

# Regulatory Analysis Form

(Completed by Promulgating Agency)

**INDEPENDENT REGULATORY  
REVIEW COMMISSION**

(All Comments submitted on this regulation will appear on IRRC's website)

(1) Agency  
Department of Environmental Protection

(2) Agency Number:  
Identification Number: 7-520

IRRC Number:

(3) PA Code Cite: 25 Pa. Code, Chapter 109

(4) Short Title:  
Disinfection Requirements Rule

(5) Agency Contacts (List Telephone Number and Email Address):

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(6) Type of Rulemaking (check applicable box):

- Proposed Regulation  
 Final Regulation  
 Final Omitted Regulation

- Emergency Certification Regulation;  
 Certification by the Governor  
 Certification by the Attorney General

(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)

The proposed amendments will strengthen public water system (PWS) 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), the Long Term 2 (LT2) Enhanced Surface Water Treatment Rule, and the Lead and Copper Rule Short-Term Revisions (LCRSTR) in order to obtain or maintain primacy.

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 the distribution system. Safe drinking water is vital to maintaining healthy and sustainable communities.

(8) State the statutory authority for the regulation. Include specific statutory citation.

Section 4(a) of the Pennsylvania Safe Drinking Water Act, 35 P.S. § 721.4(a), and section 1920-A of the Administrative Code of 1929, 71 P.S. § 510-20(b).

(9) Is the regulation mandated by any federal or state law or court order, or federal regulation? Are there any relevant state or federal court decisions? If yes, cite the specific law, case or regulation as well as, any deadlines for action.

Yes, for the Stage 2 DBPR, LT2, and LCRSTR components.

Section 1413 of the Federal Safe Drinking Water Act, 42 U.S.C. § 300g-2a, requires that, in order for the state to retain primary enforcement authority (primacy), the state must adopt drinking water regulations that are “no less stringent than” the national primary drinking water regulations not later than 2 years after the date on which the regulations are promulgated by the United States Environmental Protection Agency (EPA), or must ask EPA for an extension of up to 2 years. The federal drinking water primacy regulations at 40 CFR § 142.12(a) also require the state to adopt all new and revised national primary drinking water regulations contained in 40 CFR Part 141 in order to retain primary enforcement responsibility. Furthermore, Section 4(a) of the Pennsylvania Safe Drinking Water Act, 35 P.S. § 721.4(a), requires the Environmental Quality Board to adopt maximum contaminant levels and treatment technique requirements no less stringent than those promulgated under the Federal act for all contaminants regulated under the national primary and secondary drinking water regulations. Also Section 5(a) of the state act, 35 P.S. § 721.5(a), requires the Department to adopt and implement a public water supply program which includes those program elements necessary to assume state primary enforcement responsibility under the Federal act.

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 DBPR and LT2) and December 18, 2010 (LCRSTR). Minor clarifications are included in this proposed rulemaking, as required by EPA, in order to obtain or maintain primacy for these rules.

Regarding the disinfection requirements, the federal rule mandates CT/log inactivation requirements (CT is the product of residual disinfectant concentration (C) and disinfectant contact time (T)) for surface water and Groundwater Under Direct Influence (of surface water) (GUDI) systems and the maintenance of a detectable disinfectant residual. However, EPA leaves it up to the states to define a “detectable” residual. Currently, the Department’s residual of 0.02 mg/L does not represent a true detectable residual, and is therefore not a viable or enforceable drinking water standard.

(10) State why the regulation is needed. Explain the compelling public interest that justifies the regulation. Describe who will benefit from the regulation. Quantify the benefits as completely as possible and approximate the number of people who will benefit.

*Calculations to Demonstrate 1.0 log Giardia and 3.0 log Virus Inactivation:*

Existing regulations require filter plants to maintain 90% (1-log) inactivation of Giardia cysts and 99.9% (3-log) inactivation of viruses by way of disinfection. When these levels are not achieved, customers may be exposed to pathogenic Giardia cysts and viruses. The only way to determine compliance with this requirement is to perform log inactivation calculations, which is not required by current regulation.

The proposed amendments will require all 353 filter plants (which are operated by 319 water systems) to calculate their log inactivation at least once per day and report to the Department the lowest level achieved each day. This provision will provide a mechanism for the PWSs and the Department to determine compliance with the existing log inactivation requirements.

The proposed amendments to surface water treatment regulations will benefit more than 8 million Pennsylvanians that are supplied water by PWSs utilizing filtration technologies.

Disinfectant Residuals 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 the distribution system 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.

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.

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. Many of these deficiencies create pathways of contamination. Therefore, ensuring the integrity and effective operation of distribution systems is critical for public health protection.

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.

Based on a review of available studies, reports and data, a regulatory minimum of 0.2 mg/L (free or total chlorine) in the distribution system is necessary to ensure a true detectable (and enforceable) residual and an adequate residual for the control of microbial growth.

This provision will affect and improve public health protection for all 1,982 community water systems (CWS) and 822 noncommunity water systems (NCWS) that have installed disinfection. These 2,804 PWSs serve a total population of 10.6 million people.

(11) Are there any provisions that are more stringent than federal standards? If yes, identify the specific provisions and the compelling Pennsylvania interest that demands stronger regulations.

There are several provisions in this proposal that are more stringent than federal requirements. The Department developed these provisions to better protect public health and to be consistent with existing Pennsylvania drinking water regulations.

- Section 109.202(c)(1)(ii)(B) clarifies the minimum residual disinfectant level at the entry point by adding a zero to the minimum level (0.20 mg/L). This ensures that water suppliers 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). Under 40 CFR 141.72(b)(2), the federal rule requires a minimum level of 0.2 mg/L.
- Sections 109.202(c)(4) & (5); 109.301(1)(i)(D), (2)(i)(E) & (13); and 109.710(a) & (b) require compliance with the minimum disinfectant residual level of 0.2 mg/L in the distribution system and strengthens monitoring and reporting requirements to protect public health and ensure equitable water quality for all consumers. Additional justification for these provisions may be found in Question 10. Under 40 CFR 141.72(b)(3), the federal rule requires a “detectable” residual. EPA did not define “detectable” and left the decision to the states.
- Existing regulations at § 109.202(c)(1)(ii)(A) require filter plants to maintain 90% (1-log) inactivation of Giardia cysts and 99.9% (3-log) inactivation of viruses using disinfection. When these levels are not achieved, consumers may be exposed to pathogenic Giardia cysts and viruses. The only way to determine compliance with this requirement is to perform log inactivation calculations, which is not required by current regulation. Sections 109.301(1)(v) & (vi) and 109.701(a)(2)(i)(C) & (D) were added to require monitoring and reporting of CT calculations to the Department.
- Section 109.710(c) requires one-hour notification to the Department for certain violations related to the disinfectant residual requirements. One-hour reporting is an existing requirement under § 109.701(a)(3), and ensures that the Department and the public are alerted to potential problems as soon as possible so that appropriate investigative and corrective actions can be taken. The federal rule generally requires self-reporting of violations to the state within 24 – 48 hours.
- Section 109.715 was 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.

(12) How does this regulation compare with those of the other states? How will this affect Pennsylvania’s ability to compete with other states?

Calculations to Demonstrate 1.0 log Giardia and 3.0 log Virus Inactivation:

At least fifteen other states require log inactivation to be calculated, recorded and reported on plant Monthly Operating Reports (MORs).

Disinfectant Residuals in the Distribution System:

The Department's existing disinfectant residual requirements, while consistent with the federal rule, have not kept pace with other states. At least 23 states have promulgated more stringent requirements when compared to the Department's current standard of 0.02 mg/L. And 19 states have disinfectant residual requirements that are  $\geq 0.2$  mg/L, which supports the Department's proposed standard of 0.2 mg/L. This proposed amendment will make Pennsylvania more consistent with these other states regarding public health protection.

| <b>State</b>    | <b>Minimum Distribution System Residual (mg/L)</b>    |
|-----------------|---|
| 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 amendments will not put Pennsylvania at a competitive disadvantage with any other state. Rather the amendments will enhance Pennsylvania's ability to compete with other states by improving public health protection and promoting healthy and sustainable communities.

(13) Will the regulation affect any other regulations of the promulgating agency or other state agencies? If yes, explain and provide specific citations.

The amendments will be incorporated into the existing language of 25 Pa Code Chapter 109. Other than this incorporation, the amendments should not affect any existing or proposed regulations of DEP or any other state agency.

(14) Describe the communications with and solicitation of input from the public, any advisory council/group, small businesses and groups representing small businesses in the development and drafting of the regulation. List the specific persons and/or groups who were involved. (“Small business” is defined in Section 3 of the Regulatory Review Act, Act 76 of 2012.)

The pre-draft proposed rulemaking was originally included in the Pre-Draft Proposed Revised Total Coliform Rule (RTCR), which was presented to the Small Water Systems Technical Assistance Center (TAC) Board 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 in short order. On April 30, 2015, the TAC Board voted to recommend that the Department further split the “Non-RTCR” provisions 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 including:

Pennsylvania American  
North Penn Water Authority  
York Water Company  
Centers for Disease Control  
Chester Water Authority  
Lehigh County Authority  
EPA OGWDW  
Western Berks Water Authority  
United Water  
Corona Environmental Consulting  
Philadelphia Water Department  
Columbia Water Company  
Aqua Pennsylvania

These stakeholder presentations and other materials provided by the Department may be found on the Department’s website (select Advisory Committees, then select Small Water System Technical Assistance Center Board)

Two additional meetings were held with large water systems on June 29 and July 16, 2015 to gather additional comments. The following water suppliers and organizations attended these additional meetings:

Chester Water Authority  
York Water Company  
Western Berks Water Authority  
Aqua Pennsylvania  
Superior Water Co./National Association of Water Companies  
PA Municipal Authorities Association  
Corona Environmental  
Philadelphia Water Department

Pennsylvania American  
Columbia Water Company  
Lehigh County Authority  
North Penn Water Authority  
Water Works Operators' Association – TAC Chair  
United Water

As a result of these 6 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 the preamble as a means to solicit further public comment. Refer to the Preamble for more information about TAC's recommendations.

(15) Identify the types and number of persons, businesses, small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012) and organizations which will be affected by the regulation. How are they affected?

A review of the USA Small Business Size Regulations under 13 CFR Chapter 1, Part 121 provides a standard for determining what constitutes a small business for the NAICS category relating to PWS. A PWS falls within NAICS category 221310, Water Supply and Irrigation Systems, which comprises establishments primarily engaged in operating water treatment plants and/or operating water supply systems. The small size standard for this NAICS category is annual receipts of not more than \$27.5 million.

The SDWA and Chapter 109 regulations do not contain any requirements for the submission of financial records. The Department has no way to estimate annual receipts. The Department and EPA have historically classified system size based on the number of persons served by a water system. Under the federal Safe Drinking Water regulations, there are three classifications: small, medium, and large. Small systems serve 3,300 persons or fewer, medium systems serve 3,301 to 50,000 persons, and large systems serve more than 50,000 persons. See 40 CFR 141.2. Therefore, the Department used the federal definition of a small water system in 40 CFR 141.2, which states that a small water system is "a water system that serves 3,300 persons or fewer". Under this regulatory package, a PWS owned by a private individual or investor serving less than or equal to 3,300 persons was considered to be a small business. Some medium size systems could be classified as small businesses on the basis of revenue. It is believed that the revenues of large systems are generally over \$27.5 million.

- The disinfection requirements apply to all 1,982 CWSs. Of these, 909 are small systems that are owned by a private individual or investor and should be considered as small businesses.
- The disinfection requirements also apply to 822 NCWSs. All of these systems should be considered as small businesses.
- The total number of small businesses affected by this regulation is 1,731.

The persons and communities served by these systems will benefit from increased microbial protection and avoidance of waterborne disease outbreaks.

(16) List the persons, groups or entities, including small businesses, that will be required to comply with the regulation. Approximate the number that will be required to comply.

- The disinfection requirements apply to all 1,982 CWSs. Of these, 909 are small systems that are owned by a private individual or investor and should be considered as small businesses.
- The disinfection requirements also apply to 822 NCWSs. All of these systems should be considered as small businesses.
- The total number of small businesses affected by this regulation is 1,731.

(17) Identify the financial, economic and social impact of the regulation on individuals, small businesses, businesses and labor communities and other public and private organizations. Evaluate the benefits expected as a result of the regulation.

The expected benefits of this regulation are: (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; and (2) healthy and sustainable communities.

This regulation will provide a positive economic impact to individuals, small businesses and businesses that provide services to the drinking water industry.

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>

Disinfectant Residual Monitoring at the Entry Point:

The Department estimates that 114 out of 353 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 isn't possible, an upgrade to electronic recording devices would cost approximately \$1,500. The Department estimates that 25% of these systems or 29 systems may need to upgrade to electronic recording devices.

This cost should not be prohibitive for filter plants and the use of electronic devices 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 the disinfection residual requirements 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 chloramine, 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.

A select few large water systems with 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 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, or 6 systems, may need to install automatic flushing devices and/or booster chlorination stations.

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.

(18) Explain how the benefits of the regulation outweigh any cost and adverse effects.

The amendments strengthen existing requirements that 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.

(19) Provide a specific estimate of the costs and/or savings to the **regulated community** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

*Disinfectant Residual Monitoring at the Entry Point:*

The Department estimates that 114 out of 352 plants (or ~30%) may be using strip chart recorders. The Department believes that 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 isn't possible, an upgrade to electronic recording devices would cost approximately \$1,500. The Department estimates 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 devices 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 the disinfection residual requirements 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 chloramine, 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.

A select few large water systems with 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 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 6 systems, may need to install automatic flushing devices and/or booster chlorination stations. Three systems may need to install up to 5 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  $\$43,500 + \$780,000 = \$823,500$ .

(20) Provide a specific estimate of the costs and/or savings to the **local governments** associated with compliance, including any legal, accounting or consulting procedures which may be required. Explain how the dollar estimates were derived.

The only costs to local government will be costs incurred by systems that are owned and/or operated by local government. The cost estimates are based on the figures in question 19.

(21) Provide a specific estimate of the costs and/or savings to the **state government** associated with the implementation of the regulation, including any legal, accounting, or consulting procedures which may be required. Explain how the dollar estimates were derived.

The costs to state government will be those incurred by systems that are owned and/or operated by state government and costs associated with implementing and administering the rule. The cost estimates are based on the figures in question 19.

State costs associated with administering these revisions are not expected to substantially increase or decrease. This rulemaking proposes revisions to existing treatment technique requirements.

(22) For each of the groups and entities identified in items (19)-(21) above, submit a statement of legal, accounting or consulting procedures and additional reporting, recordkeeping or other paperwork, including copies of forms or reports, which will be required for implementation of the regulation and an explanation of measures which have been taken to minimize these 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.

(23) In the table below, provide an estimate of the fiscal savings and costs associated with implementation and compliance for the regulated community, local government, and state government for the current year and five subsequent years.

|                             | <b>Current FY<br/>Year</b> | <b>FY +1<br/>Year</b> | <b>FY +2<br/>Year</b> | <b>FY +3<br/>Year</b> | <b>FY +4<br/>Year</b> | <b>FY +5<br/>Year</b> |
|-----------------------------|----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| <b>SAVINGS:</b>             | \$                         | \$                    | \$                    | \$                    | \$                    | \$                    |
| <b>Regulated Community</b>  | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>Local Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>State Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>Total Savings</b>        | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>COSTS:</b>               |                            |                       |                       |                       |                       |                       |
| <b>Regulated Community</b>  | 411,750                    | 411,750               | 0                     | 0                     | 0                     | 0                     |
| <b>Local Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>State Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>Total Costs</b>          | 411,750                    | 411,750               | 0                     | 0                     | 0                     | 0                     |
| <b>REVENUE LOSSES:</b>      |                            |                       |                       |                       |                       |                       |
| <b>Regulated Community</b>  | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>Local Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>State Government</b>     | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |
| <b>Total Revenue Losses</b> | 0                          | 0                     | 0                     | 0                     | 0                     | 0                     |

**Note:**

Costs to the regulated community are one-time capital costs split between the first and second year of implementation.

(23a) Provide the past three year expenditure history for programs affected by the regulation.

| <b>Program</b>                   | <b>FY -3<br/>2012/13</b> | <b>FY -2<br/>2013/14</b> | <b>FY -1<br/>2014/15</b> | <b>Current FY<br/>2015/16</b> |
|----------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|
| Environmental Program Operations | \$7,000,631              | \$7,157,348              | \$7,178,700              | \$2,319,072                   |
| Environmental Program Management | \$544,267                | \$538,362                | \$475,098                | \$133,818                     |
| General Government Operations    | \$0                      | \$0                      | \$385                    | \$0                           |
| Safe Drinking Water Act          | \$58,480                 | \$15,439                 | \$50,927                 | \$2,959                       |

(24) For any regulation that may have an adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), provide an economic impact statement that includes the following:

- (a) An identification and estimate of the number of small businesses subject to the regulation.

The disinfection requirements apply to all 1,982 CWSs. Of these, 909 are small systems that are owned by a private individual or investor and should be considered as small businesses. The disinfection requirements also apply to 822 NCWSs. All of these systems should be considered as small businesses. The total number of small businesses affected by this regulation is 1,731 (as defined in Question 15).

- (b) The projected reporting, recordkeeping and other administrative costs required for compliance with the proposed regulation, including the type of professional skills necessary for preparation of the report or record.

Administrative costs associated with these revisions are not expected to substantially increase.

- (c) A statement of probable effect on impacted small businesses.

Most small systems are not expected to be impacted by these revisions because they are already maintaining adequate disinfectant residuals (0.40 mg/L) as required by the Groundwater Rule.

- (d) A description of any less intrusive or less costly alternative methods of achieving the purpose of the proposed regulation.

No alternative regulatory schemes were considered.

(25) List any special provisions which have been developed to meet the particular needs of affected groups or persons including, but not limited to, minorities, the elderly, small businesses, and farmers.

The amendments should have no effects on one particular group relative to another since it will apply to most of Pennsylvania's population served by public water systems. However, the Safe Drinking Water Program is prepared to develop special provisions or provide special services to accommodate any such group as the need arises.

(26) Include a description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

No alternative regulatory schemes were considered.

(27) In conducting a regulatory flexibility analysis, explain whether regulatory methods were considered that will minimize any adverse impact on small businesses (as defined in Section 3 of the Regulatory Review Act, Act 76 of 2012), including:

- a) The establishment of less stringent compliance or reporting requirements for small businesses;

For these provisions, no less stringent compliance or reporting requirements for small businesses were considered.

- b) The establishment of less stringent schedules or deadlines for compliance or reporting requirements for small businesses;

For these provisions, no less stringent schedules or deadlines for small businesses were considered.

- c) The consolidation or simplification of compliance or reporting requirements for small businesses;

For these provisions, neither consolidation nor simplification of compliance or reporting requirements for small businesses was considered.

- d) The establishment of performing standards for small businesses to replace design or operational standards required in the regulation; and

For these provisions, no performing standards for small businesses to replace design or operational standards required in the regulation for small businesses were considered.

- e) The exemption of small businesses from all or any part of the requirements contained in the regulation.

For these provisions, no exemptions for small businesses from all or any part of the requirements contained in the regulation were considered.

Alternative provisions were not considered for small water systems because the customers of water systems classified as small businesses must be afforded the same level of public health protection as customers of large water systems.

(28) If data is the basis for this regulation, please provide a description of the data, explain in detail how the data was obtained, and how it meets the acceptability standard for empirical, replicable and testable data that is supported by documentation, statistics, reports, studies or research. Please submit data or supporting materials with the regulatory package. If the material exceeds 50 pages, please provide it in a searchable electronic format or provide a list of citations and internet links that, where possible, can be accessed in a searchable format in lieu of the actual material. If other data was considered but not used, please explain why that data was determined not to be acceptable.

Substantial studies, reports and data were used to develop this rulemaking, including the following:

1. Berg, G., "The Virus Hazard in Water Supplies," *J. New England Water Works Association*, 1964, Vol. 78, pp. 79.
2. Butterfield, C. T., "Bactericidal Properties of Chloramines and Free Chlorine in Water," *Public Health Reports*, 1948, Vol. 63, pp. 934, *J. American Water Works Association*, 1948, Vol. 40, pp 1305.
3. Colorado Department of Public Health and Environment, "Draft – Minimum Distribution System Disinfectant Residuals: Chlorine Residual Values Reported from Within Drinking Water Distribution Systems," April 2014.
4. Fair, G. M. et al, *Water and Waste Engineering*, J. Wiley & Sons, Inc., 1968.
5. Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers (10 States Standards), "Recommended Standards for Waterworks," 2012 Edition.
6. Hach Company, "Chlorination, Chloramination and Chlorine Measurement," 2013.
7. Hach Company, "Primer on DPD Chlorine Method Detection Limits and Their Use in Compliance Monitoring," June 2015.
8. LeChevallier, M. W., "The Case for Maintaining a Disinfectant Residual," *J. American Water Works Association*, 1999, Vol. 91, Issue 1, pp. 86.
9. LeChevallier, M. W. et al, "Full-Scale Studies of Factors Related to Coliform Regrowth in Drinking Water," *Appl. & Envir. Microbiol.*, 1996, Vol. 62, No. 7, pp. 2201.
10. LeChevallier, M. W., 2007, "Sources of Coliform Bacteria and Causes of Coliform Occurrences in Distribution Systems,"  
[www.waterrf.org/resources/Lists/ProjectPapers/Attachments/3/IssuePapers.pdf](http://www.waterrf.org/resources/Lists/ProjectPapers/Attachments/3/IssuePapers.pdf).
11. LeChevallier, M. W., "Conducting Self-Assessments Under the Revised Total Coliform Rule," *J. American Water Works Association*, September 2014, 106:9, pp. 90.
12. National Research Council, "Public Water Supply Distribution Systems: Assessing and Reducing Risks, First Report," 2005, <http://www.nap.edu/catalog/11262.html> .
13. National Research Council, "Drinking Water Distribution Systems: Assessing and Reducing Risks," 2006, <http://www.nap.edu/catalog/11728.html> .
14. PA DEP, "Pennsylvania Public Water System Compliance Report for 2014."
15. Pressman, J. G. & Wahman, D. G., "Perspectives on the Meaning of Detectable Distribution System Residual and Implications for *N. fowleri* Control," "AWWA Water Quality Technology Conference, November 2014, New Orleans, LA.
16. Wahman, D. G. & Pressman, J. G. , " Distribution System Residuals – Is "Detectable" Still Acceptable for Chloramines", *J. American Water Works Association*, August 2015, 107:8, pp. 53.
17. US DHHS, Centers for Disease Control and Prevention, "Surveillance for Waterborne Disease Outbreaks Associated with Drinking Water and Other Nonrecreational Water – US, 2009-2010, *MMWR*, Weekly, Vol. 62, No. 35, September 2013.
18. US EPA, April 2010, "Final – Priorities of the Distribution System Research and Information

Collection Partnership”.

19. US EPA, April 2013, “Drinking Water Infrastructure Needs Survey and Assessment, Fifth Report to Congress,” EPA 816-R-13-006.
20. US EPA, 2002a, “The Effectiveness of Disinfectant Residuals in the Distribution System,” [http://www.epa.gov/safewater/disinfection/tcr/regulation\\_revisions.html](http://www.epa.gov/safewater/disinfection/tcr/regulation_revisions.html) .
21. US EPA, 2002b, “Health Risks from Microbial Growth and Biofilms in Drinking Water Distribution Systems,” [http://www.epa.gov/safewater/disinfection/tcr/regulation\\_revisions.html](http://www.epa.gov/safewater/disinfection/tcr/regulation_revisions.html) .
22. US EPA, Enforcement and Compliance History Online (ECHO) database.
23. Water Research Foundation, “Criteria for Optimized Distribution Systems,” 2010.
24. Water Research Foundation, “State of the Science and Research Needs for Opportunistic Pathogens in Premise Plumbing,” 2013.
25. Water Research Foundation, “Strategies for Managing Total Coliform and *E. coli* in Distribution Systems,” 2009.

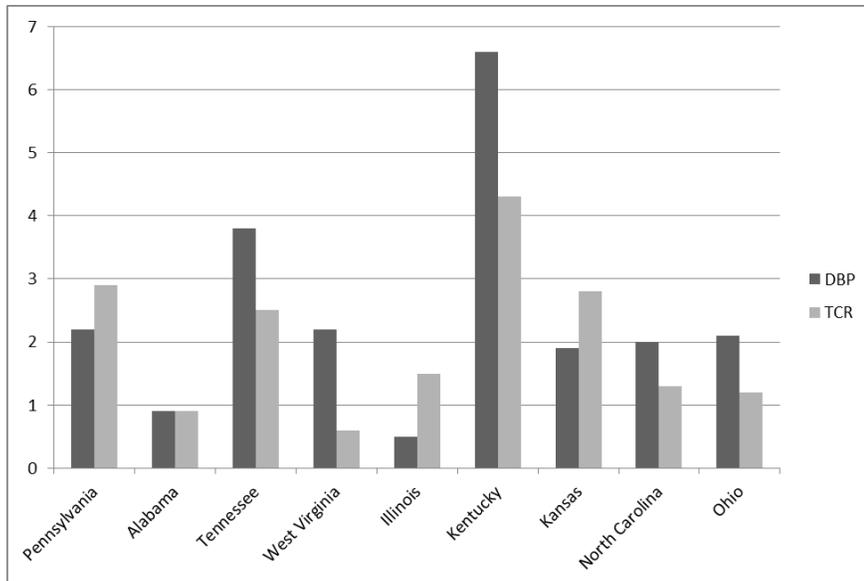
Also copies of other state’s regulations were reviewed. 23 states have more stringent requirements.

| <b>State</b>    | <b>Minimum Distribution System Residual (mg/L)</b>    |
|-----------------|---|
| 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.

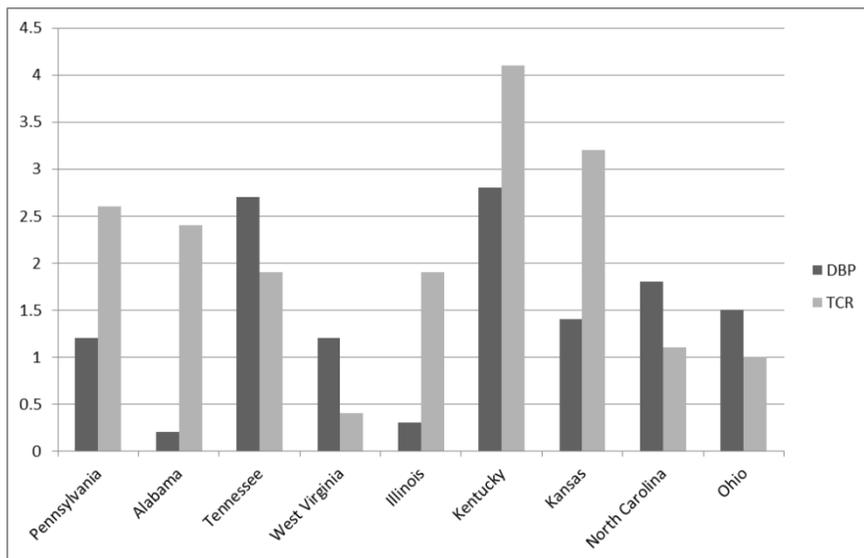
Finally, total coliform rule (TCR) and disinfection by-product (DBP) compliance data from EPA's ECHO website was reviewed to compare other state's compliance rates with Pennsylvania's.

**% CWSs w/ FY2011 Violations – PA vs. States w/ Mandatory Disinfection & Residuals  $\geq$  0.2 mg/L**



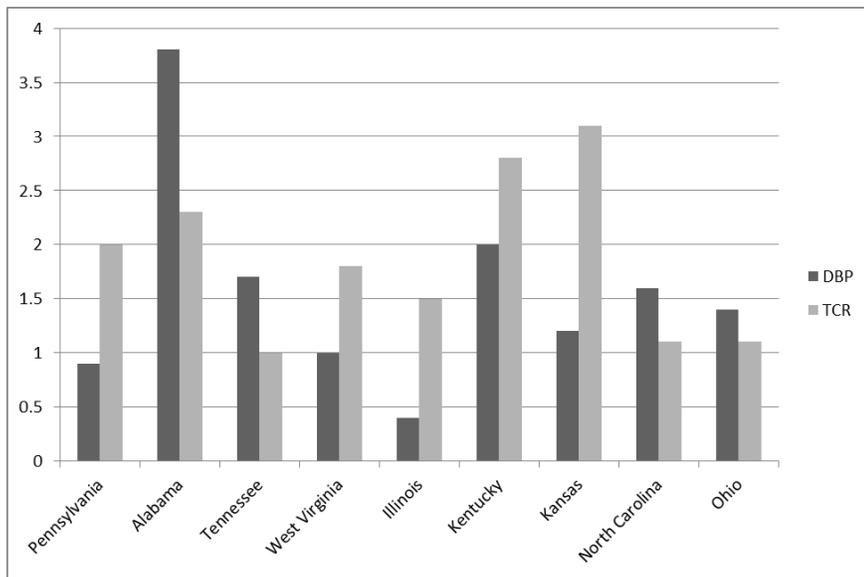
In 2011, 7 of 8 states had better TCR compliance rates than PA, while 6 of 8 states had better DBP compliance rates than PA.

**% CWSs w/ FY2012 Violations – PA vs. States w/ Mandatory Disinfection & Residuals  $\geq$  0.2 mg/L**



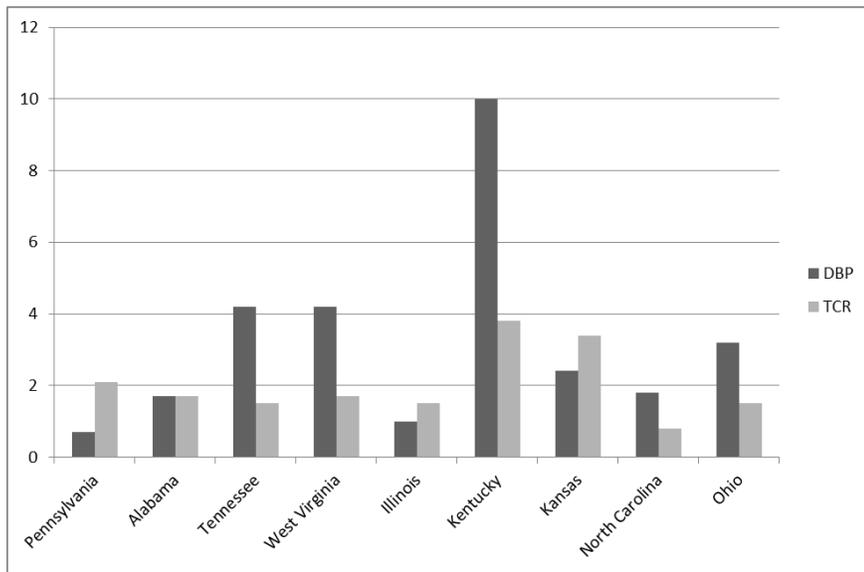
In 2012, 6 of 8 states had better TCR compliance rates than PA, while 3 of 8 states had better DBP compliance rates than PA.

**% CWSs w/ FY2013 Violations – PA vs. States w/ Mandatory Disinfection & Residuals  $\geq 0.2$  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  $\geq 0.2$  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 4 years, the large majority of states requiring disinfectant residual levels  $\geq 0.2$  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.

(29) Include a schedule for review of the regulation including:

- |   |  |
|---|--|
| A. The date by which the agency must receive public comments:                               | <u>March 2016</u>                                  |
| B. The date or dates on which public meetings or hearings will be held:                     | <u>2 Hearings</u><br><u>Dates to be determined</u> |
| C. The expected date of promulgation of the proposed regulation as a final-form regulation: | <u>December 2016</u>                               |
| D. The expected effective date of the final-form regulation:                                | <u>December 2016</u>                               |
| E. The date by which compliance with the final-form regulation will be required:            | <u>July 2017</u>                                   |
| F. The date by which required permits, licenses or other approvals must be obtained:        | <u>December 2017</u>                               |

(30) Describe the plan developed for evaluating the continuing effectiveness of the regulations after its implementation.

The amendments will be reviewed in accordance with the Sunset Review Schedule published by the Department.