

<h2 style="margin: 0;">Regulatory Analysis Form</h2> <p style="margin: 0;">(Completed by Promulgating Agency)</p>		<p><i>INDEPENDENT REGULATORY REVIEW COMMISSION</i></p>
<p>(All Comments submitted on this regulation will appear on IRRC's website)</p>		
<p>(1) Agency Department of Environmental Protection</p>		<p>IRRC Number: 3136</p>
<p>(2) Agency Number: Identification Number: 7-520</p>		
<p>(3) PA Code Cite: 25 Pa. Code, Chapter 109</p>		
<p>(4) Short Title: Disinfection Requirements Rule</p>		
<p>(5) Agency Contacts (List Telephone Number and Email Address): Primary Contact: Laura Edinger, 717.783.8727, ledinger@pa.gov Secondary Contact: Jessica Shirley, 717.783.8727, jessshirley@pa.gov</p>		
<p>(6) Type of Rulemaking (check applicable box):</p> <p><input type="checkbox"/> Proposed Regulation</p> <p><input checked="" type="checkbox"/> Final Regulation</p> <p><input type="checkbox"/> Final Omitted Regulation</p>		<p><input type="checkbox"/> Emergency Certification Regulation;</p> <p><input type="checkbox"/> Certification by the Governor</p> <p><input type="checkbox"/> Certification by the Attorney General</p>
<p>(7) Briefly explain the regulation in clear and nontechnical language. (100 words or less)</p> <p>The purpose of the Disinfection Requirements Rule is to 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.</p> <p>The amendments will protect public health through a multi-barrier approach designed to guard against microbial contamination by ensuring both 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.</p>		
<p>(8) State the statutory authority for the regulation. Include <u>specific</u> statutory citation.</p> <p>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).</p>		

(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 does not define “detectable” residual and leaves the decision to the states. The Department’s previous residual of 0.02 mg/L did not represent an achievable detectable residual and was 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 final-form rulemaking 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 amendments to the 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 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 previous disinfectant residual requirements for the distribution system had not been substantially updated since 1992 and required the maintenance of a detectable residual that is defined as 0.02 mg/L. The Department's previous treatment technique is not protective of public health because a residual of 0.02 mg/L does not represent an achievable detectable residual using current analytical methods and most likely represents a false positive reading.

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.

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 an achievable detectable (and enforceable) residual based on current analytical methods.

This provision will affect and improve public health protection for all 1,949 community water systems (CWS) and 746 noncommunity water systems (NCWS) that have installed disinfection. These 2,695 PWSs serve a total population of 11.3 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.

The following amendments are more stringent than federal requirements. These amendments are intended 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)(6) & (7); 109.301(1)(i)(E), (2)(i)(F) & (13); and 109.710(c) & (d) 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 amendments may be found in the response to 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.
- Section 109.202(c)(1)(ii)(A) requires 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. 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(e) 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 109.716 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 chloramine 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 previous disinfectant residual requirements, while consistent with the federal rule, had not kept pace with other states. At least 23 states have promulgated more stringent requirements when

compared to the Department’s previous standard of 0.02 mg/L. And 19 states have disinfectant residual requirements that are ≥ 0.2 mg/L. These amendments will make Pennsylvania more consistent with these other states regarding public health protection.

State	Minimum Distribution System Residual (mg/L)	Allows HPC as ACC
Alabama*	0.2 (free), 0.5 (total)	No
Colorado*	0.2 (free or total)	Yes
Delaware	0.3 (free)	No
Florida*	0.2 (free), 0.6 (total)	No
Georgia	0.2 (free)	Yes
Illinois*	0.2 (free), 0.5 (total)	No
Indiana	0.2 (free), 0.5 (total)	No
Iowa	0.3 (free), 1.5 (total)	Yes
Kansas*	0.2 (free), 1.0 (total)	No
Kentucky*	0.2 (free), 0.5 (total)	No
Louisiana*	0.5 (free or total)	No
Minnesota	0.1 (free or total)	No
Missouri	0.2 (total)	Yes
Nebraska	SW-0.2 (free), 0.25 or 0.5 (total); GW-0.1 (free)	Yes
Nevada	0.05 (free or total)	No
New Jersey*	0.05 (free or total)	Yes
North Carolina*	0.2 (free), 1.0 (total)	Yes
Ohio*	0.2 (free), 1.0 (total)	No
Oklahoma	0.2 (free), 1.0 (total)	No
Tennessee*	0.2 (free)	No
Texas*	0.2 (free), 0.5 (total)	No
Vermont	0.1 (free)	No
West Virginia*	0.2 (total)	No

* 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 confidence in Pennsylvania’s drinking water by increasing actual health protections 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 separating-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	Western Berks Water Authority
North Penn Water Authority	United Water
York Water Company	Corona Environmental Consulting
Centers for Disease Control	Philadelphia Water Department
Chester Water Authority	Columbia Water Company
Lehigh County Authority	Aqua Pennsylvania
EPA OGWDW	

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	Columbia Water Company
York Water Company	Lehigh County Authority
Western Berks Water Authority	North Penn Water Authority
Aqua Pennsylvania	Water Works Operators’ Association – TAC Chair
Pennsylvania American	Suez Water
PA Municipal Authorities Association	Philadelphia Water Department
Superior Water Co/ National Association of Water Companies	Corona Environmental

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. The TAC Board provided a final set of recommendations on July 15, 2015. Many of the TAC Board’s recommendations were

incorporated into the proposed rulemaking. Other recommendations were incorporated into the preamble of the proposed rulemaking as a means to solicit further public comment. Please refer to the preamble for the proposed rulemaking for more information about the TAC Board's recommendations.

The proposed rulemaking was published in the *Pennsylvania Bulletin* on February 20, 2016, with a 60-day comment period to allow adequate time for industry stakeholders and the public to submit comments. Additionally, three public hearings were held (Norristown, Harrisburg, and Pittsburgh) during the public comment period.

Several revisions were made to the draft final-form regulation in response to the comments received.

The draft final-form rulemaking was presented to the TAC Board on July 13, 2017. The TAC Board requested additional time to solicit input from their organizations so a second meeting was held on August 24, 2017, at which time the TAC Board provided their final recommendations. The TAC Board made nine recommendations, six of which were incorporated into this final-form rulemaking and one that will be incorporated in guidance.

(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 of PWSs. 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 may 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 1,949 CWSs. Of these, 925 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 746 NCWSs. All of these systems should be considered as small businesses.
- The total number of small businesses affected by this regulation is 1,671.

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

(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 1,949 CWSs. Of these, 925 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 746 NCWSs. All of these systems should be considered as small businesses.
- The total number of public water systems affected by this regulation is 2,695. This includes 1,671 small businesses.

(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 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, in 2008, a large *Salmonella* outbreak caused by contamination of a storage tank and distribution system and no disinfectant residual within 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 paper chart recorders. Paper chart recorders can record measurements to two decimal places if the suitable 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. The Department estimates that 10% of these systems or 11 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 because many of these systems are already meeting a disinfectant residual of ≥ 0.15 mg/L. There are 1,949 CWSs that are required to provide and maintain disinfection treatment. Of these systems, 1,298 (67%) are required to collect only one disinfectant residual measurement each month. An additional 232 systems are only required to collect two measurements each month. In total, 1,530 systems (79%) are only required to collect one or two disinfectant residual measurements each month; which means the average result reported each month for the large majority of systems is representative of the actual sample results.

The Department reviewed the summary data (distribution system disinfectant residual average result values) from Jan 2012-May 2017 for the 1,949 CWSs.

- During this period, 165,328 average result values were reported; of these records, 154,623 average result values (93.5%) were at or above 0.15 mg/L.
- For the systems that are required to conduct only 1 or 2 measurements each month, 136,743 average result values were reported; of these records, 126,406 average result values (92.4%) were at or above 0.15 mg/L.
- For the systems that only conduct 1 measurement each month, 116,900 average result values were reported; of these records, 107,366 (91.8%) were at or above 0.15 mg/L.

The below table shows the number of CWSs and the number of average result summary records submitted for each population group.

CWS Disinfectant Average Result by Population Category

Population Group	No. Samples Required	No. PWSs	Total POPL ¹	Total No. Records	No. Results < 0.15	No. Results ≥ 0.15
< 25 ²	1	9	172	300	14	286
25-1,000	1	1290	311,515	116,600	9,520	107,080
1,001-2,500	2	231	381,322	19,843	803	19,040
2,501-3,300	3	86	255,069	6,292	168	6,124
3,301-4,100	4	28	103,784	2,534	65	2,469
4,101-4,900	5	37	164,629	2,518	11	2,507
4,901-5,800	10	27	145,425	1,752	0	1,752
5,801-6,700	15	22	137,596	1,672	1	1,671
6,701-7,600	20	22	156,720	1,246	0	1,246
7,601-8,500	25	22	178,117	1,194	22	1,172
8,501-12,900	30	46	469,925	3,311	34	3,277
12,901-33,000	35	69	1,436,581	4,333	66	4,267
> 33,000	≥ 40	60	7,628,402	3,733	1	3,732
Total	-----	1,949	11,369,257	165,328	10,705	154,623

¹Total POPL is the total population served for the population category, based on the CWS population in PADWIS. The Revised Total Coliform Rule required water systems to submit a revised sampling plan which included updated population numbers in accordance with existing EPA guidance. The CWS population served includes nontransient and transient consumers.

²These CWSs triggered applicability under the SDWA because each system provides water to 15 or more service connections.

There are an additional 621 noncommunity water systems with disinfection treatment that are currently required to maintain a disinfectant residual in the distribution system. Of these 621 water systems, 598 (96%) are only required to collect one or two residual measurements each month; 554 (89%) are only required to conduct one measurement each month.

Therefore, the Department believes it is appropriate to use the average result data, and that the data indicate that a vast majority of the water systems are already in compliance with these minimum disinfection residual requirements.

Some 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 few medium and large water systems with extensive distribution systems may need to install automatic flushing systems, tank mixers 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:

Type of Facility	Capital Expenses	Annual Expenses
Automatic flushing device	\$2,500	\$750
Tank mixer	\$75,000	\$0
Booster chlorination station	\$250,000	\$10,000

It is estimated that 25% of community water systems serving over 25,000 people, or ~20 systems, may need to install automatic flushing devices, tank mixers or booster chlorination stations. Of these 20 systems:

- 12 water systems may need to install up to ten automatic flushing devices for capital costs of up to \$25,000 and annual expenses of up to \$7,500 per system. The total cost for 12 systems is estimated at to be as much as \$300,000 in capital costs and as much as \$90,000 in annual expenses.
- Four water systems may need to install up to two tank mixers for capital costs of up to \$150,000 per system. The total cost for four systems is estimated to be up to \$600,000 in capital costs.
- Four systems may need to install up to four booster chlorination stations for capital costs of up to \$1,000,000 and annual expenses of up to \$40,000 per system. The total cost for four systems is estimated to be up to \$4,000,000 in capital costs and up to \$160,000 in annual expenses.

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 estimated costs to the regulated community = \$4,900,000 in capital costs and \$250,000 in annual expenses.

(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 paper chart recorders. The Department believes that most paper 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. The Department estimates that 10% of these systems (or 11 systems) may need to upgrade to electronic recording devices.

- 11 systems x \$1,500 = \$16,500

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.

Some 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 few medium and large water systems with extensive distribution systems may need to install automatic flushing systems, tank mixers 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:

Type of Facility	Capital Expenses	Annual Expenses
Automatic flushing device	\$2,500	\$750
Tank mixer	\$75,000	
Booster chlorination station	\$250,000	\$10,000

It is estimated that 25% of community water systems serving over 25,000 people, or ~20 systems, may need to install automatic flushing devices, tank mixers or booster chlorination stations. Of these 20 systems:

- 12 water systems may need to install up to ten automatic flushing devices for capital costs of up to \$25,000 and annual expenses of up to \$7,500 per system. The total cost for 12 systems is estimated at to be as much as \$300,000 in capital costs and as much as \$90,000 in annual expenses.
- Four water systems may need to install up to two tank mixers for capital costs of up to \$150,000 per system. The total cost for four systems is estimated to be up to \$600,000 in capital costs.
- Four systems may need to install up to four booster chlorination stations for capital costs of up to \$1,000,000 and annual expenses of up to \$40,000 per system. The total cost for four systems is estimated to be up to \$4,000,000 in capital costs and up to \$160,000 in annual expenses.

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 estimated costs to the regulated community = \$4,900,000 in capital costs and \$250,000 in annual expenses.

However, these costs are offset by the avoidance of water borne disease outbreaks which can result in costs to residents and businesses of \$1.5 million, and additional costs to local, state and nongovernmental agencies, healthcare facilities and schools of \$1.1 million.

(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.

However, these costs are offset by the avoidance of water borne disease outbreaks which can result in costs to residents and businesses of \$1.5 million, and additional costs to local, state and nongovernmental agencies, healthcare facilities and schools of \$1.1 million.

(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 or savings to state government will be those incurred or realized by systems that are owned and/or operated by state government and costs associated with implementing and administering the rule. The cost and savings 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.

Reporting requirements include:

- Electronic reporting of log inactivation values on a monthly basis using existing formats.
- Electronic reporting of additional disinfectant residual levels measured in the distribution system using existing formats.

Recordkeeping and paperwork requirements include:

- Development, maintenance and retention of a disinfectant residual sample siting plan.
- Development, maintenance and retention of a nitrification control plan.

As indicated above, whenever possible, existing formats and forms will be used.

(22a) Are forms required for implementation of the regulation?

Yes, but only one new form is needed.

- Log inactivation values and distribution disinfectant residual values will be electronically reported through the Drinking Water Electronic Lab Reporting system (DWELR) using existing formats.
- DEP has developed a template for the disinfectant residual sample siting plan.
- The nitrification control plan is a system specific plan that does not require a form. Water systems may document the required elements in a suitable format. This plan is not submitted to DEP but is maintained by the water system to be reviewed by DEP during inspections.

(22b) If forms are required for implementation of the regulation, **attach copies of the forms here**. If your agency uses electronic forms, provide links to each form or a detailed description of the information required to be reported. **Failure to attach forms, provide links, or provide a detailed description of the information to be reported will constitute a faulty delivery of the regulation.**

- The log inactivation and distribution disinfectant residual values that must be electronically submitted is detailed in an existing paper form (SDWA-1) which is available on DEP's eLibrary at: <http://www.elibrary.dep.state.pa.us/dsweb/View/Collection-8832>

- The disinfectant residual sample siting plan template is attached.

(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.

	Current FY 2017/18	FY +1 2018/19	FY +2 2019/20	FY +3 2020/21	FY +4 2021/22	FY +5 2022/23
SAVINGS:	\$	\$	\$	\$	\$	\$
Regulated Community	0	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Local Government	0	550,000	550,000	550,000	550,000	550,000
State Government	0	550,000	550,000	550,000	550,000	550,000
Total Savings	0	2,600,000	2,600,000	2,600,000	2,600,000	2,600,000
COSTS:						
Regulated Community	0	1,630,000	1,880,000	1,880,000	250,000	250,000
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Costs	0	1,630,000	1,880,000	1,880,000	250,000	250,000
REVENUE LOSSES:						
Regulated Community	0	0	0	0	0	0
Local Government	0	0	0	0	0	0
State Government	0	0	0	0	0	0
Total Revenue Losses	0	0	0	0	0	0

Note:

Cost savings: If even one waterborne disease outbreak is avoided each year, the cost savings to the regulated community (residents and businesses) is estimated at \$1.5 million, with an additional \$1.1 million is savings to local, state and nongovernmental agencies, healthcare facilities and schools, for a total savings of \$2.6 million.

Costs: Total estimated costs to the regulated community = \$4,900,000 in capital costs and \$250,000 in annual operational expenses. Capital costs are one-time costs split over three years. Annual operational expenses are not expected to begin until year two.

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

Program	FY -3 2014/15	FY -2 2015/16	FY -1 2016/17	Current FY 2017/18
Environmental Program Operations	\$6,972,000	\$6,803,000	\$7,079,000	\$2,525,000
Environmental Program Management	\$296,000	\$334,000	\$366,000	\$208,000
General Government Operations	\$0	\$0	\$0	\$0
Safe Drinking Water Act	\$51,000	\$62,000	\$55,000	\$50,000

(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 1,949 CWSs. Of these, 925 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 746 NCWSs. All of these systems should be considered as small businesses. The total number of small businesses affected by this regulation is 1,671 (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.
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 .
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 .
22. US EPA, Enforcement and Compliance History Online (ECHO) database.
23. US EPA, December 2016, “Six-Year Review 3 Technical Support Document for Microbial Contaminant Regulations”, EPA 810-R-16-010, <https://www.epa.gov/sites/production/files/2016-12/documents/810r16010.pdf> .
24. Water Research Foundation, “Criteria for Optimized Distribution Systems,” 2010.
25. Water Research Foundation, “State of the Science and Research Needs for Opportunistic Pathogens in Premise Plumbing,” 2013.
26. 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.

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.

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.

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

- A. The date by which the agency must receive public comments: March 2016
- B. The date or dates on which any public meetings or hearings will be held: 3 hearings:
Harrisburg - 3/28/2016
Norristown - 4/5/2016
Pittsburgh - 4/7/2016
- C. The expected date of delivery of the final-form regulation: Quarter 4, 2017
- D. The expected effective date of the final-form regulation: Quarter 1, 2018
- E. The expected date by which compliance with the final-form regulation will be required: Some provisions are effective upon publication of the final-form rulemaking; the distribution disinfectant residual provisions are delayed for 6-12 months after publication of the final-form rulemaking.
- F. The expected date by which required permits, licenses or other approvals must be obtained: 1 year after the publication date of the final-form regulation (unless an alternate schedule is approved).

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

The Board is not establishing a sunset date for this regulation, since it is needed for the Department to carry out its statutory authority. The Department will continue to closely monitor this regulation for its effectiveness and recommend updates to the Board as necessary.