water system infrastructure plans,
- Certification and training of water system operators, and
- Partnerships with other institutions to increase system outreach activities and develop tools to aid in achieving and maintaining compliance.

The PWS Section believes these activities continue to improve overall water system compliance throughout the state and that these activities will continue to be crucial to achieving and maintaining water system compliance with federal drinking water rules.

Appendix A

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Table A.1: Schedule of New Rule Implementation by EPA

Calendar Year	Rule	New Monitoring Requirements	New Level (MCL or Treatment Technique) Requirements	System Description
2002	Arsenic		MCL lowered from 0.05 mg/l to 0.01 mg/l	CWS, NTNC
2002	Disinfectants and Disinfection Byproducts Rule (DDBP)	THM and HAA quarterly sampling	THM MCL lowered from 0.10 mg/L to 0.080 mg/L as a running annual average (RAA). HAA MCL established at 0.060 mg/L as RAA.	CWS, NTNC Subpart H, population >= 10,000
2002	DDBP	Disinfectant residual monthly sampling (with total coliform rule schedule)	Chlorine and chloramines maximum residual disinfectant level established at 4.0 mg/L as RAA.	CWS, NTNC Subpart H, population >= 10,000
2002	DDBP	Total organic carbon (TOC) monthly monitoring	Treatment technique for TOC removal; ratio of actual to required removal >= 1.00 as RAA.	CWS, NTNC Subpart H, population >= 10,000
2002	DDBP	Bromate monthly monitoring	Bromate < 0.010 as RAA.	CWS, NTNC Subpart H using ozone, population >= 10,000
2002	Interim Enhanced Surface Water Treatment Rule (IESWTR)	Profiling and benchmarking		All system types Subpart H, population >= 10,000
2002	IESWTR	Turbidity	Maximum turbidity level lowered from 5 NTU to 1 NTU. 95% turbidity level lowered from 1 NTU to 0.3 NTU.	All system types Subpart H, population >= 10,000
2004	DDBP	THM and HAA quarterly or annual sampling	THM MCL lowered from 0.10 mg/L to 0.080 mg/L as RAA. HAA MCL established at 0.060 mg/L as RAA.	CWS, NTNC Subpart H including populations < 10,000; Groundwater
2004	DDBP	Disinfectant residual monthly sampling (with TCR schedule)	Chlorine and chloramine maximum residual disinfectant levels established at 4.0 mg/L as RAA.	CWS, NTNC Subpart H including populations < 10,000; Groundwater
2004	DDBP	TOC monthly monitoring	Treatment technique for TOC removal; ratio of actual to required removal >= 1.00 as RAA.	CWS, NTNC Subpart H including populations < 10000
2004	DDBP	Bromate monthly monitoring	Bromate < 0.010 as RAA.	CWS, NTNC Subpart H including populations < 10,000; Groundwater

Cont'd on page A-3

Table A.1 cont'd: Schedule of New Rule Implementation by EPA

Calendar Year	Rule	New Monitoring Requirements	New Level (MCL or Treatment Technique) Requirements	System Description
2005	Long Term 1 Surface Water Treatment Rule (LT1SWTR)	Profiling and benchmarking		All system types Subpart H, populations <10,000
2005	LT1SWTR	Turbidity	Maximum turbidity level lowered from 5 NTU to 1 NTU. 95% turbidity level lowered from 1 NTU to 0.3 NTU.	All system types Subpart H, populations <10,000
2008	Radionuclides	Radium 228, monitored at each entry point	Although new radionuclides monitoring requirements do not take effect until 2008, a number of systems began monitoring early in order to grandfather data. Early monitoring led to additional MCL violations.	CWS
2009	Ground Water Rule	Microbial source water monitoring	Introduces source water monitoring requirements and treatment technique requirements for groundwater systems.	All system types Not Subpart H
2012	Stage 2 Disinfectant / Disinfection Byproducts Rule	Location-specific sampling points in the distribution system	MCLs and regulated contaminants do not change but compliance is calculated by locational running annual average. Every sampling site must be compliant with MCL.	CWS, NTNC