

North Carolina's Capacity Development Report for Public Water Systems

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Public Water Supply Section
Division of Environmental Health
Department of Environment and Natural Resources



STATE OF NORTH CAROLINA

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<http://www.deh.enr.state.nc.us/pws/>

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LIST OF ACRONYMS

ARRA	American Recovery and Reinvestment Act of 2009
Capacity	Technical, Managerial and Financial Capacity
DCP	Disadvantaged Communities Program
EPA	United States Environmental Protection Agency
EFC	Environmental Finance Center
NCRWA	North Carolina Rural Water Association
NCWOA	North Carolina Waterworks Operators Association
ORC	Operator in Responsible Charge
PWS Section	North Carolina Public Water Supply Section
SDWA	Safe Drinking Water Act
SDWIS	The Safe Drinking Water Information System (database)
SWAP	Source Water Assessment Program
UNC	University of North Carolina

I. EXECUTIVE SUMMARY

The Public Water Supply Section (PWS Section) of the North Carolina Department of Environment and Natural Resources is the primary agency responsible for assuring that the people of North Carolina are provided safe drinking water from public systems. Public water systems range from large municipalities to country stores that serve a minimum of 25 individuals for 60 days per year. The complexity of the federal Safe Drinking Water Act (SDWA) can make compliance difficult to achieve for many small systems. Of the approximately 6,650 regulated public water systems, about 5,880 serve a population of less than 500.

The PWS Section has a long history of responding to needs of public water suppliers through:

- surveillance of all public water supplies,
- enforcement of public water supply rules,
- consultation and assistance in planning and designing water supply systems,
- assistance with source water protection,
- review of technical plans and specifications for water supply construction,
- providing training programs for water works operators,
- investigation of hazards that may affect public water supplies, and
- administration of loans, grants, and bonds available for system improvements.

The 1996 Safe Drinking Water Act Amendments establish the concept of capacity development. Capacity is comprised of technical, managerial, and financial components and is intended to help water systems meet national primary drinking water regulations. The PWS Section responded to this requirement by creating the Capacity Development Program. The goal of this program is to require technical, managerial, and financial planning of new community and non-transient non-community water systems to improve the service and sustainability of the systems. The Capacity Development Program also involves the State's ability to enforce requirements of the North Carolina Drinking Water Act. The Capacity of the PWS Section is enhanced by the coordination of these efforts.

In October 1999, the PWS Section adopted revised rules requiring a self-assessment from new and altered community and non-transient non-community water systems. The self-assessment must document the water system's technical, managerial, and financial viability and must be submitted to the State. The self-assessment includes requirements for describing routine operation as well as emergency response and is used to assess whether or not the public water suppliers have demonstrated the capacity to operate. This has placed the PWS Section and the public water suppliers in an excellent position to better determine areas of strengths, weaknesses, challenges and opportunities. This information helps systems and the PWS Section to be more effective in meeting the challenge of providing safe and reliable public drinking water.

In 2008, the PWS Section continues to maintain success in the Capacity Development Program. In the last nine years the PWS Section has:

- reduced the number of public water suppliers operating in non-compliance,
- reduced the risk of system expansion without adequate capacity,
- reduced errors in system monitoring and reporting violations,
- increased coordination within the PWS Section, and
- increased the number of systems with complete Operations & Maintenance and Emergency Management Plans.

The PWS Section will continue to grow and adapt to changing needs in order to help public water suppliers meet the need of providing safe drinking water in the State of North Carolina.

II. PROGRAM SETTING: *CAPACITY REQUIREMENTS*

II.A Background

The 1996 federal Safe Drinking Water Act (SDWA) Amendments obligated States to obtain the means to ensure that all new community water systems and new non-transient non-community water systems beginning operation after October 1, 1999 demonstrate technical, managerial, and financial capacity with respect to each national primary drinking water regulation in effect, or likely to be in effect, on the date operations start. Each state could develop a unique program to meet its specific needs. The goal of the Capacity Development Program is to require technical, managerial, and financial planning of new community and non-transient non-community water systems to improve the service and sustainability of the systems. 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.

Even before the 1996 SDWA Amendments, North Carolina recognized the importance of public water system Capacity. Historically, the PWS Section found that larger municipal systems were generally well managed, but smaller systems were often lacking essential skills or resources to operate properly. Of the approximately 6,650 regulated public water systems, about 5,880 (88 percent) serve a population of less than 500. The PWS Section saw these systems as having huge needs that were not being adequately addressed.

Table 1 provides figures that show the ability of public water systems in North Carolina to comply with federal and state drinking water regulations. These systems are categorized by type and size of population served. The table shows the total number of systems in each category and the number receiving at least one violation with regard to the maximum permissible level of a contaminant in water delivered by a public water system. 1999 data is shown for comparison since the capacity development rules took effect October 1, 1999 and were not fully implemented until the year 2000. Table 1 also shows the number of systems receiving at least one violation for failure to monitor for required water quality tests for each year over a four-year period. Additionally, Table 1 provides the percentages of systems affected by violations as compared to the total number of active water systems within the given population group. These figures indicate that 23 percent of public water systems had at least one monitoring failure in 2008. (This failure could include missing one monthly sample that year. Since a typical system monitors at least monthly and has many required tests, missing a single test over the course of a year is shown as a violation.) These numbers confirm that the vast majority of systems with deficiencies are ones that serve less than 500 people. The data included in Table 1 are also shown in graphical format in Appendix A. A large percentage of the water systems in violation each year are transient water systems, which is clearly demonstrated in Figures A.1 and A.2.

It is important to note that having a monitoring violation does not necessarily equate to unsafe water. Another way of looking at compliance is by determining the number of people served by compliant public water systems. As shown in Table 2, compliance rates based on population served have increased over the last four years. The overall increase in compliance levels from 2005 through 2008 can be attributed to: (1) successful Capacity Development efforts and subsequent system compliance; and (2) the change of data management programs by the PWS Section.

On-going Capacity Development efforts have enabled compliance levels to increase since the capacity development rules took effect in 1999. Activities such as effective compliance and enforcement, onsite visits, technical assistance and consolidation of “problem” systems with more reliable ones have gradually improved compliance for the last several years. As shown in Table 1 and Table A.2 (note that Table A.2 appears in Appendix A), monitoring and reporting compliance levels in transient non-community water systems have increased significantly since 1999. Monitoring and reporting compliance levels in community systems increased between 2005 and 2008, while MCL compliance levels have varied year to year.

Possible reasons for variations in compliance levels include the cyclic occurrence of asbestos monitoring compliance and the implementation of new drinking water rules such as Stage 1 Disinfectants and

Disinfection By-Products Rule, Radionuclide Rule, Interim Enhanced and Long-Term 1 Surface Water Treatment Rules. A history of recent rule implementation is included in Appendix B.

Compliance measures were also affected by the PWS Sections' change from its traditional database management system (FOCUS) to EPA's Safe Drinking Water Information System (SDWIS). For reporting purposes, compliance levels are calculated based on the end of the compliance period for a given contaminant. Compliance levels were calculated based on federally defined water system types. Some water systems that were included in capacity development reports published during the time period of 2001-2006 are "nonpublic" systems (not subject to federal regulation) and are not included in the current report.

One of the challenges presented to the PWS Section is maintaining compliance of systems that began operation within the last three years (new systems). As shown in Table 3 and Figures 1 through 6, compliance levels of new systems vary widely. Table 4 indicates that new water systems have lower compliance with monitoring and reporting requirements in the first three years of operation than existing water systems do for the same time period. The data gathered suggests that these systems experienced difficulty performing the required monitoring necessary to remain compliant. One study performed by the PWS Section of new system compliance activities indicated that: (1) many owners/operators are confused about monitoring requirements; and (2) the proper number of lead and copper samples are not collected due to rule misinterpretation or misunderstanding. Further investigation is needed to determine why systems that began operation within the last three years have these compliance issues. The PWS Section will continue to explore strategies that will assist new systems to achieve fully compliant operations.

A comparison of Tables 1 through 4 highlights the dilemma the PWS Section faces in working with public water systems in North Carolina. Even though a great majority of the citizens of North Carolina are served by compliant community public water systems, the number of small systems needing improvements in Capacity is also large. Figures A.3 and A.4 are included in Appendix A. These tables further demonstrate the dichotomy between the number of community water systems with violations and the population served by non-compliant community water systems. Violations in small water systems typically have a minimal impact on population served but are very resource-intensive to address. Violations in a few large water systems can substantially reduce the population served by compliant community water systems.

This has created a resources challenge for the PWS Section in balancing priorities on efforts that would provide the greatest public benefit as well as assisting the greatest number of systems. As we continue to automate and streamline our compliance processes, our limited resources can be shifted somewhat to better assist small systems.

Table 1: The Number of Public Water Systems with Contaminant and Monitoring Violations

Calendar Year	Community						Non-transient non-community					Transient non-community					TOTALS				
	Population	Systems	MCL	%	MR	%	Systems	MCL	%	MR	%	Systems	MCL	%	MR	%	Systems	MCL	%	MR	%
1999 (baseline)	< 500	1,710	45	3%	487	28%	552	25	5%	180	33%	6,016	267	4%	3,315	55%	8,278	337	4%	3,982	48%
	500-9,999	557	10	2%	154	28%	132	1	1%	28	21%	85	0	0%	34	40%	774	11	1%	216	28%
	10,000-49,999	92	4	4%	15	16%	0					0					92	4	4%	15	16%
	≥ 50,000	24	1	4%	2	8%	0					0					24	1	4%	2	8%
	Totals	2,383	60	3%	658	28%	684	26	4%	208	30%	6,101	267	4%	3,349	55%	9,168	353	4%	4,215	46%
2005	< 500	1,604	76	5%	418	26%	454	22	5%	141	31%	4,252	242	6%	1,548	36%	6,310	340	5%	2,107	33%
	500-9,999	504	88	17%	138	27%	105	5	5%	36	34%	66	3	5%	14	21%	675	96	14%	188	28%
	10,000-49,999	92	11	12%	19	21%	0					0					92	11	12%	19	21%
	≥ 50,000	23	2	9%	3	13%	0					0					23	2	9%	3	13%
	Total	2,223	177	8%	578	26%	559	27	5%	177	32%	4,318	245	6%	1,562	36%	7,100	449	6%	2,317	33%
2006	< 500	1,581	93	6%	408	26%	450	14	3%	158	35%	4,141	206	5%	1,540	37%	6,172	313	5%	2,106	34%
	500-9,999	507	69	14%	128	25%	100	3	3%	34	34%	60	1	2%	12	20%	667	73	11%	174	26%
	10,000-49,999	91	8	9%	24	26%	0					0					91	8	9%	24	26%
	≥ 50,000	26	4	15%	5	19%	0					0					26	4	15%	5	19%
	Total	2,205	174	8%	565	26%	550	17	3%	192	35%	4,201	207	5%	1,552	37%	6,956	398	6%	2,309	33%
2007	< 500	1,566	73	5%	367	23%	428	20	5%	129	30%	4,042	208	5%	1,328	33%	6,036	301	5%	1,824	30%
	500-9,999	500	67	13%	124	25%	99	0	0%	28	28%	61	3	5%	17	28%	660	70	11%	169	26%
	10,000-49,999	91	8	9%	16	18%	0					0					91	8	9%	16	18%
	≥ 50,000	27	1	4%	6	22%	0					0					27	1	4%	6	22%
	Total	2,184	149	7%	513	23%	527	20	4%	157	30%	4,103	211	5%	1,345	33%	6,814	380	6%	2,015	30%
2008	< 500	1,550	67	4%	283	18%	397	16	4%	74	19%	3,937	172	4%	1,032	26%	5,884	255	4%	1,389	24%
	500-9,999	496	58	12%	73	15%	93	1	1%	17	18%	54	1	2%	9	17%	643	60	9%	99	15%
	10,000-49,999	96	8	8%	15	16%	0					0					96	8	8%	15	16%
	≥ 50,000	28	1	4%	1	4%	0					0					28	1	4%	1	4%
	Total	2,170	134	6%	372	17%	490	17	3%	91	19%	3,991	173	4%	1,041	26%	6,651	324	5%	1,504	23%

* Data were generated from the SDWIS database. Data in previous reports were generated from the legacy database and data for all years have been recalculated based on the SDWIS database. The classification of some water systems has been adjusted to match EPA water system type codes; a number of water systems included in previous reports are considered by EPA to be nonpublic systems and are not subject to federal regulation. Information is believed to be reliable and has been verified and revised as part of the data migration process.

† “Population” indicates the grouping of systems by the number of people served. The legacy database did not maintain a record of historical population of a water system and violation data for 1999-2004 and part of 2005 are reported based on the single population of record. Data entered into the SDWIS database on or after October 1, 2005 includes a record of populations. Violation data for the end of 2005, 2006, 2007 and 2008 are reported based on the latest population reported for the calendar year.

‡ “Systems” means the number of public water systems serving the population size indicated.

(Footnotes continued on page 5.)

(Footnotes continued from page 4.)

§ “MCL” means a violation with regards to the maximum permissible level of a contaminant in water delivered by a public water system.

¶ “MR” means a failure to monitor for required water quality tests as defined by federal and state regulations.

Table 1 is a summary of the number of systems receiving one or more contaminant exceedance or monitoring violations in the given time period. The compliance rates do not account for the ever-increasing number of contaminants required for testing. New complex testing requirements have resulted in more monitoring violations. This will cause a lower compliance rate unless compensating improvements are made in other contaminant testing areas.

Systems with MR violations (Table 1) are largely due to the fact that water systems have numerous opportunities to collect and report on water quality. A typical system monitors at least monthly and has a large number of required tests. A system missing a single test over the course of a year will be shown as a violator.

The MCL violations (Table 1) 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 over the course of one year. Most systems receiving bacteriological MCL violations return to compliance by the next compliance period. However, a public water system receiving at least one violation will appear on this table.

Table 2: Population Served by Compliant Community Public Water Systems

Compliance Measures	1999 (baseline)		2005		2006		2007		2008	
	Population [±]	Percent	Population [†]	Percent	Population [‡]	Percent	Population	Percent	Population	Percent
Citizens Served by Community Public Water Systems having No MCL* Violations	6,475,785	97.5%	5,394,411	81.8%	6,223,402	90.3%	6,330,349	89.5%	6,911,587	94.4%
Citizens Served by Community Public Water Systems having No MR [†] Violations	5,801,083	87.3%	5,508,432	83.5%	5,276,662	76.6%	5,885,169	83.2%	6,801,982	92.9%
Total Service Population	6,644,281		6,593,666		6,891,597		7,074,704		7,325,053	

* “MCL” means a violation with regards to the maximum permissible contaminant level in water delivered by a public water system.

† “MR” means a failure to monitor for required water quality tests as defined by federal and state regulations and for 1999 through the first half of 2005 includes systems that failed to report on time.

± The legacy database did not maintain a record of historical population of a water system and violation data for 1-FY 2005 are reported based on the single population of record. Data entered into the SDWIS database on or after October 1, 2005 includes a record of populations. Violation data for the latter half of 2005 and years 2006 and 2007 are reported based on the latest population reported for the year.

[†]In 2005, two large systems received MCL violations that were quickly resolved. The combined population of these two systems is approximately 12% of the total service population.

[‡]In 2006, one large system with a population serving 6% of the total service population received a monitoring violation.

Table 3: The Number of Public Water Systems Beginning 2001 to 2008 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	%	
2001	2001	102	61%	1	1%	9	9%	29	100%	0	0%	16	55%	305	97%	18	6%	183	60%	436	89%	19	4%	208	48%	
	2002	99	61%	0	0%	20	20%	26	100%	2	8%	12	46%	294	98%	28	10%	196	67%	419	89%	30	7%	228	54%	
	2003	98	60%	0	0%	18	18%	23	100%	1	4%	10	43%	275	97%	19	7%	146	53%	396	88%	20	5%	174	44%	
	2004	94	60%	1	1%	14	15%	19	100%	2	11%	10	53%	256	98%	17	7%	101	39%	369	88%	20	5%	125	34%	
	2005	37	86%	1	3%	7	19%	19	100%	1	5%	9	47%	241	98%	17	7%	82	34%	297	97%	19	6%	98	33%	
	2006	36	83%	2	6%	5	14%	19	95%	2	11%	8	42%	227	98%	14	6%	76	33%	282	96%	18	6%	89	32%	
	2007	36	83%	1	3%	5	14%	15	93%	1	7%	7	47%	212	98%	11	5%	71	33%	263	96%	13	5%	83	32%	
	2008	35	83%	1	3%	1	3%	14	93%	2	14%	3	21%	199	98%	9	5%	56	28%	248	96%	12	5%	60	24%	
2002	2002	54	76%	0	0%	22	41%	24	96%	5	21%	18	75%	147	98%	7	5%	83	56%	225	92%	12	5%	123	55%	
	2003	53	75%	1	2%	19	36%	24	96%	4	17%	13	54%	139	98%	8	6%	91	65%	216	92%	13	6%	123	57%	
	2004	52	75%	1	2%	8	15%	19	95%	0	0%	8	42%	135	98%	9	7%	66	49%	206	92%	10	5%	82	40%	
	2005	36	86%	2	6%	7	19%	18	94%	0	0%	6	33%	130	98%	3	2%	46	35%	184	95%	5	3%	59	32%	
	2006	34	85%	2	6%	5	15%	16	94%	0	0%	6	38%	120	99%	3	3%	44	37%	170	96%	5	3%	55	32%	
	2007	35	80%	2	6%	6	17%	15	93%	1	7%	5	33%	114	99%	3	3%	29	25%	164	95%	6	4%	40	24%	
	2008	35	80%	1	3%	6	17%	14	100%	0	0%	1	7%	109	99%	4	4%	27	25%	158	95%	5	3%	34	22%	
	2003	2003	80	65%	1	1%	16	20%	10	100%	0	0%	6	60%	80	99%	4	5%	47	59%	170	83%	5	3%	69	41%
2004		78	64%	5	6%	13	17%	9	100%	2	22%	5	56%	79	99%	10	13%	51	65%	166	83%	17	10%	69	42%	
2005		25	76%	5	20%	6	24%	9	100%	0	0%	4	44%	77	99%	5	6%	31	40%	111	94%	10	9%	41	37%	
2006		24	79%	5	21%	3	13%	9	100%	1	11%	5	56%	75	99%	1	1%	28	37%	108	94%	7	6%	36	33%	
2007		24	79%	3	13%	6	25%	9	100%	0	0%	5	56%	74	99%	3	4%	27	36%	107	94%	6	6%	38	36%	
2008		24	79%	2	8%	4	17%	9	100%	0	0%	5	56%	69	99%	3	4%	21	30%	102	94%	5	5%	30	29%	
2004		2004	53	92%	3	6%	31	58%	12	100%	0	0%	7	58%	87	99%	6	7%	47	54%	152	97%	9	6%	85	56%
		2005	53	94%	7	13%	11	21%	11	100%	1	9%	3	27%	86	99%	1	1%	35	41%	150	97%	9	6%	49	33%
	2006	38	95%	6	16%	6	16%	11	100%	1	9%	5	45%	84	99%	2	2%	39	46%	133	98%	9	7%	50	38%	
	2007	38	95%	5	13%	7	18%	10	100%	1	10%	2	20%	83	99%	3	4%	24	29%	131	98%	9	7%	33	25%	
	2008	38	89%	5	13%	5	13%	9	100%	0	0%	3	33%	81	99%	4	5%	19	23%	128	96%	9	7%	27	21%	
	2005	2005	64	84%	2	3%	22	34%	11	55%	0	0%	5	45%	83	99%	8	10%	45	54%	158	90%	10	6%	72	46%
		2006	57	95%	3	5%	20	35%	11	55%	0	0%	7	64%	80	99%	11	14%	46	58%	148	94%	14	9%	73	49%
		2007	55	95%	1	2%	21	38%	11	55%	1	9%	7	64%	78	99%	8	10%	32	41%	144	94%	10	7%	60	42%
2008		51	94%	1	2%	16	31%	9	44%	0	0%	1	11%	75	99%	4	5%	19	25%	135	93%	5	4%	36	27%	
2006		2006	39	95%	2	5%	21	54%	13	85%	1	8%	10	77%	77	100%	2	3%	46	60%	129	97%	5	4%	77	60%
		2007	39	95%	3	8%	15	38%	11	82%	1	9%	7	64%	77	100%	6	8%	38	49%	127	97%	10	8%	60	47%
		2008	35	94%	1	3%	7	20%	9	89%	2	22%	2	22%	73	100%	3	4%	14	19%	117	97%	6	5%	23	20%
2007		2007	27	93%	2	7%	7	26%	10	70%	1	10%	3	30%	54	100%	2	4%	27	50%	91	95%	5	5%	37	41%
	2008	27	93%	6	22%	4	15%	10	70%	0	0%	5	50%	52	100%	1	2%	20	38%	89	94%	7	8%	29	33%	
2008	2008	20	90%	0	0%	3	15%	4	100%	0	0%	0	0%	50	100%	2	4%	22	44%	74	97%	2	3%	25	34%	

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

Table 4: Comparison of Public Water Systems Beginning Operation Between 2006 to 2008 and All Public Water Systems Over 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	%
<i>New Systems</i> 2006-2008	2006-2008	86	93%	11	13%	38	44%	27	81%	3	11%	19	70%	181	100%	14	8%	112	62%	294	96%	28	10%	169	57%
<i>All Systems</i> 2006-2008	2006-2008	2,948	71%	296	10%	895	30%	821	82%	45	5%	298	36%	7,208	98%	500	7%	2,342	32%	10,977	90%	841	8%	3,535	32%
<i>Found Systems</i> ^β 2006-2008	2006-2008	18						6						0						24					

* *Small Systems (SS)* indicates percent of systems that serve less than 500 persons and operated during the indicated state fiscal 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. ‘Found’ systems are regarded as a subset of new systems.

Figure 1: Community Systems Beginning 2001 Through 2008 with Contamination

1 MCL Violation or More - Community Systems

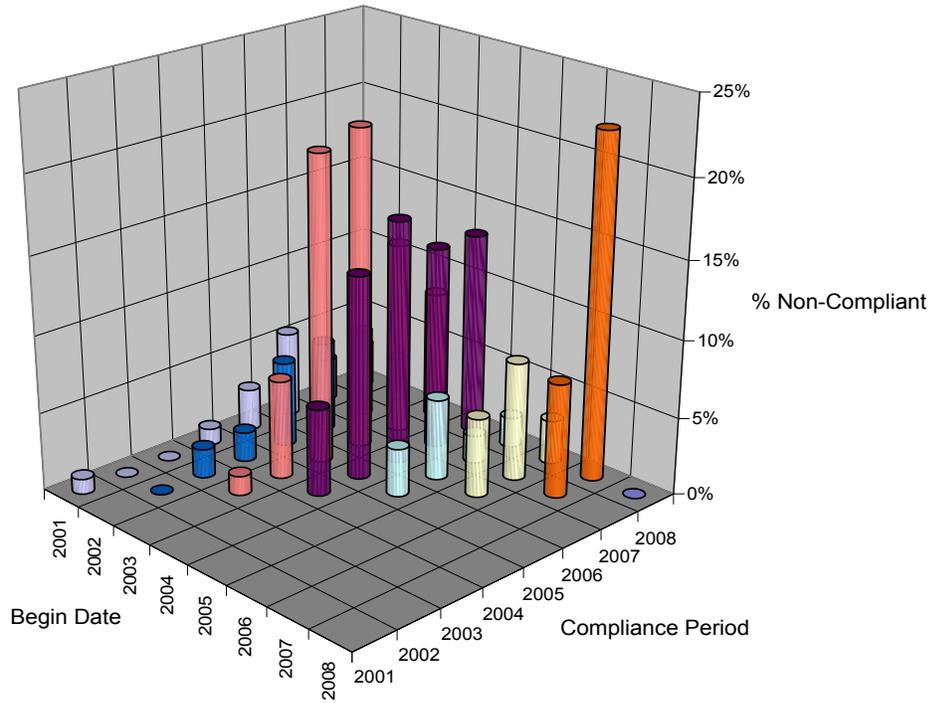


Figure 2: Community Systems Beginning 2001 Through 2008 with Monitoring Violations

1 M/R Violation or More - Community Systems

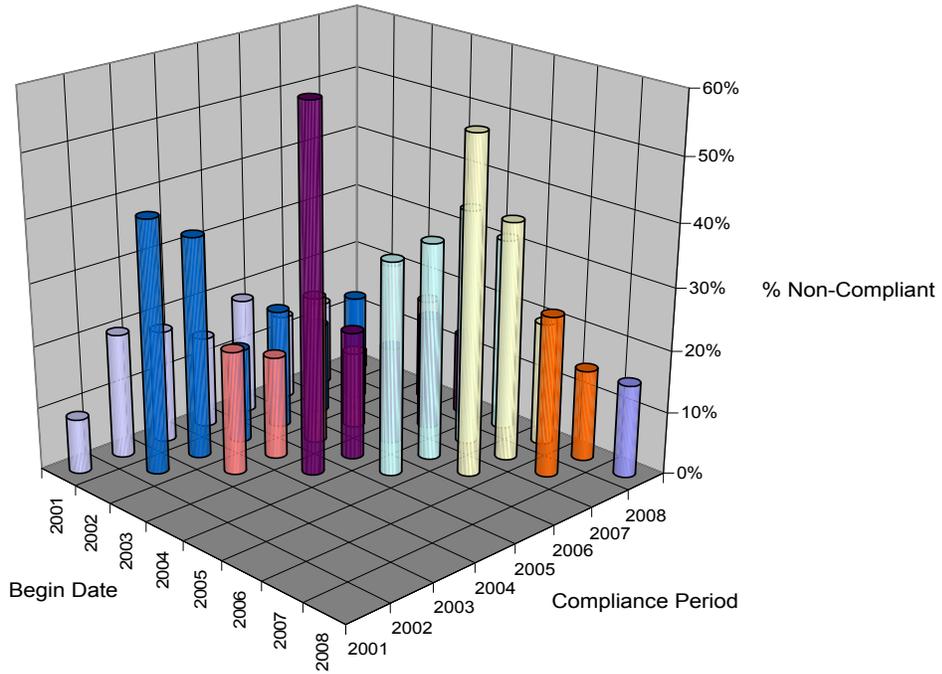


Figure 3: Non-transient non-community Systems Beginning 2001 Through 2008 with Contamination

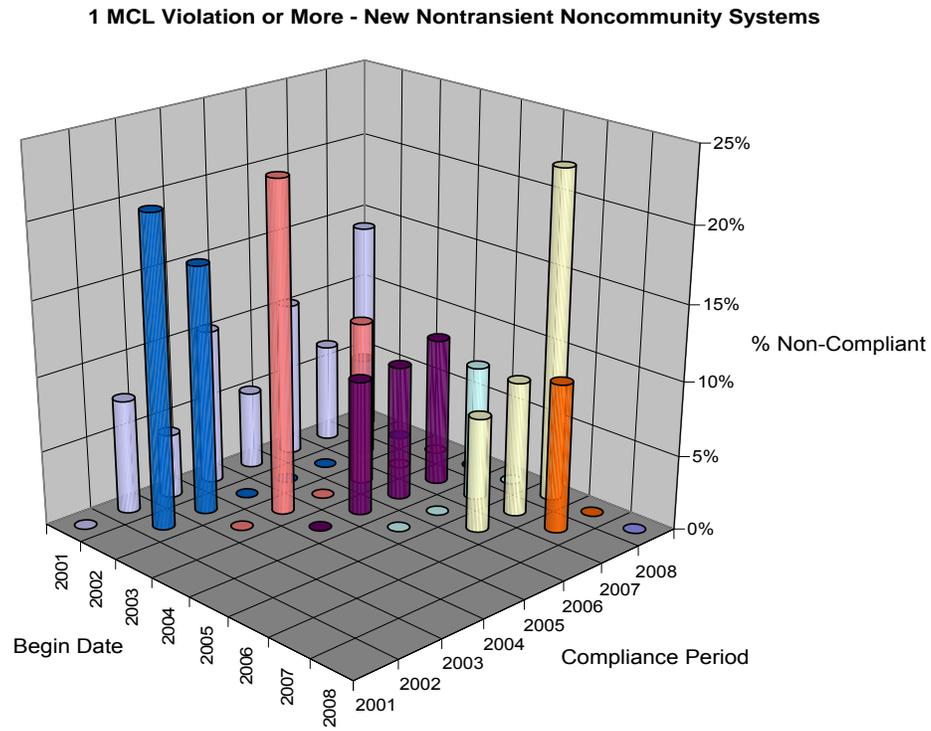


Figure 4: Non-transient non-community Systems Beginning 2001 Through 2008 with Monitoring Violations

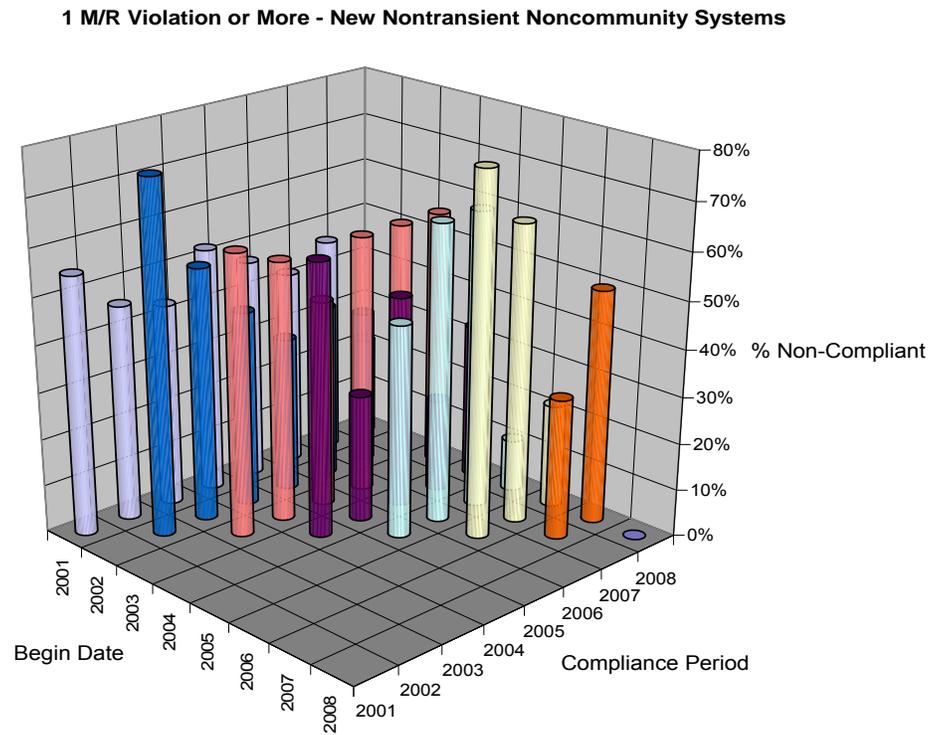


Figure 5: Transient non-community Systems Beginning 2001 Through 2008 with Contamination

1 MCL Violation or More - New Transient Noncommunity Systems

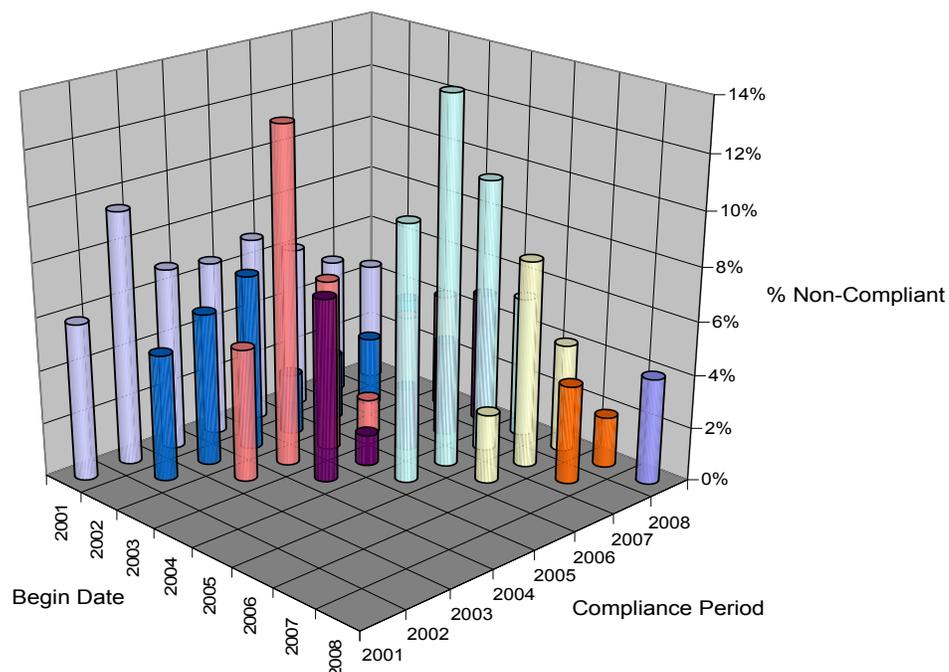
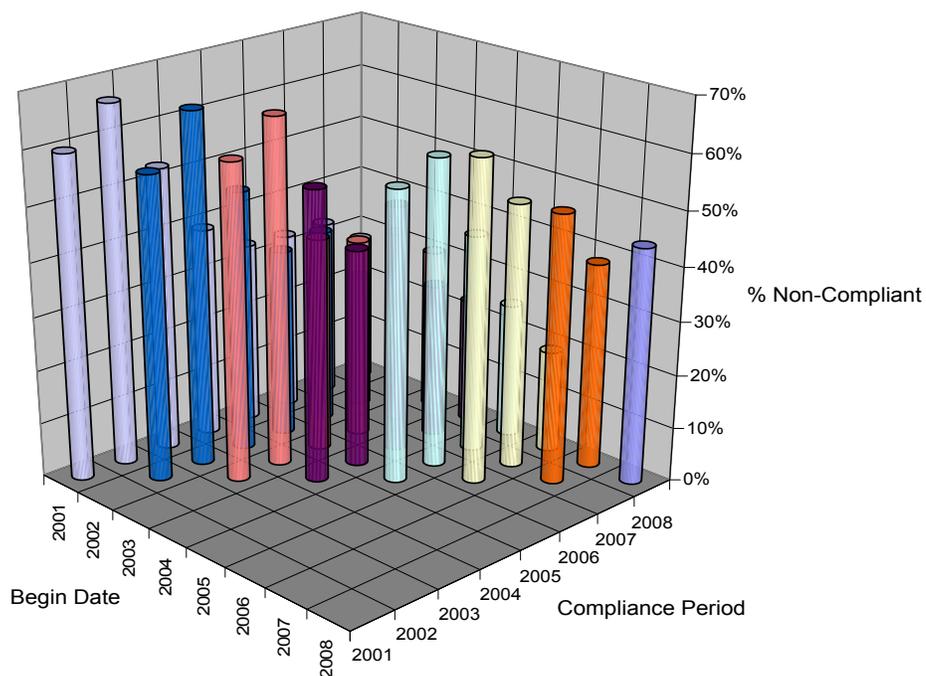


Figure 6: Transient non-community Systems Beginning 2001 Through 2008 with Monitoring Violations

1 M/R Violation or More - New Transient Noncommunity Systems



II.B Program Development

Considering the number of small systems needing improvements in Capacity and the limited resources available, the PWS Section took steps regarding system viability that provided the foundation for a Capacity Development Program. A Viability Stakeholders group was formed in May 1995 to assess the operational needs of public water systems. In 1998, a Capacity Development stakeholder group was convened. From this group the Capacity Development rules evolved with temporary rules in place October 1, 1999. The final rules for the program were adopted August 1, 2000 (NCAC Title 15A, Subchapter 18C, .0300).

A comprehensive strategy was developed and implemented through an effort involving stakeholders, interested parties, sister agencies and PWS Section staff. Due to budgetary constraints, the coordination of this effort was provided by only one added position within the PWS Section as a Capacity Development Engineer. However, the entire section would be involved in implementing the goals of the program. New positions were added to the program in 2006 and 2007, including a Team Leader for Capacity Development and an engineering position. In 2008, four positions were added to assist in Capacity Development in four of PWS Section's regional offices. The Team Leader will coordinate the program and provide guidance, while the other members of the Capacity Development team work with colleagues in the Public Water Supply Section to develop innovative approaches to improve water systems' compliance.

Training for the Capacity Development Program in April of 2000 included four one-day seminars that were co-sponsored by the PWS Section, the North Carolina Rural Water Association and the North Carolina Section of the American Water Works Association. More than 400 water system managers and operators attended these one-day seminars held in Asheville, Greensboro, Raleigh and Wilmington. The PWS Section also informed community and non-transient non-community water systems of the program through mailings and on its Internet site. Recent initiatives include monitoring guidance that has been developed for the PWS Section website and extensive outreach to water systems that had not yet completed Capacity Development requirements.

The entire PWS Section staff, both central and field office personnel, has continued to provide the energy and resources to make the Capacity Development Program a success. Several factors have been involved in ensuring the success of the program, including but not limited to the following:

- using an interactive stakeholder process in the adoption of new and revised rules, effective October 1999;
- training PWS Section staff and water system engineers, managers, and operators;
- increasing coordination within the branches of the PWS Section;
- instructing professional engineering organizations involved in plan preparation; and
- enhancing the PWS Section's on-line plan review tracking system.

The PWS Section believes this background continues to provide a strong foundation to ensure that public water systems are receiving the assistance needed to provide safe public drinking water for the citizens of North Carolina.

III. PROGRAM STRATEGY: *CAPACITY OBJECTIVES*

III.A Overview of Strategic Objectives

As reported in August 2000, the PWS Section met the challenge to improve Capacity of public water supply systems in North Carolina by taking a multi-track approach. This was due to the desire by the agency to focus on systems that were in greatest need of assistance. It was also based on budgetary limitations that would necessitate the PWS Section to center its efforts on improvements to systems that would provide the greatest public benefit.

One tool the PWS Section developed to make determinations regarding the Capacity of public water systems is the Water System Management Plan. This plan is a self-evaluation by a system of its Capacity. The plan is required for all new, altered or expanding community and non-transient non-community systems. The Water System Management Plan provides opportunity to evaluate and report on:

- ownership of the public water system;
- contractual arrangements regarding operation or interconnections;
- management structure, qualifications, and training;
- policies regarding the operation of the system; and
- financial information ensuring the continued viability of the system.

These considerations led the PWS Section to adopt the following strategic objectives.

A.1 New, Altered or Expanding Systems: The PWS Section recognized the difficulty of improving Capacity of a public water system **after** construction of a system had already taken place. In addition, systems that are changing their condition may be at greater risk of failure if proper planning and preparation is not done. Therefore, the PWS Section chose a strategy based on the requirement that all new and expanding community and non-transient non-community systems demonstrate Capacity **before** construction. The comprehensive requirements specified by the revised *Rules Governing Public Water Systems* now include the historical approval of engineering plans and specifications as well as certification that the following have been prepared:

- Water System Management Plan,
- Operation and Maintenance Plan (not submitted), and
- Emergency Management Plan (not submitted).

A.2 Existing Systems: On December 31, 2008, the state regulated 2,170 community systems, 490 nontransient, noncommunity systems, and 3,991 transient systems, and 117 water systems not recognized by federal regulations. There are a total of 6,651 regulated public water systems in North Carolina, 88 percent of which serve populations of less than 500 people. With regard to existing public water systems, the PWS Section realized that it had a well-established program that could identify and prioritize systems in need of improved Capacity. The PWS Section expects that focusing on candidates identified from these sources would provide the most benefit to existing systems in greatest need of improving Capacity. Determination for the type of assistance would be done on a case-by-case basis. The PWS Section expects that the Water System Management Plan will be another extremely useful tool in clarifying the causes of non-compliance. Systems could be identified from:

- US Environmental Protection Agency's (EPA) significant non-compliance list,
- sanitary surveys and technical assistance,
- administrative penalties,
- administrative orders,
- notices of violation, and the
- plan review process.

A.3 Improving Coordination: The PWS Section recognized opportunities among its own branches and programs to improve coordination in an effort to make the Capacity Development Program more successful. There has been a concerted effort to better coordinate internal activities in order to improve the efficiency of many of the regulatory functions. The Capacity Development Program is being used as the fulcrum in providing the leverage to implement some of these changes, as is highlighted in Section III.B.3 of this report.

III.B Efficacy of Strategies

The following is a discussion on the effectiveness of the strategies the PWS Section has implemented to improve the Capacity of public water systems.

B.1 Strategy Efficacy - New, Altered or Expanding Systems

The plan review process was revised to accommodate the new Capacity Development Program. The following procedure is now in place to ensure that the Capacity of public water suppliers exists before construction:

- The applicant submits an Engineer's Report, engineering plans and specifications, and a Water System Management Plan;
- If the Engineer's Report is complete and the engineering plans and specifications meet all requirements, the PWS Section approves engineering plans and specifications;
- When, in addition to having approved plans and specifications, the PWS Section determines that the Water System Management Plan is complete, the PWS Section issues an Authorization to Construct letter and the system begins construction;
- The applicant prepares or updates an Operation & Maintenance Plan and an Emergency Management Plan for the system;
- The applicant submits an Engineer's Certification and an Applicant Certification,
- The PWS Section issues a final approval letter; and
- The new construction, alteration or expansion project is placed into service.

Requiring the submission of a complete Water System Management Plan for review as part of the plan approval process should help ensure that any new or expanding public water system is demonstrating the Capacity necessary to operate viably. Starting from the adoption of the rules in October 1999 through December 2008, the PWS Section has accepted Water System Management Plans for approximately 1,590 public water systems. To reduce the administrative burden on the owners of public water systems, the capacity development rules allow a single Water System Management Plan for multiple systems owned by the same person or legal entity. Table 4 indicates that relative to existing systems, new systems struggle to meet monitoring and reporting requirements. The PWS Section is currently developing additional outreach for new water systems.

During the approval process, a new or expanding public water system is also required to submit an Applicant Certification. This document certifies that the owner has developed an Operation and Maintenance Plan, an Emergency Management Plan, and has an appropriately licensed operator acting as the Operator in Responsible Charge (ORC). This certification step in the approval process has accomplished a great deal in developing Capacity. It has allowed systems to exhibit the requirements of operating and maintaining the system before it is available for public use. It also allows systems to provide the forethought of managing emergency or disaster events concerning the public water system. With this requirement, the PWS Section is building a strong foundation regarding recent security concerns and has provided a good starting point for systems to meet federal requirements for disaster preparedness for public water systems.

B.2 Strategy Efficacy - Existing Systems

The PWS Section has started to identify systems using information generated from program activities throughout the Section. The systems in greatest need of improving their Capacity based on performance with respect to their compliance with state and federal monitoring requirements for water quality testing are identified using information available within the PWS Section.

Sampling Status Report: The PWS Section first made the Monitoring Status and Sampling Schedule Report available in 1999. During the year 2005, drinking water data were migrated to the Safe Drinking Water Information System (SDWIS) and the report was replaced by Drinking Water Watch. Drinking Water Watch provides extensive data on water system inventory, sampling and compliance. Many small water systems requested a simple, easy-to-understand report focusing on sampling records alone. This report was developed in 2007 and was posted to the PWS Section's public website in 2008. The report summarizes monitoring schedules for different water systems and shows the number of samples received during the current monitoring period. It allows water systems to collect samples properly and to receive credit for those samples. For labs that report electronically, the schedule will also show the credit for recently completed analyses even before the end of the monitoring period. This allows vigilant systems the ability to oversee what their lab has submitted to the PWS Section.

Compliance Inspection Report: The PWS Section developed a Compliance Inspection Report to be used during site visits by agency staff. These reports may be used to document that the system is in compliance with the *Rules Governing Public Water Systems* or may serve as a field-generated Notice of Violation. This report has been in use since July 2000 and has improved the efficiency of communicating systems deficiencies to owners and operators, as well as reducing the requirement of formal letter generation, thus saving resources.

Inspection Dates Report: The PWS Section has developed and implemented an automated report that provides staff with information important for scheduling sanitary surveys. The report informs the user of when the last sanitary survey was performed and when the next sanitary survey must be conducted. Data can be sorted by regional office, inspector, and due date of next inspection. This report allows all regional offices to access information from a centralized location and has aided in the coordination of field activities.

Technical Assistance from the North Carolina Rural Water Association: The PWS Section has a contractual agreement with the North Carolina Rural Water Association (NCRWA) to provide technical assistance to small water systems (less than 10,000 people) through a circuit rider. This circuit rider receives system referrals from the PWS Section as well as requests for assistance from other sources. During 2008, the circuit rider assisted approximately 370 systems with issues such as compliance and treatment, operation and maintenance, water loss and leak detection, management techniques, wellhead protection, and emergency response. Beginning in 2007, the Capacity Development Program began referring new community and non-transient non-community water systems to the Circuit Rider. The Circuit Rider conducts initial visits to referred water systems to explain monitoring requirements and to promote the systems' compliance.

List of Significant Noncomplier Systems: The United States Environmental Protection Agency's list of water systems in significant non-compliance is being used to determine systems that may benefit from the Capacity Development Program. The PWS Section has established the Capacity Development Committee to improve the PWS Section's capacity to provide timely and appropriate enforcement actions that incorporates the review of water systems in significant non-compliance and develops strategies to return systems to compliance.

In 2009, the PWS Section reviewed a triennial list submitted by the EPA containing systems that have appeared on multiple significant non-compliance lists in the time period of 2005 through 2008. Analysis and review of the systems appearing on the triennial list showed that most of the compliance issues were short-term in nature and have since been resolved.

Administrative Penalties: The PWS Section has an established enforcement program for issuing Administrative Orders and Administrative Penalties to public water systems that violate the *Rules Governing Public Water Systems*. The consequence for continued non-compliance has been assessment of a penalty. Through FY 2006, the Compliance Services Branch of the PWS Section issued consolidated penalties that addressed monitoring deficiencies for all contaminant groups for systems considered to be “Significant Non-Compliers.”

Beginning in 2007 and continuing into 2008, the Compliance Services Branch has accelerated its enforcement procedures. For monitoring violations, penalties quickly follow notices of violation issued for each contaminant group and each compliance period. For maximum contaminant level (MCL) violations, a combination notice of violation/administrative order is initially issued with a compliance deadline specified. Follow-up notices of violation are issued each compliance period that the system exceeds the MCL. Failure of a system to comply with the conditions in the administrative order within reasonable timeframes may result in the issuance of an administrative penalty.

During 2008, 118 Administrative Orders and 2,062 Administrative Penalties were issued to systems. Approximately \$487,843 was assessed during 2008.

B.3 Strategy Efficacy – Improving Coordination

The following highlights how the associated programs and initiatives within the PWS Section are being used in coordination with the Capacity Development Program.

Technical Assistance to Small Water Systems: The ongoing updates to the Safe Drinking Water Act have added tremendously to the responsibilities and workload of public water system personnel. All areas of water system operation have increased in complexity. Water system officials have called on the state for assistance more than ever before. The result is limited assistance available to water systems and the public. During 2008, approximately 59 field personnel provided technical assistance to systems during 7,351 on-site contacts, 2,760 of which were sanitary surveys.

Transient non-community Water Systems: From the inception of the Safe Drinking Water Act in 1974, the very small transient non-community water systems have been a concern. Examples of the transient water systems include churches, gas stations, restaurants, highway rest stops, and state parks. For states with large numbers of transient systems such as North Carolina, funding was not provided to adequately address transient water system compliance problems. For years, North Carolina implemented the drinking water program in accordance with the “Priorities Guidance” from EPA, which focused the limited program resources available on the most significant issues leaving little time for oversight of the transient water systems. The State Revolving Fund set aside for State Program Management provided North Carolina with the opportunity to initiate oversight and enforcement activities of the transient systems to include:

- identifying transient non-community water systems not on inventory,
- verifying and maintaining the transient non-community water system inventory,
- performing initial sanitary surveys and follow-up surveys every 10 years,
- conducting compliance and enforcement work including automated violation letters,
- issuing boil water notices and performing follow-up actions, and
- providing technical assistance.

One staff position in the central office and staff in each regional office monitor and assist transient systems. Central office activities include inventory coordination and updating, training and regulatory consultation to system owners and operators, compliance and enforcement activities, and development and oversight of related computer programming. Additional duties in the regional offices include:

- providing on-site technical assistance;
- providing transient non-community inventory updates, site visits and consultation as follow-ups to contamination;
- conducting sanitary surveys;
- issuing boil water notices;
- assisting with public notice of contamination; and
- providing training.

During 2008, the PWS Section performed 2,171 site visits to transient water systems. In addition to transient system work, some technical assistance activity was performed for all other types of public water systems. Recent statutory increases to the operating permit fee structure were phased in through 2007 and early 2008 and several new positions provided have been filled. The additional staff resources provided will allow significant progress to be made on specific needs of water systems including technical assistance to new water systems, audits of operation and maintenance plans and emergency management plans, and lead and copper compliance audits.

Lead and Copper Rule Activities: Many water systems have struggled to understand and to comply with all requirements of the Lead and Copper Rule. Regional office staff has developed detailed audit procedures to ensure that lead and copper sampling is being conducted appropriately. The Compliance Services Branch of the PWS Section has developed educational and outreach materials pertaining to this rule.

In 2006, the PWS Section required water systems to submit Lead and Copper sample siting plans and the PWS Section developed a pilot Lead and Copper audit program. During Lead and Copper audits, Regional Office Staff reviews sampling histories and sampling records with water system representatives. Water systems that are found to be deficient in lead and copper compliance have been returned to more frequent monitoring schedules often requiring sampling from an increased number of sampling locations. Staff also educates water systems on lead and copper monitoring requirements. During calendar year 2008, the PWS Section conducted 82 lead and copper audits.

Compliance Services Branch staff reviews system sampling histories and sample siting plans to ensure that all initial sampling requirements have been met prior to a system being placed on a reduced monitoring schedule. If a system has been found to be deficient in completing initial sampling requirements, the system's reduced monitoring status is revoked and the system is returned to a standard monitoring schedule to complete the requirements that were missed. Additional efforts include:

- placing forms and guidance on site selection and monitoring on the PWS Section website to simplify and expedite communications with water systems;
- providing training for other PWS Section staff, water systems, and stakeholder groups; and
- targeting education and assistance to several large water systems to resolve questions regarding lead and copper monitoring and water quality parameter monitoring requirements.

Compliance Services Branch Initiatives: The Compliance Services Branch of the PWS Section has developed several initiatives that complement the goals of the Capacity Development Program. They have been aimed at improving the efficiency of compliance reporting requirements of public water systems. The initiatives are also improving the issuance and tracking of enforcement activities, as well as the overall administration of the PWS Section's compliance program. These initiatives include:

- placing public notices on the PWS Section website;
- standardizing laboratory reporting forms (including training and workshops for laboratories);
- continually clarifying and revising enforcement letters (Notices of Violation, Administrative Orders and Administrative Penalties) and using standardized templates for their ease of preparation;
- identifying systems with invalid addresses;
- improving the tracking and follow-up of contaminant violations by carefully reviewing remedial plans submitted by water systems;
- incorporating remedial plans and public notices into enforcement proceedings; and
- automating daily identification of public water systems exceeding bacteriological and nitrate/nitrite contaminant violations and weekly identification of those systems required to increase monitoring due to detection(s) of volatile organic compounds, synthetic organic compounds, inorganics, and nitrates/nitrites.

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

- send letters and sample schedules explaining monitoring requirements to all new systems,
- prepare and distribute annual "Regulatory Updates" to each water system by type,
- notify existing systems of increased or decreased monitoring requirements,
- mail unsatisfactory analyses back to laboratories and supplying 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 invalid Notices of Violation issued to systems,

- include required forms for public notification as attachments to violation letters,
- enforce non-compliance more strictly, and
- develop contact protocols for interaction with sister agencies such as Children's Environmental Health and Dairy and Food Protection Branches.

North Carolina's Source Water Program: The PWS Section continued to improve and implement items in accordance with North Carolina's approved Source Water Assessment Program (SWAP) during 2008. SWAP evaluates the susceptibility to contamination for the state's public drinking water sources. Susceptibility results are summarized in reports that are available to the public via the PWS Section's geographic information application, NCSWAPinfo (<http://swap.deh.enr.state.nc.us/swap/>). Critical datasets used in the Source Water Assessment Program have recently been updated through a contract with the U.S. Geological Survey.

The information on this website is available for water system owners, operators, local governments, volunteer organizations, and citizens to develop and implement source water protection strategies. The results of the Source Water Assessment Program, along with voluntary source water protection activities, will enhance the capacity of public water systems to meet safe drinking water standards.

The Source Water Protection Program is designed to promote efforts at the local level that result in the creation of source water protection plans. Technical assistance is readily available to any public water provider wishing to develop a source water protection plan. Additional information, including comprehensive guidance documents, is available on the PWS Section website.

The Source Water Protection Program has been actively promoted throughout the state to encourage development of local level surface water protection plans. This effort includes presentations and consultations with local government officials, public water providers, and stakeholder groups. To date, six public water providers have formally agreed to participate in the NC's voluntary Source Water Protection Program. In cooperation with NCRWA, source water protection plans have been initiated for these participants.

The PWS Section has initiated efforts to introduce drinking water protection into the agendas of other agencies and programs. The emphasis has been to identify such programs, develop a relationship, and establish drinking water protection as a priority concern. This initiative has been very successful and has received national attention. Partnering agencies have adopted our SWAP data and Susceptibility analysis to evaluate a variety of environmental projects, including land conservation, agricultural best management practices, stormwater best management practices, and stream restoration. In the coming years, these interactions will likely have a major impact on statewide drinking water protection efforts. Participating agencies not only promote source water protection, but also finance environmental projects consistent with drinking water objectives.

In cooperation with the EPA, the PWS Section has created a new low-interest loan program to assist communities with land conservation projects. This program is designed to provide economic incentive for drinking water protection. The intent of such projects must be protection and conservation in ways that safeguard a public drinking water source. Additionally, the community must complete comprehensive source water protection planning to qualify for the loan program. Land acquisition projects financed with this program must be protected with permanent conservation easements. Lincoln County was the program's first applicant. The county purchased and conserved 116 acres of undeveloped property directly upstream from its intake. The project included protection of more than a mile of sensitive streams and associated stream buffers. The case study regarding Lincoln County was showcased at the Southeast Regional Watershed Forum. It is being used as a model for source water protection in other NC communities.

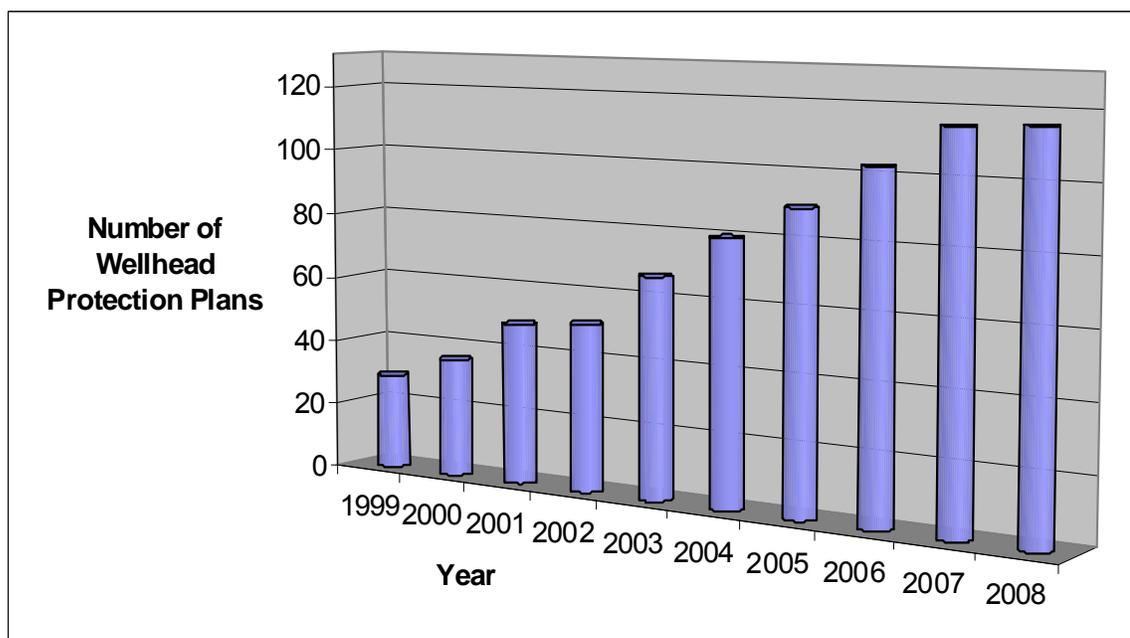
In February 2009, the NC Source Water Protection Program was selected to participate in EPA's national program, the *Enabling Source Water Protection Project*. For the next 12 months, a national team comprised of the Trust for Public Land, the Smart Growth Leadership Institute, the River Network, and

the Association of State Drinking Water Administrators will work with us to identify incentives and tools conducive to local drinking water protection. Key to the success of this project is creation and support of partnerships designed to protect drinking water sources at the local level.

North Carolina's Wellhead Protection Program: The Safe Drinking Water Act established requirements for States to develop Wellhead Protection Programs. These Programs were intended by Congress to be a key part of a national ground-water protection strategy to prevent contamination of ground waters that are used as public drinking water supplies. North Carolina's EPA-approved Wellhead Protection Program is part of this national strategy. The North Carolina Wellhead Protection Program is a pollution prevention and management program designed to protect ground-water sources of public drinking water supply. Public water supply systems that choose to participate in the Program develop and submit a local Wellhead Protection plan to the PWS Section for review and approval.

In North Carolina, development of a local Wellhead Protection plan is not mandatory but rather, is viewed as a valuable supplement to existing State ground-water protection programs. North Carolina's Wellhead Protection Program is intended for city and county governments and water supply operators that decide to provide added protection to their local ground-water supplies. Upon implementation the local Wellhead Protection Plan reduces (but does not eliminate) the susceptibility of wells to contaminants.

Figure 7: Cumulative Wellhead Protection Plan Approvals



The PWS Section has received 174 local wellhead protection plans submitted for review and approval. Currently, 116 systems in North Carolina have State approved wellhead protection plans. The majority of the remaining plans are under active review. Active review involves determining if the Wellhead Protection plan submittals meet the criteria established under North Carolina's EPA-approved Program (e.g., wellhead protection area delineation, potential contamination source inventory, management plan, contingency plan, public participation, etc.). This activity involves the generation of review letters requesting additional information, the correction of deficiencies, or clarification with regard to the submitted information and often involves meetings held with the applicants and/or their consultants. The 116 PWS systems with approved local wellhead protection plans comprise 616 PWS wells serving a population of 712,484. It is expected that these plans will assist in improving the Capacity of public water systems in North Carolina. Through the Drinking Water State Revolving Fund, the state provides funding to the North Carolina Rural Water Association for two positions to assist local governments in the development of these plans.

Operator Certification and Training: The State of North Carolina has approximately 4,801 certified water system operators who possess approximately 6,595 active operator certifications. The Division of Environmental Health's Office of Education and Training is responding to the need to provide certification and training to these operators by providing an active certification program through the North Carolina Water Treatment Facility Operator Certification Board. A network of volunteers and member organizations conducts the program. The PWS Section together with the North Carolina Waterworks Operators Association (NCWOA), the North Carolina Rural Water Association, and the North Carolina American Water Works Association coordinate schools, seminars, workshops, and conferences. PWS Section staff is relied on heavily to provide technical training and assistance at these events. This program has successfully increased the capacity of public water systems by directly influencing the training and certification provided public water system operators. Through the Expenditure Reimbursement Grant from EPA, the state provides funding to the NCWOA for a training coordinator position. This funding will end January 1, 2011.

In 2008, Notices of Violation were sent to four systems for failure to have a properly certified operator.

Automated Site Inspection Forms: The PWS Section revised and automated site inspection forms to be used during site visits and sanitary surveys by agency staff. These automated forms accomplish the following:

- Regional staff and data processing staff spend less time completing the forms and entering the data, respectively;
- Data is now centrally stored; there are no longer multiple versions of the same site visit;
- Regional staff can query site visit information from their personal computers by using simple reports;
- System deficiencies are more easily tracked allowing PWS Section to adopt a quicker response time to assist systems with corrective actions and, if necessary, engage in enforcement proceedings;
- Regional staff now collects information about a system's operator, which is shared with the Operator Certification Board.

These forms have increased the coordination between the central and regional staff as well as coordination between the PWS Section and water systems.

Electronic Monthly Operating Reports: Water systems that use surface water as their water source must submit monthly operating reports. The operating reports are completed by the system operator and submitted to PWS Section for compliance review. Beginning in 2008, PWS Section developed electronic versions of the monthly operating reports. The electronic reports perform all calculations required and notify the operator if required information has not been input. The operator then emails the report to the engineer responsible for compliance review. The review engineer inspects a summary sheet that was generated by the electronic operating report for the compliance elements. Use of the electronic monthly operating reports has resulted in fewer operator reporting errors and decreased the time required for compliance review. Approximately 80 systems are currently using the electronic monthly operating reports. It is anticipated that all municipalities will be using the electronic reports by April 1, 2010, the mandatory deadline.

The PWS Section is also working to develop a program that will input the contents of the electronic reports directly to the compliance database, thus allowing for easier access to the information and automated compliance review.

Enhanced Database Management: The PWS Section continues to improve its database management system and capabilities. In June 2008, SDWIS release 1 was upgraded to release 2. With this change, the PWS Section's main database management system became accessible via Internet browser. This opened up opportunities for easier access to the application by both Central and Regional staff.

During the past year the PWS Section moved the SDWIS applications from four stand alone servers to servers running VMWare (Virtual Machine). In addition, the database server operating system has been changed from 32-bit Windows 2003 Standard Edition with 4 gigabytes (GB) of random access memory (RAM) to 64-bit Red Hat Linux with 8 GB of RAM. The improvement in response has been considerable.

In addition to improvements in the response, the new environment is more reliable (Linux vs. Windows), is easier to restore (VMWare), and provides easier access during disaster via Internet browser. The PWS Section gets all of this improvement in performance, reliability and security at a lower cost (approximately 20%).

During this time the PWS Section also made improvements in our data collection methods and implemented the EPA application “Lab-To-State” (LTS) that is for use with SDWIS. This application along with “Migrate-To-State” (MTS) has allowed the PWS Section to receive lab results electronically from certified laboratories. All certified laboratories must report results electronically by 2010. The PWS Section applied to EPA and received a determination of compliance on July 9, 2009 with the requirements of the Cross Media Electronic Reporting Rule (CROMERR). The successes of these initiatives make it possible for the PWS Section and certified laboratories to meet the requirements of new legislation for electronic reporting of laboratory results.

Financial Capacity Support: The PWS Section provided improved financial capacity support for public water systems by several initiatives achieved through contract and cooperation with the UNC School of Government’s Environmental Finance Center (EFC). Support for establishing and strengthening partnerships and collaboration between water systems was provided, and sustainable finance and rate setting support was developed and delivered. Two of the key deliverables are as follows:

The EFC developed a detailed quantitative assessment of current regional and partnership practices across the state (state inventory) for those systems willing to provide information. The assessment included an inventory of interconnections and the institutional agreements that control their usage. The database contains a series of attributes for each interconnection that includes connected parties, institutional arrangement governing the interconnection, line size and material, elevation, and an estimate of the transfer capacity range.

As a complement to the analysis of system interconnections in North Carolina, the EFC developed guidelines to help systems establish contractual agreements for the purchase and sale of drinking water. The contract guidelines encourage systems to consider the following:

- The expected duration of the purchase agreement,
- Future demand requirements,
- Emergency water supply agreements,
- Agreements that require the construction of infrastructure,
- Responsibilities for water that may exceed MCL values,
- How and whether purchased water can be resold, and
- The financial ramifications of the agreement.

The PWS Section anticipates that the new contract guidelines developed by the EFC will assist systems in maintaining viable interconnections in order to increase system capacity.

The second deliverable was the development of concise general rate setting guidelines for water usage that take into consideration state and local policy goals and objectives. The guidelines provide an overview of the legal framework and a description of different rate structures and the impacts of different rate structures on rates and usage.

Professional Development: The PWS Section annually hosts several forums that discuss a range of topics related to the water industry. Recent forums have addressed water treatment plant infrastructure, disinfection byproducts, and reclaimed water. These forums provide PWS Section staff the opportunity to interact with local and regional experts and discuss issues pertinent to systems in North Carolina.

IV. PROGRAM SUCCESS: *CAPACITY IMPROVEMENTS*

IV.A Indicators for Measuring Capacity Improvement

The August 2000 report, “North Carolina’s Capacity Development Strategy for Existing Public Water Systems,” discussed indicators the PWS Section is using to determine the progress of its Capacity Development Program as follows:

The primary component of North Carolina’s capacity development program is 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 plans to use existing databases to track the following information for public water systems:

- Number of public water systems with approved plans and specifications,
- Number of public water systems with a complete Water System Management Plan (WSMP),
- Number of public water system projects with a submitted Engineer’s Certification to document that the system is constructed in accordance with approved plans and specifications,
- Number of public water system projects with an Applicant Certification to document that the system has an Operation and Maintenance Plan and an Emergency Management Plan, and
- Number of Public Water Supply systems that have an appropriate certified operator in responsible charge.

The above information, in addition to compliance information will be used to measure improvements in capacity.

Also, the PWS Section will track the number of water supply intakes with complete Wellhead Protection Plans and/or Source Water Assessments as a measure of improved capacity.

The PWS Section has therefore adopted the following approach in determining the effectiveness of the Capacity Development Program:

- *Progress*: Progress in the Capacity Development Program is defined as improving the technical, managerial, and financial viability of an increasing number of public water systems;
- *Measuring Progress*: Measuring progress will be accomplished by tracking the number of public water systems that have completed the requirements of the Capacity Development Program as specified in the rules;
- *Benchmark Figures*: The benchmark figures against which this progress is to be measured are the completion rates of the program requirements of the first period of the program (October 1, 1999 to June 30, 2000). The goal of each year is to surpass the completion rate of the previous year. It is expected that an ever-increasing number of public water systems will have completed the requirements of the program.

Supporting activities for Capacity development include Compliance and Enforcement, Wellhead Protection Plans and Source Water Assessments. The PWS Section is looking at ways in which information from these activities can be used to enhance the Capacities of regulated water systems.

IV.B Current Status: Facts and Figures

Table 5 is a summary of the numbers of systems that have completed these specific Capacity Development Program activities and provides the percent completed compared to the total community and non-transient non-community systems. In previous reports, Capacity Development measures were presented on a fiscal year basis. In the current report, measures for all years have been recalculated based on calendar years.

Table 5: 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, 2000	3,096	549	17.7	469	15.1	847	27.4	142	4.6	38	1.2	41	1.3
Dec. 31, 2001	3,135	766	24.4	658	21.0	970	31.0	336	10.7	84	2.7	95	3.0
Dec. 31, 2002	3,113	917	29.5	780	25.1	1,055	33.9	479	15.4	188	6.0	189	6.1
Dec. 31, 2003	3,098	1,076	34.7	902	29.1	1,340	43.3	606	19.6	309	10.0	298	9.6
Dec. 31, 2004	3,056	1,212	39.7	1,012	33.1	1,405	46.0	720	23.6	440	14.4	429	14.0
Dec. 31, 2005	2,794	1,311	46.9	1,119	40.1	1,453	52.0	840	30.1	538	19.3	549	19.6
Dec. 31, 2006	2,762	1,400	50.7	1,210	43.8	1,500	54.3	940	34.0	711	25.7	727	26.3
Dec. 31, 2007	2,719	1,478	54.4	1,291	47.5	1,521	55.9	1,080	39.7	996	36.6	957	35.2
Dec. 31, 2008	2,662	1,564	58.8	1,366	51.3	1,591	59.8	1,177	44.2	1,104	41.5	1,080	40.6
<i>Increase from 1st period[†]</i>		1,015	41.0	897	36.2	744	32.4	1,035	39.6	1,066	40.2	1,039	39.2

*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 fiscal 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 which receive this authorization are not constructed.

[†] % value indicates the increase in the percentage of public water systems that have completed the particular capacity development measure indicated since the 1st period (October 1, 1999 through December 31, 2000).

[‡] 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 that a project was constructed according to approved plans and specifications.

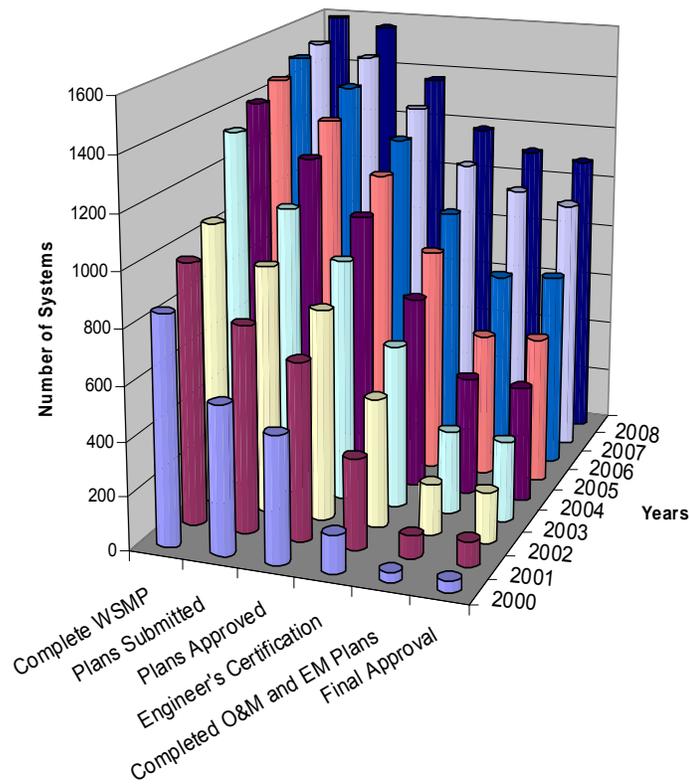
“Systems with O&M and EM Plans” means the number of systems having at least one applicant certification during the indicated period that a project had an operation and maintenance plan and an emergency management plan.

“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.

Table 5 is summarized graphically in Figure 8 in order to illustrate the number of systems that have submitted plans to the PWS Section; obtained plan approval; and have developed Water System Management Plans, Operation & Maintenance Plans, and Emergency Management Plans; and have received final approval for projects.

Currently, the individual plan review engineer checks plan submittals to ensure a current Water System Management Plan is on file or is being submitted with the application. In the later case, the plan review engineer reviews the Water System Management Plans for completeness.

Figure 8: Capacity Development Measures



“WSMP” indicates the documentation of the Water System Management Plan.

“O&M Plan” indicates Certification of the completion of an Operation and Maintenance Plan

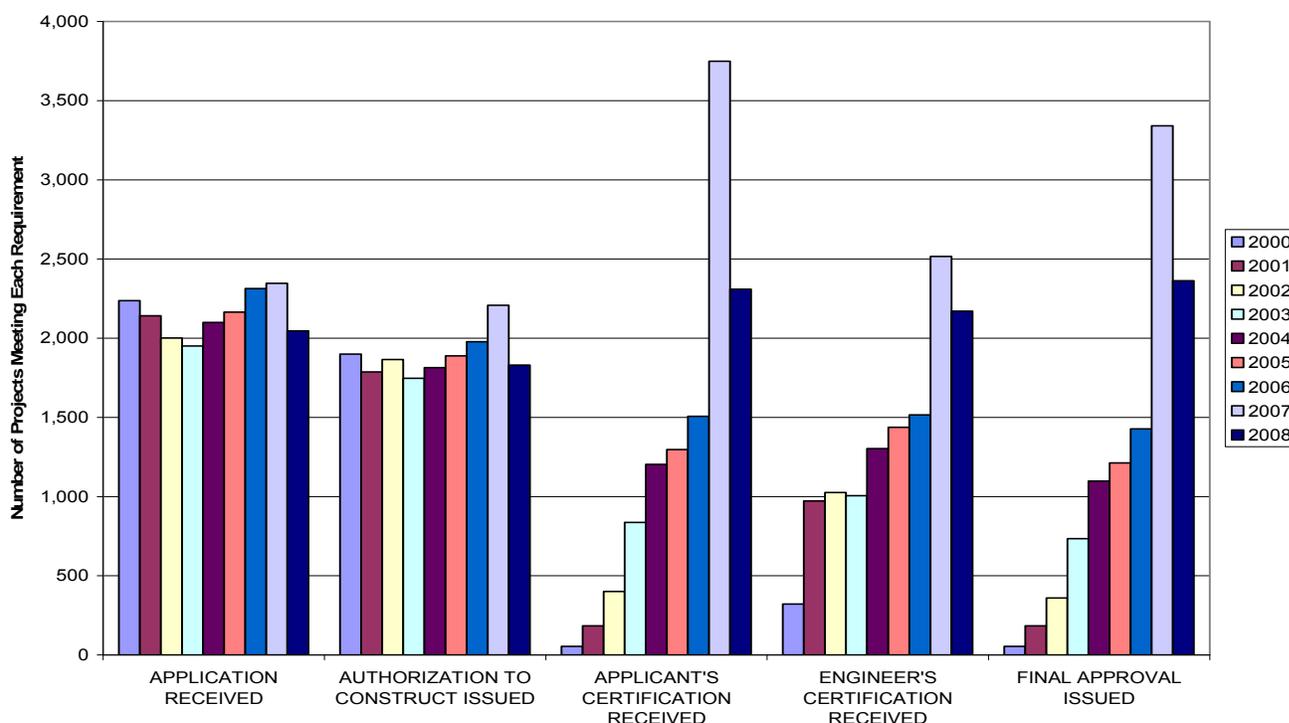
“EM Plan” indicates Certification regarding the completion of an Emergency Management Plan

“Final Approval” indicates the completion of the requirements of the Capacity Development Program.

IV.C Discussion of Progress

As demonstrated in Figure 8, the Capacity Development Program has allowed the PWS Section to make steady progress in assuring that an increasing number of public water systems have evaluated their Capacity. Since 1999, approximately 1,560 systems entered the plan evaluation process with a total of 1,080 of these systems completing all of the requirements necessary to reach final approval status. As of December 31, 2008 approximately 1,590 systems were covered by a WSMP self-assessment deemed satisfactory by the State. Multiple systems under single ownership, including those not expanding, may be covered by one master WSMP. Each year, more systems complete the Capacity Development Program. However, many systems that began the plan evaluation process have not achieved final approval status. In 2007, the PWS Section has begun developing a process to review the records, to identify non-compliant systems and to notify them of their requirements. As shown in Figure 9, approximately twice as many final approvals were issued in 2007 as in 2006. This increase represents significant progress.

Figure 9. Number of Projects Meeting Capacity Development Measures



Completion of the Capacity Development Program requirements indicates that a public water system has completed Operation & Maintenance and Emergency Management Plans. These plans are not only invaluable tools for the proper maintenance of the system, but they also provide incentive for the system to prepare for emergency and disaster events. With this requirement, the PWS Section built a strong foundation regarding recent security concerns and federal requirements for vulnerability assessments and disaster preparedness for public water systems.

The PWS Section is very pleased with the progress of the Capacity Development Program to date. The numbers show that there has been much effort and activity toward accomplishing the requirements of the program to assist in improving the Capacity of public water systems in North Carolina. The numbers also show that there is much more to do.

V. PROGRAM DIRECTION: *CAPACITY INITIATIVES*

V.A New Challenges and Opportunities

The PWS Section has been able to identify several challenges through the implementation of its Capacity Development Program. The greatest challenge facing the agency is how to identify and assist the individual needs of the smaller public water suppliers (those serving less than 500 people). These small systems are faced with a wide range of hurdles in attaining adequate Capacity as compliant water suppliers. Also, as mentioned previously, the resources necessary for the PWS Section to supply the labor-intensive assistance to these systems presents a challenge.

The PWS Section wants to provide assistance to all public water systems regardless of size. Some of the opportunities that are available include:

- **Emergency Management:** North Carolina received an initial grant during 2002 and subsequent State Territorial Assistance Grant amendments through federal fiscal year 2011 from the USEPA to initiate and maintain state level activities and/or strategies that assist in emergency planning and response. Beginning in 2005, PWS Section staff received training in the National Incident Management System (which includes Incident Command System components). The PWS Section has devoted significant staff time to emergency response preparedness and coordination. Staff has participated in seminars, Table Top exercises, workshops and web casts sponsored by organizations such as the National American Water Works Association (AWWA), the Disaster Preparedness Committee (DPC) of North Carolina Section of the AWWA, EPA, and ASDWA.

In 2008, several actions critical to advancing the PWS Section's emergency management capabilities were completed. One full-time Security and Emergency Planning Engineer position was added to the PWS Section Technical Services Branch. This position is responsible for developing strategies and protocols that facilitate a coordinated response to emergency situations that may be encountered by public water systems across the state. In order to improve information distribution during emergencies, PWS Section has developed a protocol that allows real-time communication to many users via phone, email, and WebEOC, a crisis information management system.

A Table Top Exercise was conducted in March, 2009 involving representatives of state agencies, local agencies, and the Federal Bureau of Investigation. The recently developed communication techniques in conjunction with the existing Emergency Planning and Response guidance document were used to assist in the simulated response activities during the exercise.

- **Central Coastal Plain Capacity Use Area:** This area, located in Eastern North Carolina, is underlain by Cretaceous aquifers that are threatened by excessive groundwater withdrawal and by saltwater encroachment. Systems that withdraw more than 100,000 gallons per day were required to begin curtailing water production by as much as 25 percent by 2008 with future reductions up to 75 percent by 2016. Strategies for managing demands while meeting withdrawal reductions included construction of new surface water treatment plants, interconnects with other systems, drought management planning and preparation of water conservation plans. A significant portion of available Drinking Water State Revolving Funds were awarded to systems meeting these challenges. The majority of projects identified have been initiated with several nearing completion. In the coming years, customers of the affected water systems will experience financial impacts of the capital improvements.

- **Additional Infrastructure Needs in North Carolina:** Water systems in North Carolina will require significant updates to infrastructure in the coming years. The cost of needed infrastructure has been estimated in the 2007 EPA Infrastructure Needs Survey and the North Carolina Rural Economic Development Center’s Water 2030 Study. The Water 2030 Study (developed in 2005) focused primarily on rural water systems in North Carolina and estimated that water systems would require \$7.64 billion in capital improvements to meet needs between the year 2005 and 2030. The 2007 Infrastructure Needs Survey allowed more replacement of a water system’s existing infrastructure, and estimated that water systems would require \$10 billion in capital improvements by 2027.

Water system infrastructure across the state is aging and many components will require replacement in the coming years. Maintenance on water treatment plants and water lines cannot be deferred indefinitely. As material costs increase, replacement costs may be significantly greater than previously estimated. Growth and the demands of an ever-increasing population will strain water system budgets even further. The U.S. Census Bureau estimates that the population in North Carolina will have increased 50 percent over 2000 levels by 2030. State and local governments must prepare carefully to meet upcoming water system needs.

- **Disadvantaged Communities Program:** Many systems, especially small ones, lack the resources needed to provide consistent safe drinking water to the public as required by EPA. This frequently results in long-term non-compliance. The PWS Section has developed a strategy to consolidate “problem” systems with more reliable water suppliers in the immediate vicinity. The North Carolina Disadvantaged Community Program eliminates by consolidation non-viable public water systems. In this context a Disadvantaged Community is defined as a community served by a public water system that lacks capacity as defined the Safe Drinking Water Act, Sections 1420 and 1452 (a)(3).

Principal forgiveness loans are made to the most appropriate water system having capacity that is willing to take over the failing system. In most cases this consists of a project to run supply to and replace the distribution system in the Disadvantaged Community public water system. These projects are initiated by PWS Section and thus no application is necessarily required. Currently PWS Section is working to consolidate 12 non-viable public water systems with more reliable systems. These 12 systems serve a total population of approximately 2,000 residents. Completion of these consolidation projects will give these residents access to water systems with greater capacity. Elimination of these noncompliant water systems has little impact on the compliance rates in Table 2, although the improvement in drinking water quality is critical to the 2,000 residents.

- **New System Assistance:** From the current data analysis, systems that began operation within the last three years appear to have highly variable annual compliance levels as well as difficulty complying with monitoring and reporting requirements of “*The Rules Governing Public Water Systems.*” During 2007 and continuing into 2008, Circuit Riders with the North Carolina Rural Water Association began visiting new water systems to educate such systems on monitoring and operations requirements. Approximately 26 percent of systems that began during FY 2006 through FY 2008 were placed on at least one of EPA’s SNC lists for that time period. Analysis of systems that began operation during FY 2007 through FY 2009 indicates that 13 percent of systems were placed on at least one of EPA’s SNC lists for the most recent three-year time period. PWS Section is encouraged by the increase in compliance of new systems during the most recent three-year period. The PWS Section continues to investigate new system progress and is developing ways to provide more focused assistance to new systems during their early years of operation.

- **Operator Certification:** The United States Environmental Protection Agency’s guidelines require that all community and non-transient non-community public water systems be operated by a certified Operator in Responsible Charge (ORC) or risk withholding of 20 percent of the State Revolving Fund Capitalization Grant. This mandate provides an opportunity to improve Capacity for these existing systems. The PWS Section expects the smaller systems to benefit greatly by having trained operators managing these systems. To assist small systems (serving 3,300 persons or less) with resources needed for initial training and continuing education to acquire or maintain certification, the state provides reimbursement for this training through the Expenditure Reimbursement Grant from EPA. Funding for this grant is currently slated to expire January 1, 2011.

- **American Recovery and Reinvestment Act (ARRA):** The American Reinvestment and Recovery Act of 2009 was passed by Congress and signed in to law on February 17, 2009. The purpose of ARRA is to assist in national and state economic stimulus activities by providing timely funding for eligible infrastructure projects. Approximately \$65.6 million was parceled to North Carolina’s drinking water program for distribution to projects that meet ARRA requirements. In order to implement ARRA, the PWS Section was tasked with:
 - Targeting funds to maximize job creation and economic benefit;
 - Using the priority system developed in the North Carolina Operating Agreement to rate projects by public health and compliance need;
 - Developing procedures to streamline the application preparation and review process in order to make project funding available as soon as possible;
 - Confirming all projects use iron, steel and manufactured goods produced in the United States;
 - Confirming that projects adhere to the Davis-Bacon Act;
 - Ensuring that 20% of the funds support green infrastructure projects in accordance with ARRA requirements; and
 - Entering all projects into the DWSRF Project Tracking system and any state mandated reporting system within one week of data availability.

In November, 2008, the PWS Section began preparatory work to address the expected volume of applications for funding in anticipation of the finalization of ARRA. In December, 2008 The PWS Section announced acceptance of supplemental applications for potentially eligible projects with a submittal deadline of February 27, 2009. Water systems throughout North Carolina responded by submitting a total of 1,108 letters of intent for potentially eligible projects with a combined value of approximately \$2.3 billion. The volume and scope of work reflected in the letters of intent demonstrated that systems throughout North Carolina have a great need to increase capacity. ARRA funding was to be parceled out in two rounds, with 50 – 65 percent of funding granted in the first round. The PWS Section received 494 Supplemental Applications from systems that expressed interest in beginning projects with funding with ARRA monies. The projects proposed by all Supplemental Applications totaled approximately \$809 million. PWS Section staff reviewed each application in order to determine the priority level of each project for funding purposes. The projects of highest priority that were “ready to proceed” by March 30, 2009 were considered for funding in the first round. In the first round, 35 projects valued at approximately \$40.4 million were funded. The second round of funding was comprised of 30 projects totaling approximately \$23.9 million.

In addition to providing jobs and increasing the capacity of water systems, the ARRA funding raised the awareness level of PWS Section Loans and Grants program. The unprecedented response to the PWS Section’s acceptance of applications displayed the

need for water system improvements throughout North Carolina. Infrastructure improvements are required as water systems age, as rules and regulations become more stringent, and as population increases.

V.B Future Reports

Section 1420(c)(3) of the 1996 Safe Drinking Water Act Amendments require that:

“Not later than 2 years after the date on which a State first adopts a capacity development strategy under this subsection, and every three years thereafter, the head of the State agency that has primary responsibility to carry out this title in the State shall submit to the Governor a report that shall also be available to the public on the efficacy of the strategy and progress made toward improving the technical, managerial, and financial capacity of public water systems in the State.”

The PWS Section must provide the governor of the State of North Carolina with the required report on the dates specified, starting from September 30, 2002 (2005, 2008...), until otherwise notified by EPA. The PWS Section plans to prepare an updated report annually and publish it on its web site at:

<http://www.deh.enr.state.nc.us/pws>.

VI. PUBLIC AVAILABILITY OF THE 2009 CAPACITY DEVELOPMENT REPORT

As required by the EPA, the PWS Section makes this report available to the public. The Internet web page of the PWS Section contains a link to the report. The web page can be found at:

<http://www.deh.enr.state.nc.us/pws>

This Internet web page also has links to the following supporting documentation and recent reports regarding the Capacity Development Program of the North Carolina PWS Section:

North Carolina’s Capacity Development Report for Public Water Systems, September 2008,

North Carolina’s Capacity Development Report for Public Water Systems, November 2007.

North Carolina’s Capacity Development Report for Public Water Systems, September 2006.

North Carolina’s Capacity Development Report for Public Water Systems, September 2005.

North Carolina’s Capacity Development Report for Public Water Systems, September 2004.

North Carolina’s Capacity Development Report for Public Water Systems, September 2003.

North Carolina’s Capacity Development Report for Public Water Systems, September 2002.

North Carolina’s Capacity Development Strategy Implementation Report, August 2001.

North Carolina’s Capacity Development Strategy for Existing Public Water Systems, August 2000.

Appendix A

Figure A.1: Water Systems with MCL Violations Since 1999, Grouped by Water System Type



Figure A.2: Water Systems with MR Violations Since 1999, Grouped by Water System Type

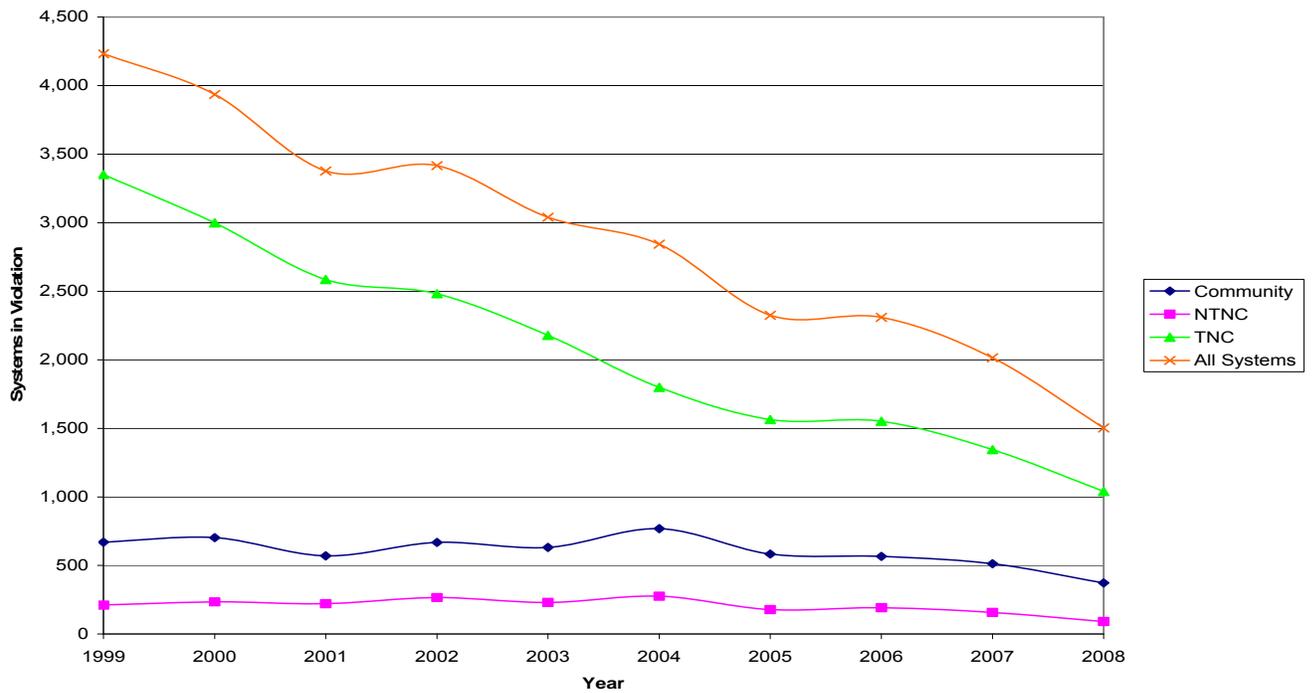


Figure A.3: Community Water Systems with MCL Violations Since 1999, Grouped by Population

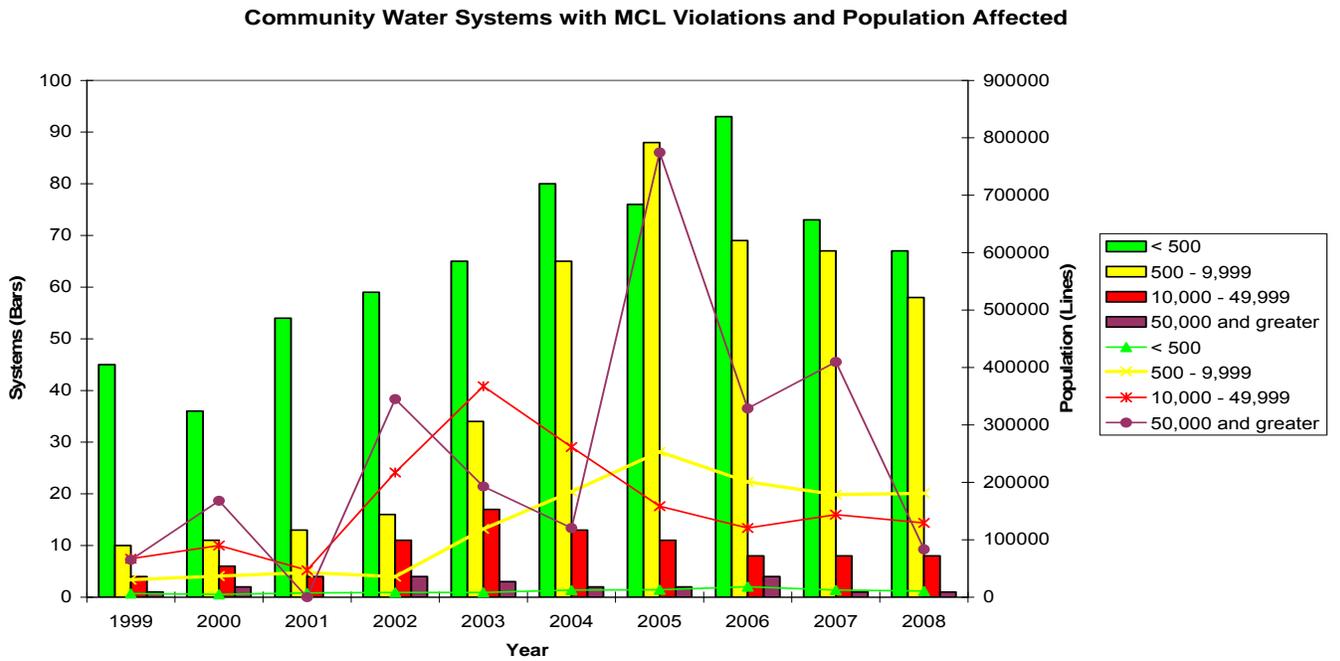


Figure A.4: Community Water Systems with MR Violations Since 1999, Grouped by Population

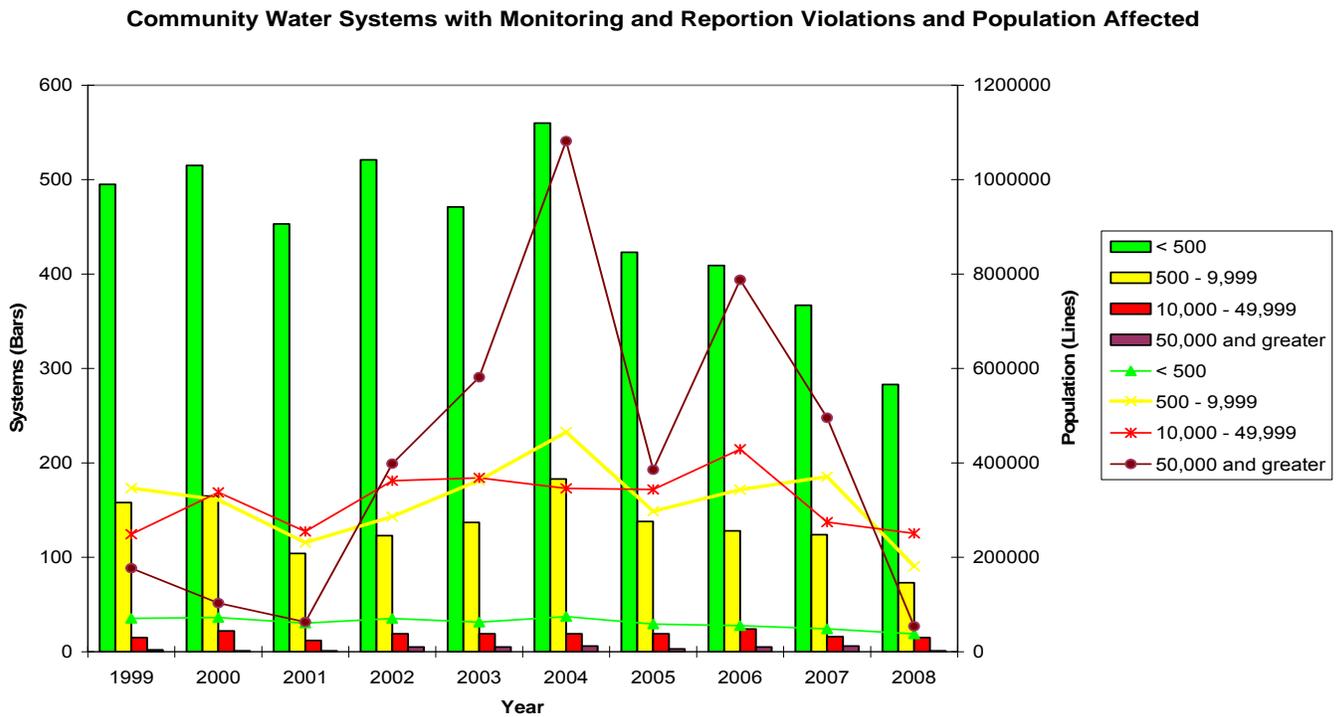


Figure A.5: Community Water Systems with MCL Violations Since 1999

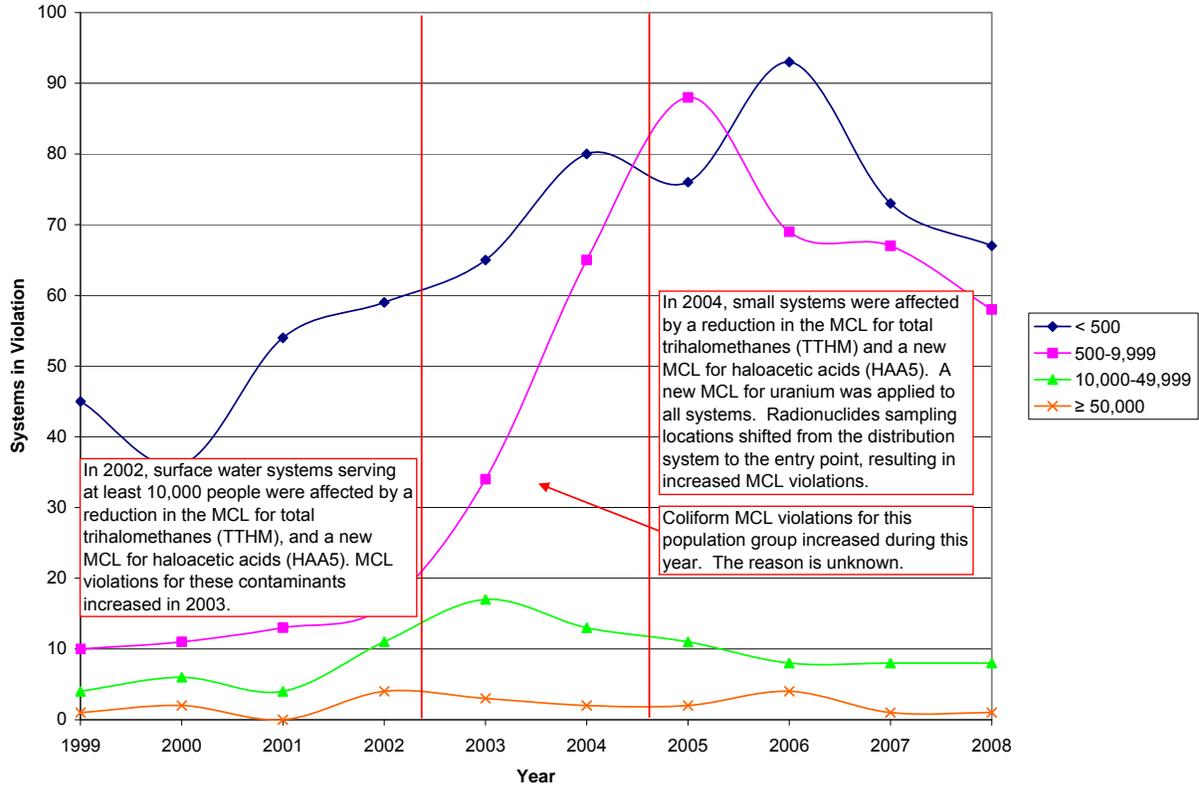


Figure A.6: Community Water Systems with MR Violations Since 1999

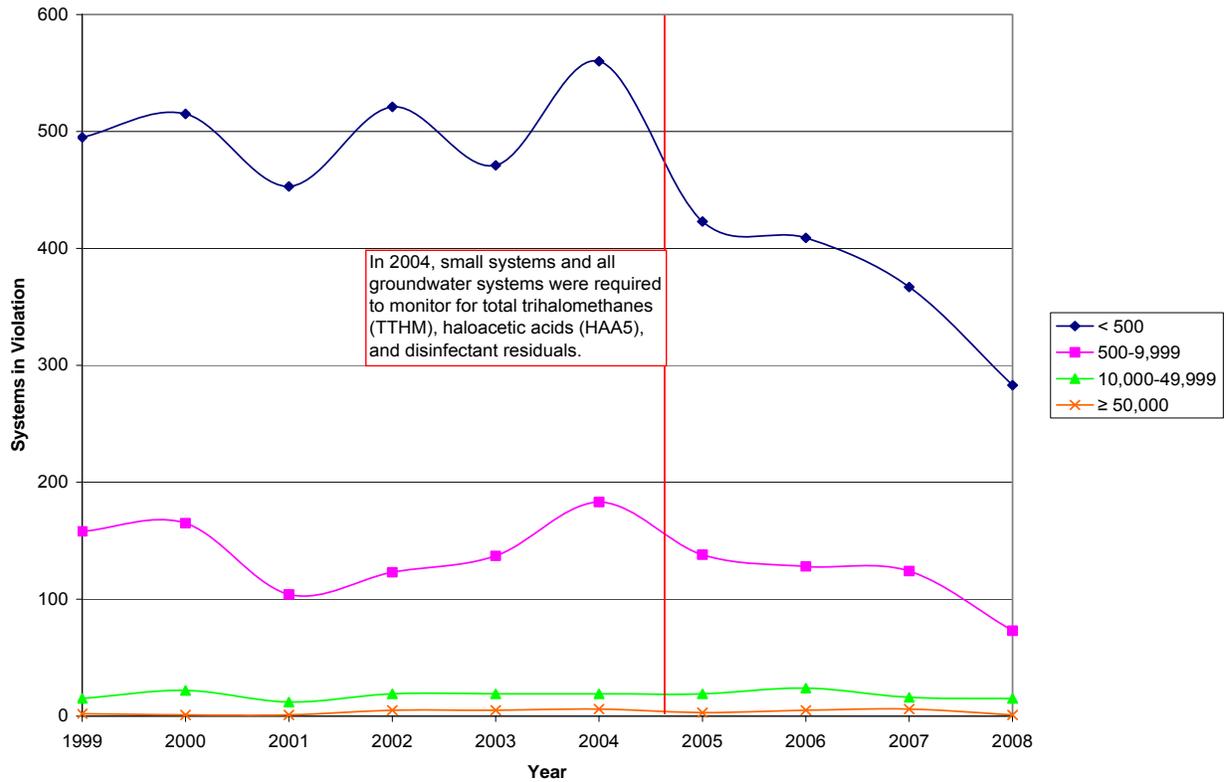


Figure A.7: Non-transient non-community Water Systems with MCL Violations Since 1999

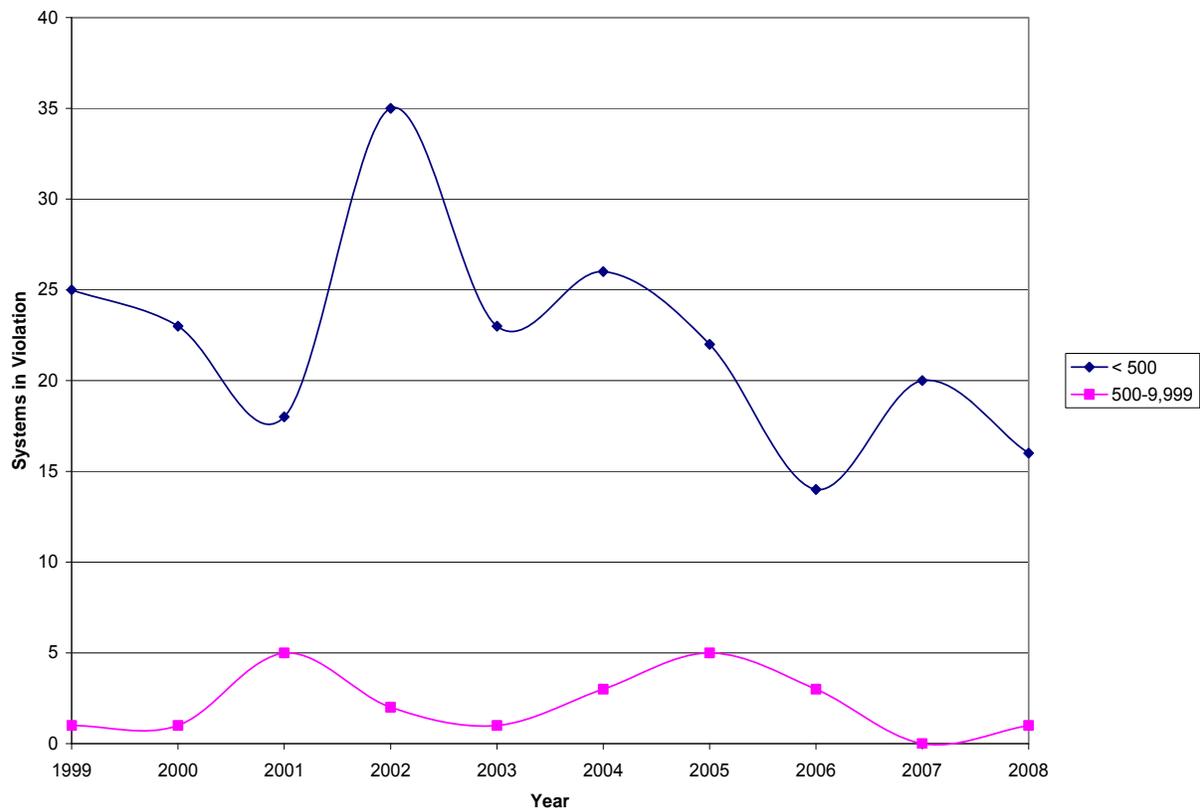


Figure A.8: Non-transient non-community Water Systems with MR Violations Since 1999



Figure A.9: Transient non-community Water Systems with MCL Violations Since 1999

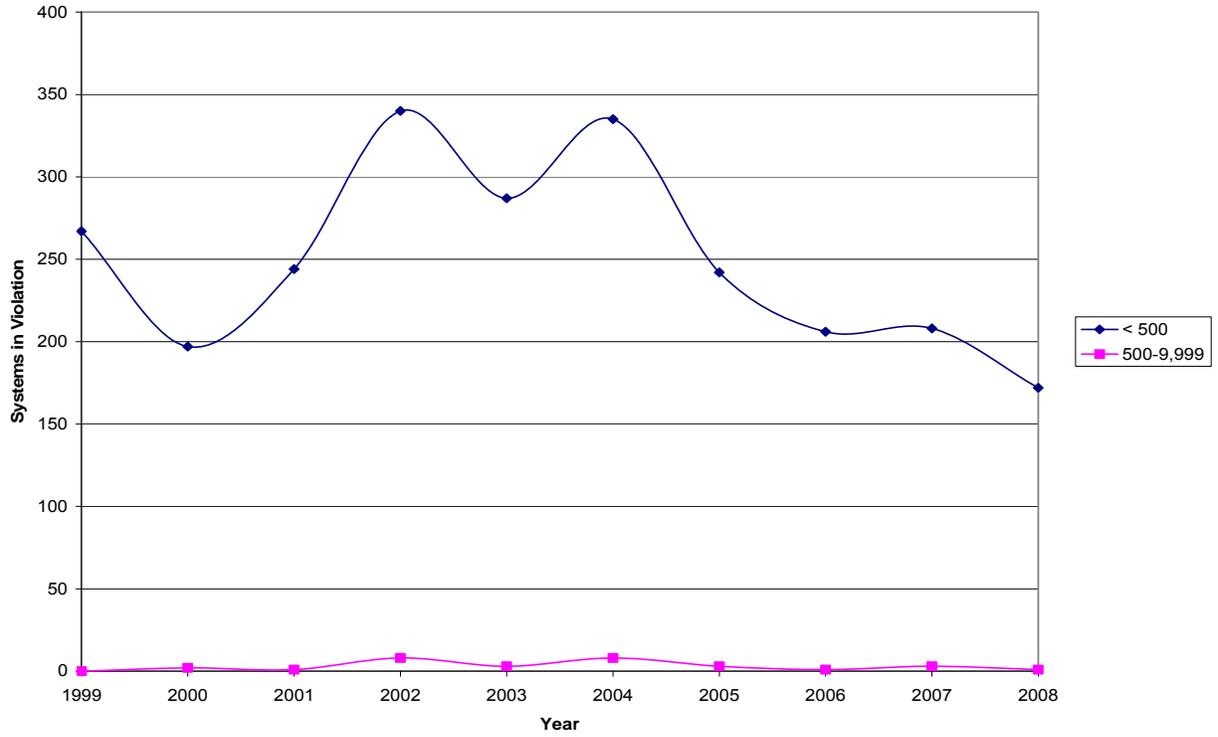


Figure A.10: Transient non-community Water Systems with MR Violations Since 1999

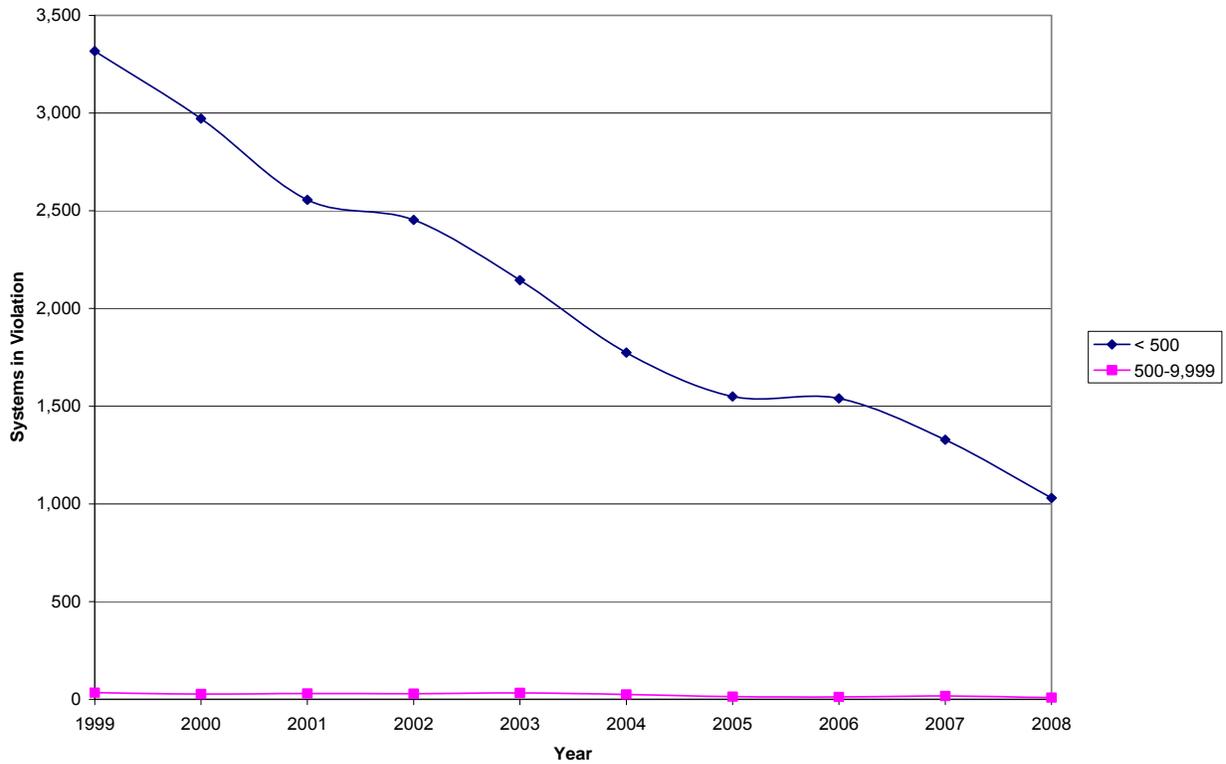


Figure A.11: Water Systems with MCL Violations Since 1999, Grouped by Population

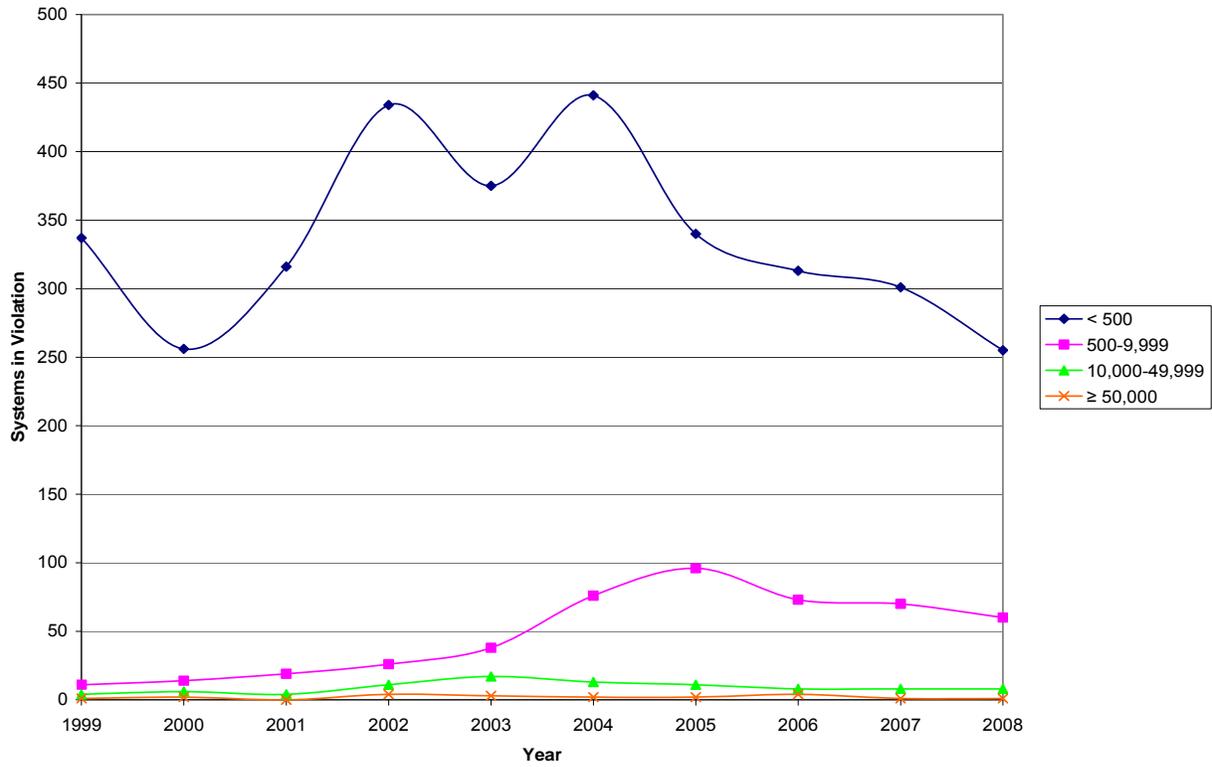
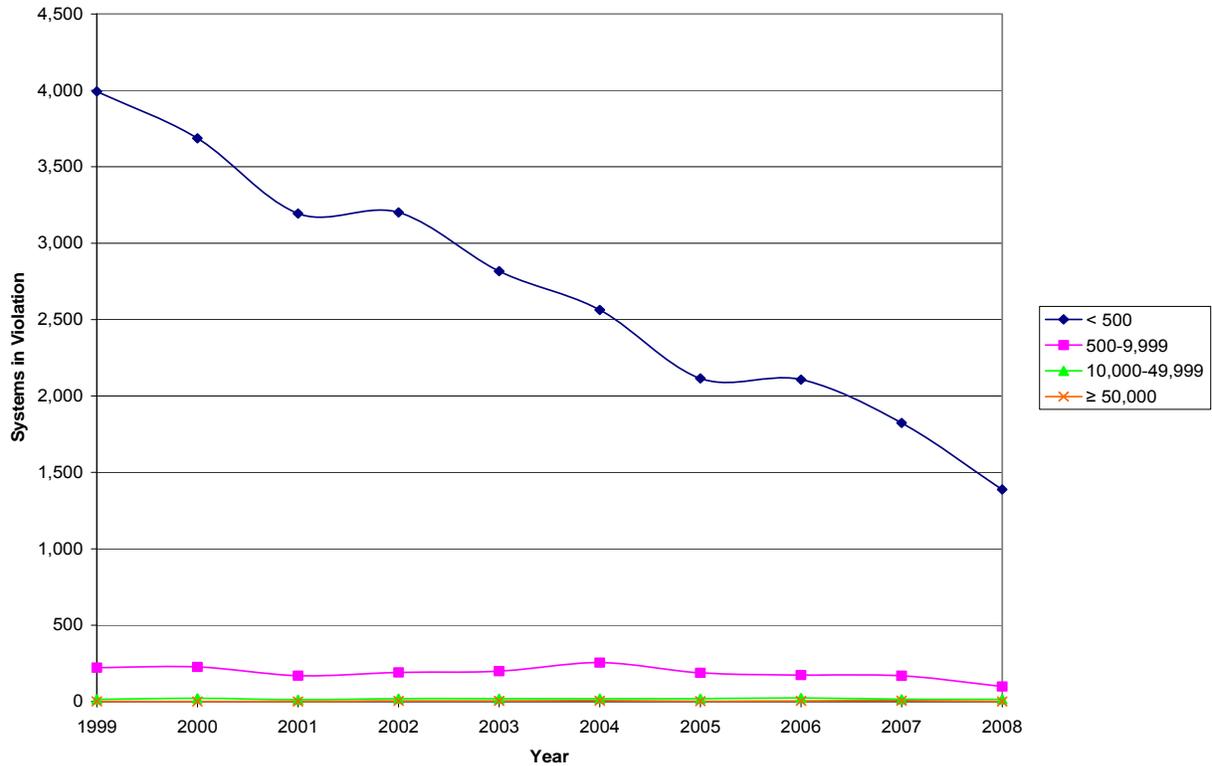


Figure A.12: Water Systems with MR Violations Since 1999, Grouped by Population



Appendix B

Table B.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, NTNCWS
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, NTNCWS Subpart H, population >= 10,000
2002	DDBP	Disinfectant residual monthly sampling (with TCR schedule)	Chlorine and chloramines maximum residual disinfectant level established at 4.0 mg/L as RAA	CWS, NTNCWS Subpart H, population >= 10,000
2002	DDBP	TOC monthly monitoring	Treatment technique for TOC removal; ratio of actual to required removal >= 1.00 as RAA	CWS, NTNCWS Subpart H, population >= 10,000
2002	DDBP	Bromate monthly monitoring	Bromate < 0.010 as RAA	CWS, NTNCWS 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, NTNCWS 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, NTNCWS 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, NTNCWS Subpart H including populations < 10000
2004	DDBP	Bromate monthly monitoring	Bromate < 0.010 as RAA	CWS, NTNCWS Subpart H including populations < 10,000; Groundwater

Table B.1: 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 <10000
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 <10000
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