PROPOSED RULEMAKING
ENVIRONMENTAL QUALITY BOARD
[25 PA. CODE CH. 109]

Disinfection Requirements Rule

The Environmental Quality Board (Board) proposes to amend Chapter 109 (relating to safe drinking water). The amendments will strengthen water system requirements relating to microbial protection and disinfection requirements.

The amendments also include minor clarifications to the Stage 2 Disinfectants/Disinfection Byproducts Rule (Stage 2 DBPR), Long Term 2 Enhanced Surface Water Treatment Rule (LT2) and the Lead and Copper Rule Short-Term Revisions (LCRSTR) in order to obtain or maintain primacy. The U. S. Environmental Protection Agency (EPA) promulgated the Federal Stage 2 DBPR on January 4, 2006, the Federal LT2 on January 5, 2006, and the Federal LCRSTR on October 10, 2007. Pennsylvania adopted state regulations implementing the Federal rules on December 26, 2009 (Stage 2 and LT2) and December 18, 2010 (LCRSTR). Minor clarifications are needed in order to obtain or maintain primacy for these rules.

The amendments will protect public health through a multi-barrier approach designed to guard against microbial contamination by ensuring the adequacy of treatment designed to inactivate microbial pathogens and the integrity of drinking water distribution systems.

Safe drinking water is vital to maintaining healthy and sustainable communities. Proactively avoiding incidents such as waterborne disease outbreaks can prevent loss of life, reduce the incidents of illness, and reduce health care costs. Proper investment in public water system infrastructure and operations helps ensure a continuous supply of safe drinking water; enables communities to plan and build future capacity for economic growth; and ensures their long-term sustainability for years to come.

The disinfectant residual requirements in the distribution system will apply to all 1,982 community water systems and those noncommunity water systems that have installed disinfection (822) for a total of 2,804 public water systems. These public water systems serve a total population of 10.6 million people.

The CT/log inactivation monitoring and reporting requirements will apply to all 353 filter plants which are operated by 319 water systems.

This proposal was adopted by the Board at its meeting of _____.

A. *Effective Date*

These amendments will go into effect upon publication in the *Pennsylvania Bulletin* as final rulemaking. The submission of a sample siting plan is required six months after promulgation to allow time for development of the plan.

The Board is seeking comment on whether other provisions of the proposed rule should be deferred. For example, some systems may need up to six months to make operational changes and effectively increase disinfectant residuals to 0.2 mg/L throughout the distribution system. If capital improvements are needed, a system-specific compliance schedule may be needed. Please provide comments on the anticipated length of time needed to increase disinfectant residuals and whether capital improvements are anticipated to meet the proposed requirements.

B. *Contact Persons*

For further information, contact Lisa D. Daniels, Director, Bureau of Safe Drinking Water, PO Box 8467, Rachel Carson State Office Building, Harrisburg, PA 17105-8467, (717) 787-9633 or William Cumings, Assistant Counsel, Bureau of Regulatory Counsel, P. O. Box 8464, Rachel Carson State Office Building, Harrisburg, PA 17105-8464, (717) 787-7060. Information regarding submitting comments on this proposal appears in Section I of this preamble. Persons with a disability may use the Pennsylvania AT&T Relay Service by calling (800) 654-5984 (TDD users) or (800) 654-5988 (voice users). The proposal is available electronically through the Department of Environmental Protection's (DEP) web site www.dep.state.pa.us.

C. *Statutory Authority*

The proposed rulemaking is being made under the authority of Section 4 of the Pennsylvania Safe Drinking Water Act (SDWA) (35 P. S. § 721.4), which grants the Board the authority to adopt rules and regulations governing the provision of drinking water to the public, and section 1920-A of The Administrative Code of 1929 (71 P. S. § 510-20) which authorizes the Board to promulgate rules and regulations necessary for the performance of the work of the Department.

D. *Background and Purpose*

Amendments to Surface Water Treatment Regulations Regarding Monitoring and Reporting:

The proposed amendments include new monitoring and reporting requirements to ensure compliance with existing treatment techniques regarding log inactivation and CT requirements. Log inactivation is a measure of the amount of viable microorganisms that are rendered nonviable during disinfection processes. CT is the product of residual disinfectant concentration (C) and disinfectant contact time (T). The CT value is used to determine the levels of inactivation under various operating conditions.

Public water systems using surface water or groundwater under the direct influence of surface water (GUDI) sources have long been required to meet log inactivation and CT requirements for the inactivation of Giardia cysts and viruses. These existing treatment technique requirements are intended to ensure that water systems provide adequate and continuous disinfection for the inactivation of pathogens.

The Small Water Systems Technical Assistance Center (TAC) Board recommended (by a vote of 7 to 6) that the monitoring requirements for CT calculations should be deleted and deferred to a future Chapter 109 revision because there are many variables for calculating CTs and TAC

believes this would be an additional burden for most systems. This recommendation was not incorporated into this proposed rulemaking because the only way to ensure compliance with the existing treatment techniques is to measure and record the data elements that are needed to calculate CTs (i.e., disinfectant residual, temperature, pH, flow and volume) and report the results. In addition, water suppliers should already be monitoring these data elements because the data is needed to properly operate filtration plants. Costs associated with the new reporting requirements should be minimal due to the availability of EPA's CT Calculator tool and the use of summary forms for reporting data for compliance purposes.

The proposed amendments also clarify the existing minimum residual disinfectant level at the entry point. By adding a zero to the minimum level (0.20 mg/L), water suppliers will be required to maintain a residual that is equal to or greater than 0.20 mg/L. Currently, levels of 0.15 mg/L or higher round up to 0.2 mg/L and are considered in compliance. A level of 0.20 mg/L is necessary due to the importance of meeting CTs and of maintaining an adequate disinfectant residual in the water entering the distribution system. Also, this level of sensitivity is consistent with existing requirements for the Groundwater Rule (0.40 mg/L) as specified in § 109.1302(a)(2). Finally, this level of sensitivity is achievable using current on-line instrumentation for the measurement of disinfectant residuals.

TAC recommended (by a vote of 10 to 3) that the residual remain at 0.2 mg/L because water systems using strip chart recorders may not be able to record data to two decimal places and water systems would be required to upgrade to more costly supervisory control and data acquisition (SCADA) systems. The Department estimates that 114 out of 352 plants (or ~30%) may be using strip chart recorders. Strip chart recorders can record measurements to two decimal places provided the proper scale and resolution is used. In cases where the requisite scale and resolution is not possible, an upgrade to electronic recording devices would cost approximately $1,500. This cost should not be prohibitive for filter plants and the use of electronic devises offers several advantages. Advantages of using electronic recording devices include improved data reliability, faster and more comprehensive data analysis, better data resolution, elimination of the need for interpolating trace values from a chart, cost savings through the elimination of consumables (pens and chart paper), and reductions in errors associated with transferring 'analog' data to a spreadsheet for recordkeeping or reporting purposes.

Log inactivation and entry point disinfectant residual requirements are existing federal requirements found in 40 CFR 141.72(b).

Amendments to Disinfectant Residual Requirements in the Distribution System:

The proposed amendments are intended to strengthen the distribution system disinfectant residual requirements by increasing the minimum residual in the distribution system to 0.2 mg/L free or total chlorine. The Department's existing disinfectant residual requirements for distribution systems have not been substantially updated since 1992 and require the maintenance of a detectable residual that is defined as 0.02 mg/L. The Department's existing treatment technique is not protective of public health because a residual of 0.02 mg/L does not represent a

true detectable residual and the level is inadequate to protect against microbial growth within the distribution system.

Why is it important to maintain a disinfectant residual within the distribution system?

Maintenance of a disinfectant residual in the distribution system is:

- Required under the federal Surface Water Treatment Rule for all systems using surface water and GUDI sources, and under Chapter 109 for all community water systems and those noncommunity water systems that have installed disinfection.
- Designated by EPA as the best available technology (BAT) for compliance with both the Total Coliform Rule and the Revised Total Coliform Rule.
- Considered an important element in a multiple barrier strategy aimed at maintaining the integrity of the distribution system and protecting public health.
- Intended to maintain the integrity of the distribution system by inactivating microorganisms in the distribution system, indicating distribution system upset, and controlling biofilm growth.

Most regulatory mandates regarding drinking water focus on enforcing water quality standards at the treatment plant and not within the distribution system. There should be no change in the quality of treated water from the time it leaves the treatment plant until the time it is consumed. However, substantial changes can occur to finished water as a result of physical, chemical and biological reactions. Data on waterborne disease outbreaks suggest that distribution systems remain a source of contamination that has yet to be fully addressed (NRC, 2006).

The distribution system is a critical and often under-recognized component of every public water system. Thousands of miles of pipes, pumps, valves, finished water storage tanks and other appurtenances link treated water from plants to consumers' taps. Distribution systems represent the largest majority of physical infrastructure for public water systems and their repair and replacement requires significant financial resources. EPA estimates the 20-year water transmission and distribution needs for Pennsylvania at $9.3 billion, with finished water storage facility infrastructure needs estimated at an additional $1.6 billion (EPA Drinking Water Infrastructure Needs Survey, 2013).

As distribution systems age, deterioration can occur due to corrosion, erosion of pipe materials, and external pressures that can lead to breaches in pipes and storage facilities, intrusion, and main breaks. In recent years, deteriorating water infrastructure in many parts of the U.S. has resulted in frequent water main breaks and other situations that can pose intermittent or persistent health risks (EPA, 2010). Many of these deficiencies create pathways of contamination. Therefore, ensuring the integrity and effective operation of distribution systems is critical for public health protection.

Water quality may degrade during water distribution for the following reasons: the way water is treated or not treated before it is distributed, chemical and biological reactions that take place in the water during distribution, reactions between the water and distribution system materials, and

contamination from external sources that occurs because of main breaks, leaks coupled with hydraulic transients, improperly maintained storage facilities, and other factors (NRC, 2005).

Many different microbes have demonstrated the ability to survive in the distribution system, with some possessing the ability to grow and/or produce biofilms. Microbes that may be present include bacteria, viruses and protozoa. Microbial presence in the distribution system can result in colonization of the distribution system infrastructure. Once biofilm development begins, subsequent material, organisms and contamination introduced to the distribution system can become entrained in the biofilm. Contamination and material in the biofilm may subsequently be released into the flowing water under various circumstances. As a result, biofilms can act as a slow-release mechanism for persistent contamination of the water (EPA, 2002b).

Factors that influence pathogen survival and growth in the distribution system include water chemistry (temperature, pH, etc.), presence of nutrients, system hydraulics, sediment accumulation, and presence (or absence) of disinfectant residual. Of these factors, maintenance of an adequate disinfectant residual throughout the distribution system plays a key role in controlling the growth of pathogens and biofilms and is a treatment technique that serves as one of the final barriers to protect public health. Lack of an adequate residual may increase the likelihood that disease-causing organisms such as *E. coli* and *Legionella* are present.

LeChevallier (1999) reported that two fundamental reasons for adding secondary disinfection are (1) to prevent or limit regrowth of microorganisms in the distribution system and (2) to inactivate any microorganisms that may enter the system through contamination. In addition to controlling regrowth, maintaining a disinfectant residual in the distribution system serves to inactivate microorganisms that may enter the system through cross-connections, main breaks and pressure transients. Although it may be true in some cases (that conventional disinfectant residuals may be ineffective against massive contamination from cross-connections), it is likely that small amounts of contamination occur on a much more frequent basis and that maintenance of an effective disinfectant residual throughout the distribution network acts as an important barrier in these instances.

It is increasingly being recognized that water treatment and chemistry factors may play a role in downstream proliferation of opportunistic pathogens and utilities therefore play some role in controlling outbreaks (Water Research Foundation, 2013).

According to the Centers for Disease Control and Prevention (CDC), despite advances in water treatment and management, waterborne disease outbreaks continue to occur in the United States. (Figure 1) The outbreaks reported during 2009 – 2010 highlight several emerging and persisting public health challenges associated with drinking water systems. *Legionella* accounted for 58% of outbreaks and is the most frequently reported etiology among drinking water systems. (Figure 2) In addition, the large proportion (78%) of illnesses observed in outbreaks involved distribution system deficiencies. (Figure 3) This data emphasizes the importance of protecting, maintaining and improving the public drinking water distribution system infrastructure because these deficiencies can lead to widespread illness (CDC, 2013).

Figure 1. Number of waterborne disease outbreaks associated with drinking water (N = 851), by year and etiology – United States, 1971-2010.

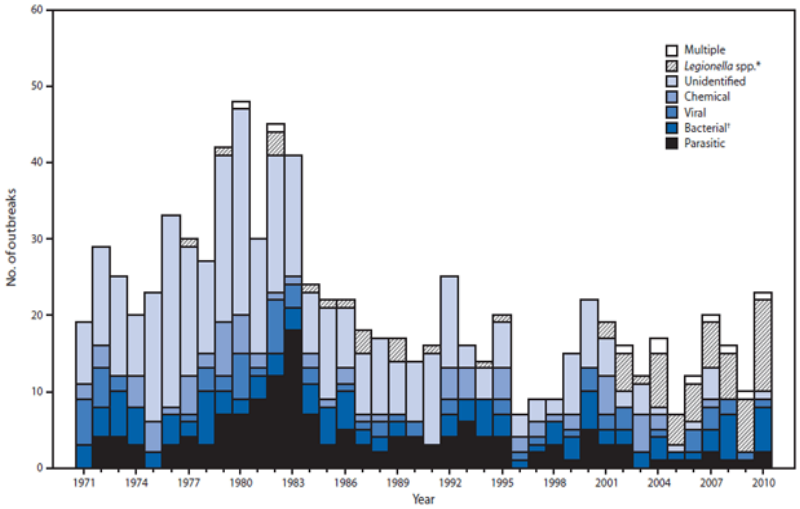


Figure 2. Etiology of Drinking Water Outbreaks (N = 33) and Outbreak-related Cases (N = 1,040), Waterborne Disease and Outbreak Surveillance System, 2009-2010.

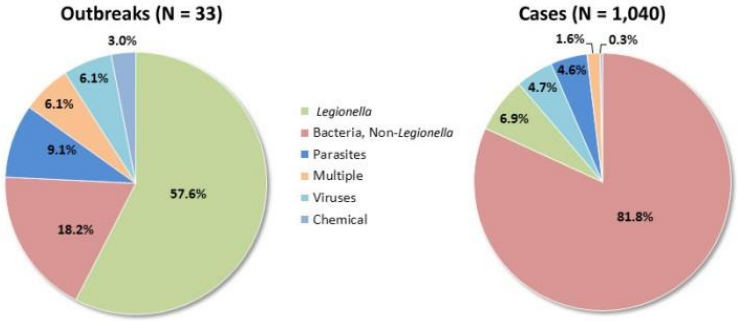
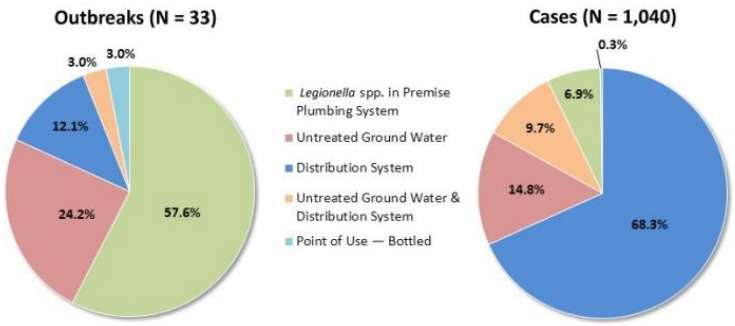
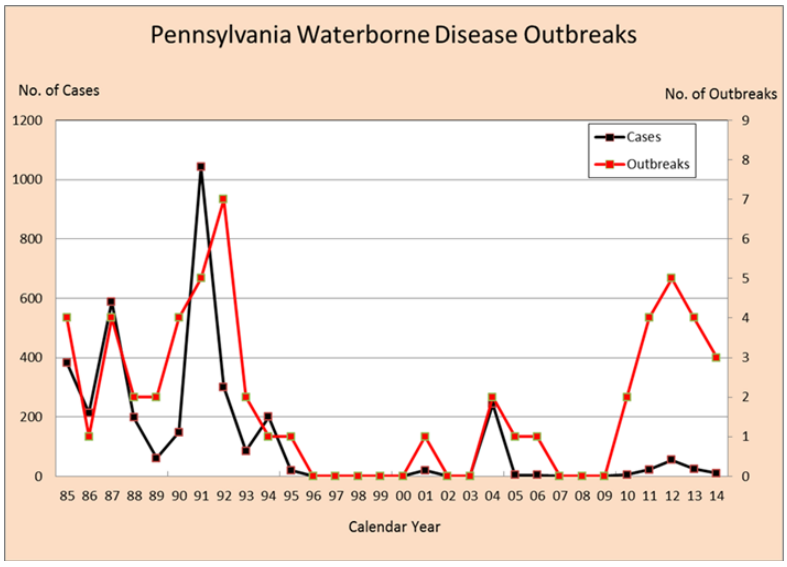


Figure 3. Deficiencies Assigned to Drinking Water Outbreaks (N = 33) and Outbreak-related Cases (N = 1,040), Waterborne Disease and Outbreak Surveillance System, 2009-2010.



Waterborne disease outbreaks in Pennsylvania have followed a similar trend in that nearly all outbreaks since 2010 have been associated with *Legionella* and distribution system deficiencies.

Figure 4. Waterborne Disease Outbreaks in Pennsylvania Associated with Drinking Water, 1985-2014. (Source: Pennsylvania Public Water System Compliance Report for 2014)



There have been a total of 18 *Legionella* outbreaks in Pennsylvania since 2010. The outbreaks occurred at several types of facilities, including personal care homes, apartment buildings, long term care facilities, hotels, condominiums, correctional facilities, recreational parks and hospitals. The outbreaks resulted in 117 cases of illness, 71 hospitalizations, and 8 deaths.

The distribution system is the remaining component of public water supplies yet to be adequately addressed in national efforts to eradicate waterborne disease. This is evident from data indicating that although the number of waterborne disease outbreaks including those attributable to distribution systems is decreasing, the proportion of outbreaks attributable to distribution systems is increasing (NRC, 2006).

What is a true detectable residual?

In order to answer this question, several terms must first be defined. The Method Detection Limit (MDL) is a statistically derived qualitative value that is determined in the lab and provides a 99% confidence that the detected value in a given matrix is greater than zero. The MDL does not represent a quantitative value. The Method Limit (ML), also known as the practical quantitation limit (PQL), is the lowest achievable quantifiable limit at a 95% confidence level and is derived from the MDL. The MDL is multiplied by a factor to yield the ML. The ML is often rounded based on the precision and sensitivity of the method and/or the maximum contaminant level (MCL).

According to Hach Company © (Primer, 2015), a leading manufacturer of chlorine residual monitoring devices, the MDL and ML used by EPA to approve Hach's Free and Total Chlorine Residual Methods was 0.02 mg/L Cl and 0.1 mg/L Cl, respectively.

MDL = 0.024, rounded to 0.02 mg/L Cl

ML = MDL * 3.18
ML = 0.02 * 3.18
ML = 0.06 mg/L Cl, rounded to **0.1 mg/L Cl**

In other words, the lowest achievable quantifiable limit is 0.1 mg/L.

In addition, all chlorine residual test methods are subject to interferences from inorganic and organic constituents such as iron, manganese, other oxidants and disinfection byproducts, and organic chloramines. These interferences can cause false positive results (Hach Company ©, 2013).

Pressman and Wahman (2014 & 2015) reported that free chlorine and inorganic chloramines may react with dissolved organic nitrogen to form organic chloramines. Organic chloramines are problematic because they interfere with analytical methods and are poor disinfectants (i.e., show little or no bactericidal activity). When total chlorine residuals are very low, between "detectable" and around 0.2 mg Cl_2/L, there may be little to no active disinfectant (i.e., inorganic monochloramine) actually present.

The Colorado Department of Public Health and Environment conducted a study to determine the detection limit for free chlorine using hand-held DPD devices in a field setting. The study included analyzing data from over 450 samples that were collected from 15 public water systems from across the state. The study findings showed a detection limit of 0.09 mg/L (99% confidence) (CDPHE, 2014).

Based on these studies and reports, and the prevalence of iron, manganese and other constituents of concern in Pennsylvania's raw and finished waters, the Department believes that the true detectable residual is likely somewhere between 0.1 – 0.2 mg/L.

The Board is seeking comments on additional studies and reports related to detection limits for free and total chlorine residual analysis in the field.

What is an adequate residual for the control of microbial growth?

This proposed rule includes a regulatory limit of 0.2 mg/L (free or total chlorine) in the distribution system in order to ensure a true detectable residual and a meaningful residual for the control of microbial growth. This position is supported by the following studies, reports and data.

Early studies that were used to support the regulatory limit of 0.2 mg/L at the entry point include the following:

- Fair et al (1968) reported that the contact time needed to achieve a 99% *E. coli* kill at a free chlorine concentration of 0.2 mg/L was six (6) minutes at a temperature of 2-5 °C and a pH of 8.5. Additional data suggests that the bactericidal efficacy increases with decreasing pH.
- Berg (1964) reported kill rates in excess of 99% for *E. coli*, Adenovirus 3, and Poliomyelitis virus 1. These kill rates were achieved at 0.2 mg/L of HOCL and 10 minutes of contact time at 0-6 °C.
- Butterfield (1948) reported to the U.S. Public Health Service that the minimum free chlorine residual to disinfect water at 10 minutes of contact time should be 0.2 mg/L. This recommendation was for a pH range of 6.0-7.0.

LeChevallier et al (1996, 2007 & 2014) conducted an 18-month survey of 31 water systems in North America to determine the factors that contribute to the occurrence of coliform bacteria in drinking water. The study found that systems that maintained dead-end free chlorine levels of < 0.2 mg/L or monochloramine levels of < 0.5 mg/L had substantially more coliform occurrences than systems that maintained higher disinfectant residuals. Research also showed data from a utility in Utah that experienced occurrences of total coliform bacteria and *E. coli* when free chlorine residuals in its distribution system averaged only 0.1 mg/L. Coliform occurrences were controlled by increasing the free chlorine concentration > 0.2 mg/L. The study concludes that the occurrence of coliform bacteria within a distribution system is dependent upon a complex interaction of chemical, physical, operational, and engineering parameters. No one factor could account for all of the coliform occurrences and one must consider all of the parameters in devising a solution to the regrowth problem.

The Colorado Department of Public Health and Environment conducted a study to review total coliform and *E. coli* occurrence data. The study showed a relationship between chlorine residuals and occurrence. There was a higher rate of occurrence of both contaminants as the chlorine residual decreased. Specifically, CDPHE found the following:

Coliform Bacteria and Residual Chlorine Data (7/1/11 – 11/15/2013)			
	Samples Received	**Number of TC+**	**% of Positives**
< 0.1 mg/L	3,357	102	3.0%
<0.2 mg/L	7,805	160	2.0%
≥ 0.2 mg/L	83,433	462	0.55%
Totals	91,238	622	0.7%

Regarding *E. coli*, CDPHE found that ~ 48% of all *E. coli* positive results occurred when disinfectant residuals were < 0.2 mg/L. (CDPHE, 2014)

Industry standards:

- The 2012 edition of The Great Lakes-Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (Ten States Standards) specifies that the minimum free chlorine residual in water distribution systems should be 0.2 mg/L, and the minimum chloramine residual, where chloramination is practiced, should be 1.0 mg/L at distant points in the distribution system.
- The Water Research Foundation recommends a free chlorine residual of 0.20 mg/L and a total chlorine residual of 0.50 mg/L for an optimized distribution system. (Water Research Foundation. 2010. Criteria for Optimized Distribution Systems.)

Both EPA and DEP have developed Area Wide Optimization Programs (AWOP) for Distribution Systems and recommend maintenance of residuals ≥ 0.20 mg/L free chlorine at all locations in the distribution system at all times. In addition, EPA recommends maintenance of residuals ≥ 1.50 mg/L monochloramine at all locations in the distribution system at all times to provide a disinfection barrier against both microbial contamination and nitrification prevention.

The goal of the Distribution System Optimization Program is to sustain the water quality leaving the plant throughout all points in the distribution system. To further define distribution system optimization, "optimization" refers to improving drinking water quality to enhance public health protection *without significant capital improvements* to the water treatment plant or distribution system infrastructure.

The distribution system is the last "barrier" for protecting public health, meaning the physical and chemical barriers that have been established are necessary to protect the public from intentional or unintentional exposure to contaminants after the water has been treated. Distribution system optimization focuses on two primary health concerns related to water quality within the distribution system:

- Microbial contamination
- Disinfection By-Product (DBP) formation

If implemented, distribution system optimization will lead to increased public health protection through increased monitoring and operational oversight, resulting in improved physical protection and improved water quality for all customers.

State data:

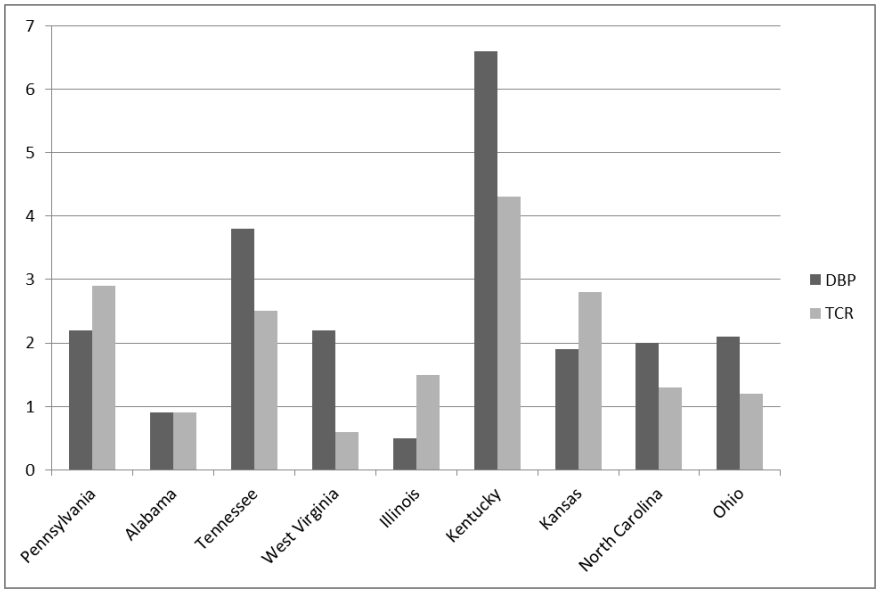
In addition to reviewing numerous studies, the disinfectant residual requirements of other states were also reviewed. At least 23 states have promulgated more stringent requirements when compared to Pennsylvania's current standard of 0.02 mg/L. Nineteen of these states have disinfectant residual requirements that are ≥ 0.2 mg/L, which supports the Board's proposed standard of 0.2 mg/L. The table below includes a summary of other state's requirements.

State	Minimum Distribution System Residual (mg/L)
Alabama*	0.2 (free), 0.5 (total)
Colorado*	0.2 (free or total)
Delaware	0.3 (free)
Florida*	0.2 (free), 0.6 (total)
Georgia	0.2 (free)
Illinois*	0.2 (free), 0.5 (total)
Indiana	0.2 (free), 0.5 (total)
Iowa	0.3 (free), 1.5 (total)
Kansas*	0.2 (free), 1.0 (total)
Kentucky*	0.2 (free), 0.5 (total)
Louisiana*	0.5 (free or total)
Minnesota	0.1 (free or total)
Missouri	0.2 (total)
Nebraska	SW - 0.2 (free), 0.25 or 0.5 (total); GW – 0.1 (free)
Nevada	0.05 (free or total)
New Jersey*	0.05 (free or total)
North Carolina*	0.2 (free), 1.0 (total)
Ohio*	0.2 (free), 1.0 (total)
Oklahoma	0.2 (free), 1.0 (total)
Tennessee*	0.2 (free)
Texas*	0.2 (free), 0.5 (total)
Vermont	0.1 (free)
West Virginia*	0.2 (total)

*States with mandatory disinfection.

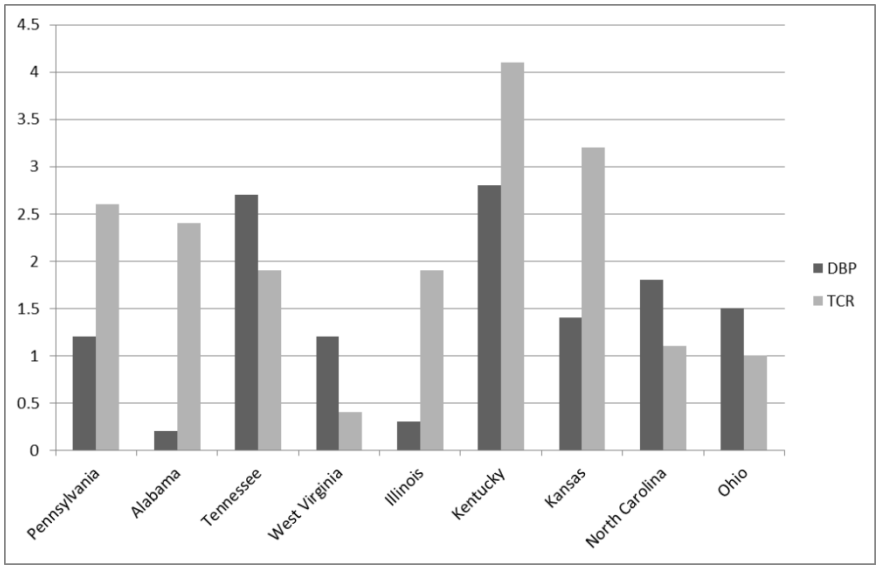
The proposed disinfectant residual requirements aim to strike a balance between improving microbial inactivation while limiting adverse impacts on disinfection by-product formation. Water systems can meet more stringent disinfectant residual requirements and still be in compliance with disinfection by-products as evidenced by a review of total coliform rule (TCR) and disinfection by-product (DBP) compliance data from other states. (Source: EPA's ECHO website)

% CWSs w/ FY2011 Violations – PA vs. States w/ Mandatory Disinfection & Residuals ≥ 0.2 mg/L



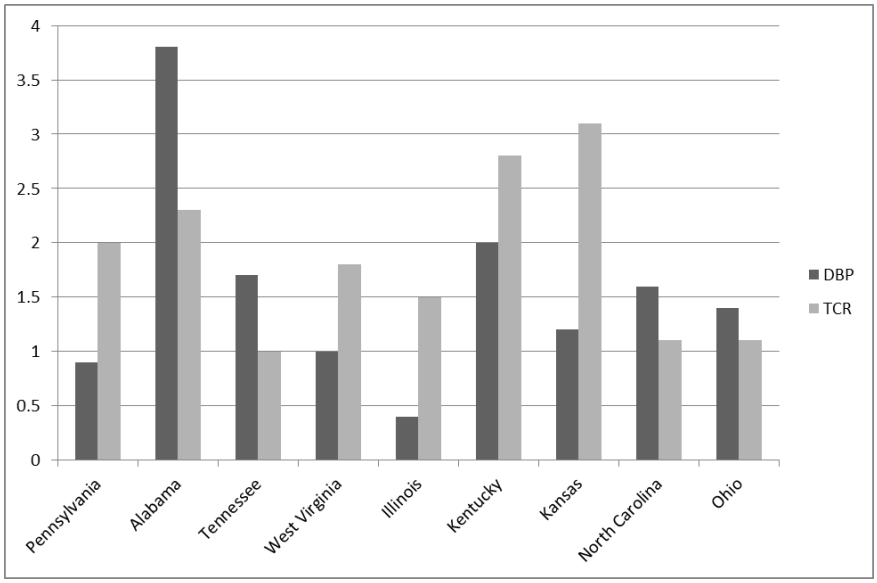
In 2011, 7 of 8 states had better TCR compliance rates than PA, while 6 of 8 states had better DBP compliance rates than PA.

% CWSs w/ FY2012 Violations – PA vs. States w/ Mandatory Disinfection & Residuals ≥ 0.2 mg/L



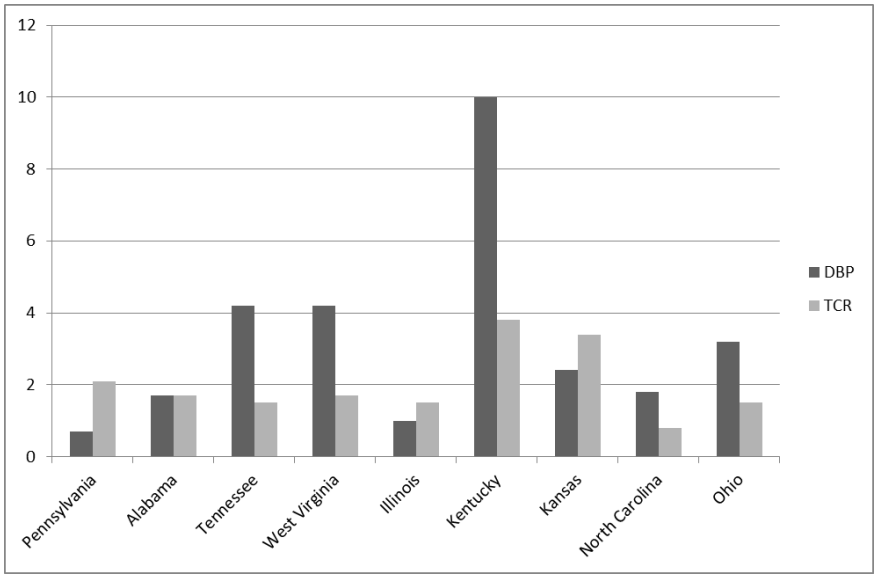
In 2012, 6 of 8 states had better TCR compliance rates than PA, while 3 of 8 states had better DBP compliance rates than PA.

% CWSs w/ FY2013 Violations – PA vs. States w/ Mandatory Disinfection & Residuals ≥ 0.2 mg/L



In 2013, 5 of 8 states had better TCR compliance rates than PA, while 1 of 8 states had better DBP compliance rates than PA.

% CWSs w/ FY2014 Violations – PA vs. States w/ Mandatory Disinfection & Residuals ≥ 0.2 mg/L



In 2014, 6 of 8 states had better TCR compliance rates than PA, while 0 of 8 states had better DBP compliance rates than PA.

In each of the last four years, the large majority of states requiring disinfectant residual levels ≥ 0.2 mg/L had better TCR compliance rates than Pennsylvania (i.e., had lower percentages of CWSs with TCR MCL violations). Some states were also able to control DBP violations as well.

A disinfectant residual serves as an indicator of distribution system contamination and the effectiveness of distribution system best management practices. Best management practices include flushing, storage tank maintenance, cross connection control, leak detection, and effective pipe replacement and repair practices. The effective implementation of best management practices will help water suppliers comply with the disinfectant residual treatment technique by lowering chlorine demand and maintaining an adequate disinfectant residual throughout the distribution system. These same practices can also help control DBP formation.

TAC recommended (by a vote of 8 to 5) that the minimum required disinfectant residual should be 0.1 mg/L (free or total). No supporting studies or reports were provided in support of a residual of 0.1 mg/L (free or total).

The Board requests comments including references to studies, reports or data that support a disinfectant residual of 0.1 mg/L, or any other disinfectant residual that is equally protective of public health.

TAC also recommended (by a vote of 12 to 0 with 1 abstention) that the Board retain the requirement for Heterotrophic Plate Count (HPC) monitoring. It was recommended that HPC should be kept as another tool to demonstrate compliance with the distribution system disinfectant residual requirements. No supporting studies or reports were provided to support that an HPC < 500 provides an equivalent level of public health protection when compared to a disinfectant residual of 0.2 mg/L.

The Board requests comments including references to studies, reports, or data that provide supporting evidence that an HPC < 500 provides an equivalent level of public health protection when compared to a disinfectant residual of 0.2 mg/L.

Costs:

Disinfectant Residuals in the Distribution System:

It is anticipated that the large majority of water systems will be able to comply with this requirement with little to no capital costs. According to Department records for the last three years (2012 – 2014):

- Based on more than 82,000 monthly average distribution system disinfectant residual values reported by 2,583 different water systems:
    - 95.6% of the average values already meet or exceed the increased minimum residual of 0.2 mg/L (free chlorine)
    - Only 4.4% of the average values are below the minimum residual.

- For the 37 systems that chloraminate, based on more than 1,200 monthly average values reported:
    - 99.67% of the average values already meet or exceed the increased minimum residual of 0.2 mg/L (total chlorine)
    - Only 0.33% of the average values are below the minimum residual.

Systems may need to increase the frequency of or improve the effectiveness of existing operation and maintenance best management practices, such as flushing, storage tank maintenance, cross connection control, leak detection, and effective pipe replacement and repair practices, in order to lower chlorine demand and meet disinfectant residual requirements at all points in the distribution system.

Some systems with very large and extensive distribution systems may need to install automatic flushing systems or booster chlorination stations in order to achieve a 0.2 mg/L residual at all points in the distribution system. The estimates for these facilities are as follows:

- Costs for automatic flushers: ~ $2,000
- Costs for booster chlorination stations: $200,000 - $250,000

The Department estimates that 20% of large systems (serving > 50,000), or six systems, may need to install automatic flushing devices and/or booster chlorination stations. Three systems may need to install up to five automatic flushers for a cost of $10,000 for each system, or a total of $30,000. Three systems may need to install a booster chlorination station at $250,000 for each system, or a total of $750,000. The total capital costs to the regulated community may be $780,000.

Costs for small systems are not expected to increase because most small systems are already maintaining adequate disinfectant residuals (0.40 mg/L) as required by the Groundwater Rule.

The Board requests comments on anticipated costs to comply with the proposed disinfectant residual requirements.

The Board is also seeking comments on whether a deferred effective date of six months after final promulgation is warranted in order to provide water systems with additional time to make any necessary operational changes. If capital improvements are needed, a system-specific compliance schedule may be needed. Please provide comments on the anticipated length of time needed to increase disinfectant residuals and whether capital improvements are anticipated to meet the proposed requirements.

References:

1. Berg, G., "The Virus Hazard in Water Supplies," *J. New England Water Works Association*, 1964, Vol. 78, pp. 79.
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History of pre-draft proposed rulemaking for disinfection requirements:

The pre-draft proposed rulemaking was originally included in the Pre-Draft Proposed Revised Total Coliform Rule (RTCR), which was presented to TAC on June 18 and September 23, 2014 for review and comment. On April 21, 2015, the Environmental Quality Board approved the proposed RTCR with modifications. The modifications included splitting out the "Non-RTCR" provisions for additional stakeholder input. The motion was made with the expectation that the "Non-RTCR" provisions would be revisited promptly. On April 30, 2015, the TAC Board voted to recommend that the regulation be split further; with the "Non-RTCR" rulemaking to focus solely on the disinfection requirements and the minor corrections needed to obtain/maintain primacy.

In order to provide additional opportunity for stakeholder input on the disinfection requirements, TAC meetings were convened on May 18, May 26, June 16 and June 30, 2015. During these meetings, 14 water systems and organizations delivered presentations to help inform the discussion. These stakeholder presentations and other materials provided by the Department may be found on the Department's website. Two additional meetings were held with large water systems on June 29 and July 16, 2015 to gather additional comments. As a result of these six additional stakeholder meetings, several revisions were made during the pre-draft rulemaking process, including revisions to the minimum required disinfectant residual levels, monitoring and reporting requirements, and compliance determinations. These revisions were made to address concerns about compliance costs and the frequency of public notification. TAC provided a final set of recommendations on July 15, 2015. Many of TAC's recommendations are incorporated into the proposed rulemaking. Other recommendations are incorporated into this preamble as a means to solicit further public comment. Refer to Section E for more information about TAC's recommendations.

E. *Summary of Regulatory Requirements*

§ 109.1. Definitions.

The existing definition for "Consecutive water system" was amended to clarify that a system which obtains all of its water from another public water system and provides treatment to meet a primary MCL***, MRDL or treatment technique*** is a consecutive water system.

§ 109.202. State MCLs, MRDLs, and treatment technique requirements.

The title of § 109.202(a) was amended to "*Primary MCLs, **MRDLs, and treatment technique requirements"*** to be consistent with the title of Subchapter B. "MCLs, MRDLs or Treatment Technique Requirements."

Sections 109.202(a)(1) and (2) were amended to add the language "***MRDLs, and treatment technique requirements"*** following any mention of "MCLs". These revisions were made to be

consistent with the title of Subchapter B. which is "MCLs, MRDLs or Treatment Technique Requirements."

Section 109.202(c)(1)(ii) was separated into two clauses, (A) and (B), to improve readability and to clarify disinfection requirements within filtration plants.

Section 109.202(c)(1)(ii)(A) was amended to clarify that monitoring is required to ensure compliance with existing log inactivation requirements. Refer to Section D for more information.

Section 109.202(c)(1)(ii)(B) was amended to clarify the minimum residual disinfectant level at the entry point. By adding a zero to the minimum level (***0.20 mg/L***), water suppliers will be required to maintain a residual that is equal to or greater than 0.20 mg/L. Currently, levels of 0.15 or higher round up to 0.2 and are in compliance. A level of 0.20 mg/L is necessary due to the importance of meeting CTs and maintaining an adequate disinfectant residual in the water entering the distribution system. Also, this level of sensitivity is consistent with existing requirements for the Groundwater Rule (0.40 mg/L) as specified in § 109.1302(a)(2). Refer to Section D for more information.

Log inactivation and entry point disinfectant residual requirements are existing federal requirements found in 40 CFR 141.72(b).

Section 109.202(c)(4) was added to clarify that disinfectant residual requirements specified in 109.710 apply to community water systems using a chemical disinfectant or that deliver water that has been treated with a chemical disinfectant (i.e., a consecutive water system).

Section 109.202(c)(5) was added to clarify that nontransient noncommunity water systems that have installed chemical disinfection and transient noncommunity water systems that have installed chemical disinfection under §§ 109.202(c)(1) or 109.1302(b) must comply with the disinfectant residual requirements specified in § 109.710.

The misspelled word "community" was corrected in the first line of § 109.202(g).

§ 109.301. General monitoring requirements.

Section 109.301(1) was amended to remove an unnecessary reference to the federal drinking water regulations.

Section 109.301(1)(i)(C) was amended to clarify that a public water supplier shall record the number of periods each day when the residual disinfectant concentration at the entry point is less than ***0.20*** mg/L for more than 4 hours to be consistent with revised language in § 109.202(c)(1)(ii). This section was also amended to clarify that the length of time that grab sampling or manual recording can be substituted for continuous monitoring or recording is 5 ***working*** days after the equipment fails which is consistent with federal requirements found in 40 CFR 141.74(c)(2).

Section 109.301(1)(i)(D) was amended to incorporate new monitoring requirements for the residual disinfectant concentration in the distribution system for filtered surface water and GUDI systems. Public water suppliers shall monitor in accordance with a sample siting plan.

Sections 109.301(1)(i)(D)(I) and (II) were added to clarify that public water suppliers shall monitor the residual disinfectant concentration at the same time and from the same location as total coliform samples, and shall ensure that the disinfectant residual is measured at least once per week. Disinfectant residual monitoring conducted at total coliform sample sites can be used to meet the weekly monitoring requirement. For any week that a total coliform sample is not collected, the water supplier shall measure the disinfectant residual at a representative location within the distribution system as per its sample siting plan. TAC recommended (by a unanimous vote) that water suppliers be required to measure the distribution system disinfectant residual at least once per week, instead of once per day as initially proposed. This recommendation was incorporated into this proposed rulemaking.

Section 109.301(1)(i)(D)(III) was added to ensure equitable water quality for all consumers by requiring public water suppliers to include sample sites (that do not meet the minimum level) in the monitoring conducted the following month. The expectation is that sample sites that were out of compliance should be returned to compliance by the next month. This ensures that areas of the distribution system with chronically low disinfectant residuals receive additional monitoring and operational oversight.

Section 109.301(1)(i)(D)(IV) was added to cross reference the compliance determination requirements found in § 109.710.

Sections 109.301(1)(v) and (vi) were added to require new monitoring requirements to ensure compliance with existing treatment technique requirements specified in § 109.202(c)(1)(ii)(A). Refer to Section D for more information.

Section 109.301(2)(i) was amended to change "fecal coliform" to "*E. coli*" to be consistent with the federal MCL specified under 40 CFR 141.63(c).

Section 109.301(2)(i)(E) was amended to incorporate new monitoring requirements for the residual disinfectant concentration in the distribution system for unfiltered surface water and GUDI systems. Public water suppliers shall monitor in accordance with a sample siting plan. This language is consistent with the proposed amendments in § 109.301(1)(i)(D).

Sections 109.301(5)(iii)(B) and 109.301(6)(ii)(B) were amended to clarify monitoring requirements after the initial detection of a VOC or SOC. These amendments are consistent with federal requirements found in 40 CFR 141.24.

Section 109.301(6)(vii) was amended to include a cross reference relating to submission requirements for waiver requests and renewals set forth in clause (D).

Section 109.301(6)(vii)(A) was amended to clarify that dioxin and PCBs are included in the waiver process. Section 109.301(6)(vii)(E) was deleted. These amendments reflect federal requirements found in 40 CFR 141.24.

Section 109.301(7)(i)(A) was deleted to reflect federal requirements found in 40 CFR 141.23.

Existing § 109.301(7)(i)(B) was renumbered as § 109.301(7)(i)(A) and was retitled to reflect the federal requirements found in 40 CFR 141.23.

A new § 109.301(7)(i)(B) was added to clarify sampling point location requirements for asbestos monitoring. This addition reflects federal requirements found in 40 CFR 141.23.

Section 109.301(7)(i)(C) was amended to include a cross reference to the new waiver language found in § 109.301(7)(i)(F).

Section 109.301(7)(i)(F) was added to clarify asbestos monitoring waiver requirements. This addition reflects federal requirements found in 40 CFR 141.23.

Section 109.301(7)(iii)(C)(II) was amended to clarify repeat monitoring requirements for inorganic chemical (IOC) monitoring.

Section 109.301(12)(iv)(B)(II) was amended to reflect federal analytical requirements for bromate found in 40 CFR 141.132(b)(3)(ii)(B).

Section 109.301(13) was rewritten for clarity and amended to also require transient noncommunity water systems with 4-log treatment under Subchapter M to conduct disinfectant residual monitoring consistent with requirements of this paragraph and § 109.710.

§ 109.303. Sampling requirements

Section 109.303(e) was amended to correct a federal citation relating to monitoring requirements for unregulated contaminants and to remove another federal citation which no longer exists.

§ 109.408. Tier 1 public notice - categories, timing and delivery of notice.

Section 109.408(a)(2) was amended to correct a Chapter 109 cross-reference.

Section 109.408(a)(6) was amended to clarify that Tier 1 public notice is required for a failure to meet log inactivation requirements for more than 4 hours or a failure to maintain minimum entry point disinfectant residuals for more than 4 hours when the log inactivation value was not calculated.

§ 109.701. Reporting and recordkeeping.

Section 109.701(a)(2) was amended to clarify that water systems must follow reporting requirements under § 109.701(a)(1) in addition to the requirements specified under § 109.701(a)(2).

Section 109.701(a)(2)(i)(C) was amended to require new reporting requirements for log inactivation values for Giardia to ensure compliance with *existing* treatment technique requirements specified in § 109.202(c)(1)(ii)(A). The existing reporting requirements that are in addition to the reporting requirements specified in § 109.701(a)(1) are no longer necessary and are being deleted.

Section 109.701(a)(2)(i)(D) was amended to require new reporting requirements for log inactivation values for viruses to ensure compliance with *existing* treatment technique requirements specified in § 109.202(c)(1)(ii)(A). The existing reporting requirements that are in addition to the reporting requirements specified in § 109.701(a)(1) are no longer necessary and are being deleted.

Existing § 109.701(a)(2)(ii)(D) was renumbered as §109.701(a)(2)(ii)(C). The existing language in §109.701(a)(2)(ii)(C) was deleted because this additional reporting requirement is no longer necessary. The distribution residual reporting requirements are specified in existing language in § 109.701(a)(1).

Section 109.701(a)(2)(iv) was deleted because the requirement to collect Heterotrophic Plate Count measurements is being deleted from § 109.710(b). This provision is no longer necessary due to the changes to residual disinfectant requirements specified in § 109.710.

Section 109.701(a)(8) was revised to require a sample siting plan for distribution system disinfectant residual monitoring. The existing reporting requirements that are in addition to the reporting requirements specified in § 109.701(a)(1) are no longer necessary and are being deleted.

§ 109.710. Disinfectant residual in the distribution system.

Sections 109.710(a) and (b) were amended to strengthen minimum distribution system disinfectant residual requirements for community water systems, nontransient noncommunity water systems with chemical disinfection and any transient noncommunity water system with filtration or 4-log treatment of viruses. These amendments will assist water systems to maintain compliance with the requirement of § 109.4(2) that treatment is adequate to protect the public health. Refer to Section D for more information.

Section 109.710(c) was renumbered as § 109.710(d).

Section 109.710(c) was added to clarify that a treatment technique violation occurs when the minimum disinfectant residual is not maintained in the distribution system and defines the water system's obligation to respond to this situation. This section also retains the requirement for a water system to investigate the cause and corrective action(s) whenever the minimum residual is not maintained; however, this investigation is only required if the minimum residual is not maintained at the same sample location in 2 or more consecutive months.

TAC recommended (by a vote of 8 to 5) that compliance should be required 95% of the time. While this compliance requirement is reasonable for large water systems that collect more than 40 TCR samples per month, it may not be feasible to calculate a 95^{th} percentile for smaller systems that only collect one or two samples per month. In lieu of a 95% compliance determination for small systems, the proposed monitoring frequency was increased to 4 samples per month (one per week) with systems remaining in compliance if no more than one sample per month is below the limit.

The Board requests comments on the compliance determinations, especially for small systems.

§ 109.715. Nitrification control plan.

Section 109.715 is being added to require a water system that uses chloramines as a disinfection process to develop and implement a nitrification control plan. This plan is in lieu of requiring a higher residual for systems that chloraminate in order to provide simultaneous control of microbes and nitrification. TAC recommended (by a vote of 8 to 5) that nitrification control plans should be system-specific. This recommendation was incorporated into this proposed rule.

§ 109.1002. MCLs, MRDLs or treatment techniques.

Section 109.1002(a) was amended to clarify that disinfection profiling and benchmarking requirements in § 109.204 apply to bottled, vended, retail and bulk water haulers (BVRB). These changes were made in response to EPA comments and are required to obtain primacy for LT2.

Section 109.1002(c) was amended to correct the name of subchapter L in the relating to language to make it consistent with the actual name of subchapter L which is the "Long-term 2 enhanced surface water treatment rule".

§ 109.1003. Monitoring requirements.

Section 109.1003(a) was amended in response to EPA comments to obtain primacy for LT2.

Section 109.1003(a)(1)(ix) was amended to clarify that samples for disinfection byproduct monitoring must be collected during the peak historical month and that systems on a quarterly frequency must ensure the samples are evenly spaced. These revisions are necessary to be consistent with existing language in §109.301(12) and the federal Stage 2 Disinfection Byproducts Rule and are in response to EPA comments to obtain primacy for the Stage 2 DBPR.

Section 109.1003(a)(1)(xi) was amended to clarify chlorine dioxide monitoring requirements for bottled, vended, bulk and retail water systems. These revisions are in response to EPA comments to obtain primacy for the Stage 2 DBPR.

Section 109.1003(a)(1)(xi) was renumbered as § 109.1003(a)(1)(xii) due to the new language added to the paragraph above.

Section 109.1003(a)(1)(xiii) was added to clarify that bottled, vended, bulk and retail water systems with filtration for surface water or GUDI sources must meet minimum disinfection residual requirements. These revisions are in response to EPA comments to obtain primacy for LT2.

Section 109.1003(a)(1)(xiv) was added to require that bottled, bulk and retail water systems that use or purchase water from a system that uses surface water or GUDI sources must also meet the minimum distribution system disinfection residual requirements. These revisions are in response to EPA comments to obtain primacy for LT2. The provision allowing HPC less than 500 in lieu of a disinfectant residual is included because these systems are purchasing finished water that has already been treated with an appropriate level of disinfection, and these systems often remove the chlorine from the water prior to their entry point and add an alternate secondary disinfectant such as ultraviolet light (UV).

Section 109.1003(a)(2)(iv) was added to require that vended water systems that purchase water from a system that uses surface water or GUDI sources must also meet the minimum distribution system disinfection residual requirements. These revisions are in response to EPA comments to obtain primacy for LT2.

Section 109.1003(b)(2) was amended to change "certified" to "accredited" in reference to the type of laboratory acceptable to the Department. This amendment reflects the revised terminology in 25 Pa. Code Chapter 252 (relating to environmental laboratory accreditation).

Section 109.1003(b)(6) was added to clarify sampling and analysis requirements in order to be consistent with § 109.304(a). These amendments were made in response to EPA comments and are required in order to maintain primacy.

Section 109.1003(e) was amended to require retail water facilities to follow the requirements set forth in that subsection. This amendment was made in response to EPA comments and is required in order to maintain primacy.

Section 109.1003(h) was moved from § 109.1003(a) for clarification of compliance determinations. This change was in response to EPA comments and is necessary to maintain primacy.

Section 109.1003(i) was added to be consistent with existing language in § 109.302.

§ 109.1004. Public notification.

Section 109.1004(a) was amended to correct terminology for bottled, vended, retail and bulk public water systems in response to EPA comments in order to maintain primacy.

§ 109.1008. System management responsibilities.

Section 109.1008(b) was amended to correct the Department's Drinking Water Bureau name.

Section 109.1008(g) was added to require bottled, vended, retail, and bulk hauling water systems to comply with the significant deficiencies requirements specified in § 109.705.

Section 109.1008(h) was added to clarify Stage 2 DBPR monitoring plan and operational evaluation level requirements. These amendments were made in response to EPA comments and are required in order to maintain primacy.

§ 109.1103. Monitoring requirements.

Section 109.1103(c)(1)(ii) was amended to clarify the period within which a small or medium water system that exceeded an action level is required to conduct additional lead and copper monitoring. This amendment was made to be consistent with federal requirements found in 40 CFR 141.86.

Section 109.1103(d) was amended to clarify lead service line replacement requirements. This amendment reflects federal requirements found in 40 CFR 141.84.

Section 109.1103(e)(3)(i)(C) was amended to clarify that the requirements specified in that clause relate to a water system that exceeded the action level for either lead or copper. This amendment was made to be consistent with existing language in § 109.1103(e)(3).

Section 109.1103(g)(2)(v) was amended to clarify the original intent of the subparagraph, which is to require that 50% of the total samples being collected for lead and copper shall be taken from sites served by a lead service line.

Section 109.1103(k)(6)(ii) was amended to clarify that a system must monitor in accordance with all of the requirements specified in subsection (e), including the frequency and timing of such monitoring, not just the number of sample sites.

§ 109.1107. System management responsibilities.

Section 109.1107(d)(4) was amended to clarify that a water system is not required to pay for replacement of privately owned lead service lines.

§ 109.1202. Monitoring requirements.

Sections 109.1202(a)(4)(i) and (ii) were amended to change the annual mean *E. coli* concentration triggers for monitoring to be greater than 100 *E. coli*/100 mL. These amendments were made to be consistent with federal guidance.

Section 109.1202(i) was amended to correct a Chapter 109 citation.

§ 109.1302. Treatment technique requirements.

Section 109.1302(a) was amended to correct a citation relating to state MCLs, MRDLs and treatment technique requirements.

F. *Benefits, Costs and Compliance*

Benefits

The proposed amendments will affect all 1,982 community water systems and those noncommunity water systems that have installed disinfection (822) for a total of 2,804 public water systems. These public water systems serve a total population of 10.6 million people.

The proposed amendments are intended to reduce the public health risks and associated costs related to waterborne pathogens and waterborne disease outbreaks. Costs related to waterborne disease outbreaks are extremely high. For example, the total medical costs and productivity losses associated with the 1993 waterborne outbreak of cryptosporidiosis in Milwaukee, Wisconsin was $96.2 million: $31.7 million in medical costs and $64.6 million in productivity losses. The average total cost per person with mild, moderate, and severe illness was $116, $475, and $7,808, respectively according to the following study:

Cost of illness in the 1993 Waterborne Cryptosporidium outbreak, Milwaukee, Wisconsin. Corso PS, Kramer MH, Blair KA, Addiss DG, Davis JP, Haddix AC. Emerg Infect Dis [serial online] 2003 April. Available from: URL: http://wwwnc.cdc.gov/eid/article/9/4/02-0417 .

In 2008, a large Salmonella outbreak caused by contamination of a storage tank and distribution system of the municipal drinking water supply occurred in Alamosa, Colorado. The outbreak's estimated total cost to residents and businesses of Alamosa using a Monte Carlo simulation model (10,000 iterations) was approximately $1.5 million (range: $196,677–$6,002,879), and rose to $2.6 million (range: $1,123,471–$7,792,973) with the inclusion of outbreak response costs to local, state and nongovernmental agencies and City of Alamosa healthcare facilities and schools. This investigation documents the significant economic and health impacts associated with waterborne disease outbreaks and highlights the potential for loss of trust in public water systems following such outbreaks. This information can be found in the following study:

Economic and Health Impacts Associated with a Salmonella Typhimurium Drinking Water Outbreak−Alamosa, CO, 2008. Available from URL: http://www.ncbi.nlm.nih.gov/pubmed/23526942 .

Communities within the Commonwealth will benefit from: (1) the avoidance of a full range of health effects from the consumption of contaminated drinking water such as, acute and chronic illness, endemic and epidemic disease, waterborne disease outbreaks, and death; (2) the continuity of a safe and adequate supply of potable water; and (3) the ability to plan and build future capacity for economic growth and ensure long-term sustainability for years to come.

Compliance Costs

Disinfectant Residual Monitoring at the Entry Point:

It is estimated that 114 out of 352 plants (or ~30%) may be using strip chart recorders. Strip chart recorders can record measurements to two decimal places provided the proper scale and

resolution is used. In cases where the requisite scale and resolution is not possible, an upgrade to electronic recording devices would cost approximately $1,500. It is estimated that 25% of these systems or 29 systems may need to upgrade to electronic recording devices.

- 29 systems x $1,500 = $43,500

This cost should not be prohibitive for filter plants, and the use of electronic devises offers several advantages. Advantages of using electronic recording devices include improved data reliability, faster and more comprehensive data analysis, better data resolution, elimination of the need for interpolating trace values from a chart, cost savings through the elimination of consumables (pens and chart paper), and reductions in errors associated with transferring 'analog' data to a spreadsheet for recordkeeping or reporting purposes.

Disinfectant Residuals in the Distribution System:

It is anticipated that the large majority of water systems will be able to comply with this requirement with little to no capital costs. According to Department records for the last three years (2012 – 2014):

- Based on more than 82,000 monthly average distribution system disinfectant residual values reported by 2,583 different water systems:
    - 95.6% of the average values already meet or exceed the increased minimum residual of 0.2 mg/L (free chlorine)
    - Only 4.4% of the average values are below the minimum residual.

- For the 37 systems that chloraminate, based on more than 1,200 monthly average values reported:
    - 99.67% of the average values already meet or exceed the increased minimum residual of 0.2 mg/L (total chlorine)
    - Only 0.33% of the average values are below the minimum residual.

Systems may need to increase the frequency of or improve the effectiveness of existing operation and maintenance best management practices, such as flushing, storage tank maintenance, cross connection control, leak detection, and effective pipe replacement and repair practices, in order to lower chlorine demand and meet disinfectant residual requirements at all points in the distribution system.

Some systems with very large and extensive distribution systems may need to install automatic flushing systems or booster chlorination stations in order to achieve a 0.2 mg/L at all points in the distribution system. The Department's estimates for these facilities are as follows:

- Costs for automatic flushers: ~ $2,000
- Costs for booster chlorination stations: $200,000 - $250,000

It is estimated that 20% of large systems (serving > 50,000), or six systems, may need to install automatic flushing devices and/or booster chlorination stations. Three systems may need to

install up to five automatic flushers for a cost of $10,000 for each system, or a total of $30,000. Three systems may need to install a booster chlorination station at $250,000 for each system, or a total of $750,000. The total capital costs to the regulated community may be $780,000.

Costs for small systems are not expected to increase because most small systems are already maintaining adequate disinfectant residuals (0.40 mg/L) as required by the Groundwater Rule.

Total costs for the regulated community are estimated at $43,500 + $780,000 = $823,500.

The Board requests comments on anticipated costs to comply with the proposed disinfectant residual requirements.

Compliance Assistance Plan

The Safe Drinking Water Program utilizes the Commonwealth's PENNVEST Program to offer financial assistance to eligible PWSs. This assistance is in the form of a low-interest loan, with some augmenting grant funds for hardship cases. Eligibility is based upon factors such as public health impact, compliance necessity, and project/operational affordability.

The Safe Drinking Water Program has established a network of regional and central office training staff that is responsive to identifiable training needs. The target audience in need of training may be either program staff or the regulated community.

In addition to this network of training staff, the Bureau of Safe Drinking Water has staff dedicated to providing both training and outreach support services to PWS operators. The DEP website also provides timely and useful information for treatment plant operators.

Finally, the Department also provides various tools and technical assistance to water systems through the Distribution System Optimization Program. The goal of distribution optimization is to sustain the water quality leaving the plant throughout all points in the distribution system. To further define distribution system optimization, "optimization" refers to improving drinking water quality to enhance public health protection without significant capital improvements to the water treatment plant or distribution system infrastructure.

The distribution system is the last "barrier" for protecting public health, meaning the physical and chemical barriers that have been established are necessary to protect the public from intentional or unintentional exposure to contaminants after the water has been treated. Distribution system optimization focuses on two primary health concerns related to water quality within the distribution system:

- Microbial contamination
- Disinfection By-Product (DBP) formation

If implemented, distribution system optimization will lead to increased public health protection through increased monitoring and operational oversight, resulting in improved physical protection and improved water quality for all customers.

Paperwork Requirements

Paperwork requirements include:

- Reporting of log inactivation values on a monthly basis using existing forms.
- Reporting additional disinfectant residual levels measured in the distribution system using existing forms.
- Development of a disinfectant residual sample siting plan.
- Development of a nitrification control plan.

G. *Sunset Review*

This regulation will be reviewed in accordance with the sunset review schedule published by the Department to determine whether the regulation effectively fulfills the goals for which it was intended.

H. *Regulatory Review*

Under section 5(a) of the Regulatory Review Act (71 P. S. § 745.5(a)), on DATE, the Department submitted a copy of these proposed amendments to the Independent Regulatory Review Commission (IRRC) and the Chairpersons of the House and Senate Environmental Resources and Energy Committees (Committees). In addition to submitting the proposed amendments, the Department has provided IRRC and the Committees with a copy of a detailed Regulatory Analysis Form prepared by the Department. A copy of this material is available to the public upon request.

Under section 5(g) of the Regulatory Review Act, IRRC may convey any comments, recommendations or objections to the proposed amendments within 30 days of the close of the public comment period. The comments, recommendations or objections shall specify the regulatory review criteria that have not been met. The Regulatory Review Act specifies detailed procedures for review of these issues by the Department, the General Assembly and the Governor prior to final publication of the regulations.

I. *Public Comments*

Interested persons are invited to submit written comments, suggestions or objections regarding the proposed rulemaking to the Environmental Quality Board. Comments, suggestions or objections must be received by the Board by DATE. In addition to the submission of comments, interested persons may also submit a summary of their comments to the Board. The summary may not exceed one page in length and must also be received by the Board by DATE. The one-page summary will be distributed to the Board and available publicly prior to the meeting when the final-form rulemaking will be considered.

Comments including the submission of a one-page summary of comments may be submitted to the Board online, by e-mail, by mail or express mail as follows. If an acknowledgement of

comments submitted online or by e-mail is not received by the sender within 2 working days, the comments should be retransmitted to the Board to ensure receipt. Comments submitted by facsimile will not be accepted.

Comments may be submitted to the Board by accessing eComment at http://www.ahs.dep.pa.gov/eComment. Comments may be submitted to the Board by e-mail at RegComments@pa.gov. A subject heading of the proposed rulemaking and a return name and address must be included in each transmission.

Written comments should be mailed to the Environmental Quality Board, P. O. Box 8477, Harrisburg, PA 17105-8477. Express mail should be sent to the Environmental Quality Board, Rachel Carson State Office Building, 16th Floor, 400 Market Street, Harrisburg, PA 17101-2301.

JOHN QUIGLEY,
Chairperson