



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL PROTECTION



Bureau of Safe Drinking Water

# **Pennsylvania's Proposed Disinfectant Residual Rule**

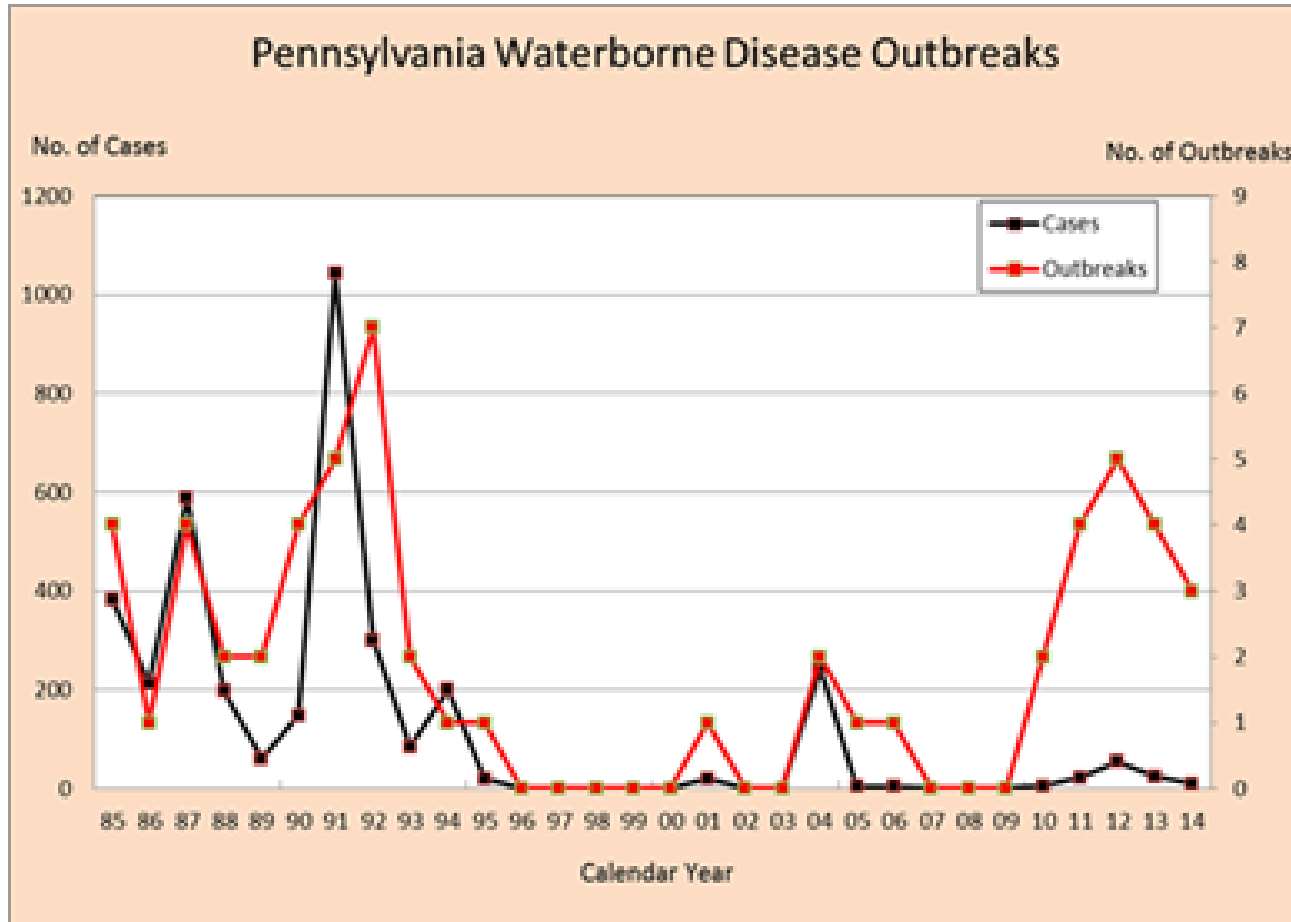
**PA Municipal Authorities Association  
Annual Conference & Trade Show  
August 30, 2016**

# History of Disinfection Requirements

PA has had a long history of waterborne disease outbreaks (WBDO) attributed to drinking water

Pennsylvania Giardiasis Outbreaks			
Location	Date	Pop Affected	# Confirmed Cases
Houtzdale	Nov 1983	8,600	42
Pittston	Dec 1983	75,000	366
McKeesport	Feb 1984	45,000	349
Scranton	Mar 1984	175,000	49

# Pennsylvania Waterborne Disease Outbreaks



# History of Disinfection Requirements

- PA Filter Rule
- PA Ground Water Rule
- TCR & RTCR

# Current Activities

- Continue to implement and expand PA's Distribution System Optimization Program
- Amend the state's disinfection requirements

# Distribution System Optimization

## DSO objectives:

- Identify water quality and quantity limiting factors related to disinfectant residual, DBP formation, microbial activity and distribution operations
- Protect public health by improving the quality of water delivered to customers
- Focus on ***operational*** changes rather than capital improvements

# DSO Overview

## Approaches:

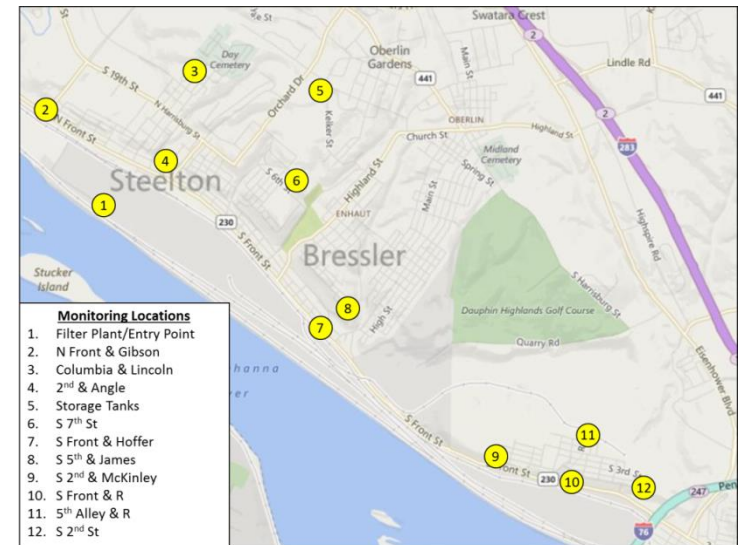
- Investigative Distribution System Sampling
- Distribution System Influent Hold Studies
- Storage Tank Evaluations



# Investigative Sampling

Identify “critical areas” of distribution system:

- Dead-ends, low demand, hydraulically distant, influenced by storage tanks
- High water age, low disinfectant residuals, elevated DBPs





# Hold Study

## Purpose of hold study:

- Simulate/estimate the bulk water chlorine decay rate and DBP formation potential
- Determine if chlorine loss is associated with chlorine demand inherent in the bulk water or if it's a function of the distribution system
- Determine whether to focus DBP control strategies at the plant or within the distribution system

# Storage Tank Evaluations

- Examine characteristics of storage tanks:
  - Low turnover, thermal stratification, insufficient mixing, degraded water quality
- In-tank procedures:
  - Sample at various depths via purge pump
  - Temperature data loggers to examine stratification
  - Continuous disinfectant residual monitoring
- Storage tank assessment spreadsheet:
  - Estimates mixing and storage tank turnover based on dimensions and fill/draw cycles
  - Evaluate operational strategies for improvement

# Storage Tank Evaluations

## Recommendations:

- Maintain turnover time  $\leq 5$  days at all times or establish and maintain an optimal water turnover rate at each storage facility
- Maintain good mixing performance ratios (PR  $\geq 1.0$ ) at all times

# DSO Tools

- Hold Study Protocol
- Hydrant and Tap Sampling Protocols
- Distribution Water Quality Assessment Software
- Storage Tank Assessment Software
- Tools are available on our website:  
[http://www.portal.state.pa.us/portal/server.pt/community/distribution\\_system\\_optimization/21175/distribution\\_optimization\\_goals/1588922](http://www.portal.state.pa.us/portal/server.pt/community/distribution_system_optimization/21175/distribution_optimization_goals/1588922)

# Program Findings

- Since 2007, DSO evaluations have been conducted at 27 CWSs
- The most common limiting factor is high water age caused by:
  - Inadequate storage tank cycling (low turnover)
  - Excessive storage tank capacity relative to system demand
  - Low demand at dead ends and distant points
  - Old/oversized distribution mains

# Program Findings

- High water age can lead to low or no disinfectant residuals and high TTHMs
- Improved operations and the reduction of water age can lead to better maintenance of disinfectant residuals and lower TTHMs

# Purpose of Rulemaking

- Further prevention from WBDOs associated with distribution system defects.
- Existing requirements at 0.02 mg/l are based on a detectable residual.
- Levels of detectability and quantitation differ between labs and based on water chemistry.
- Water systems generally agree that the current detectable residual of 0.02 mg/L is not valid.

# Purpose of Rulemaking

- Protect public health through a multi-barrier approach designed to guard against microbial contamination by ensuring the adequacy of treatment for the inactivation of microbial pathogens and the integrity of drinking water distribution systems
- Incorporate minor clarifications needed to obtain primary enforcement authority (primacy)



# Pathways of Contamination

Pathogens can be introduced into potable water lines through:

- Treatment breakthrough
- Cross connections and backflow
- Leaking pipes, valves, joints and seals
- Water line breaks, repairs, and new construction
- Storage tanks

# ▶ Distribution System Disinfectant Residual

- Required by state and federal regulations
- Designated as the Best Available Technology (BAT) for compliance with the TCR and RTCR
- Considered an important element in the multi-barrier strategy for protecting public health
- Intended to maintain the integrity of the distribution system
- Intended to control biofilm growth

# Significant Provisions

Increases the minimum disinfectant residual in the distribution system from 0.02 mg/L to 0.2 mg/L to:

- Ensure adequately disinfected water is delivered to all customers (equitable water quality)
- Establish a comprehensive treatment technique that will drive the need for better operations which will improve overall water quality
- Make PA consistent with existing industry standards
- Make PA consistent with other states

# Significant Provisions

Why is the proposed limit of 0.2 mg/L significant?

- Scientific studies and data support the fact that residuals of 0.2 mg/L are effective at inactivating *E. coli* and other pathogens
- Due to analytical method limitations and interferences from organic and inorganic contaminants, when disinfectant residuals are low, there may be little to no active disinfectant actually present.

# Comparison to Other States

State	Minimum Residual	State	Minimum Residual	State	Minimum Residual	State	Minimum Residual
Alabama*	0.2 (F) 0.5 (T)	Indiana	0.2 (F) 0.5 (T)	Missouri	0.2 (T)	Oklahoma	0.2 (F) 1.0 (T)
Colorado*	0.2	Iowa	0.3 (F) 1.5 (T)	Nebraska	SW-0.2 (F) GW-0.1 (F)	Tennessee*	0.2 (F)
Delaware	0.3 (F)	Kansas*	0.2 (F) 1.0 (T)	Nevada	0.05	Texas*	0.2 (F) 0.5 (T)
Florida*	0.2 (F) 0.6 (T)	Kentucky*	0.2 (F) 0.5 (T)	New Jersey*	0.05	Vermont	0.1 (F)
Georgia	0.2 (F)	Louisiana*	0.5	North Carolina*	0.2 (F) 1.0 (T)	West Virginia*	0.2 (T)
Illinois*	0.2 (F) 0.5 (T)	Minnesota	0.1	Ohio*	0.2 (F) 1.0 (T)		

\* States with mandatory disinfection

# Significant Provisions

- Requires at least weekly monitoring at RTCR sites as per a sample siting plan
- Sets the standard at no more than one sample (for small systems) or no more than 5% of the samples (for med and large systems) out of compliance for 2 consecutive months
- Clarifies the disinfectant residual at the entry point by adding a zero to the minimum level = 0.20 mg/L
- Requires water systems to monitor, calculate and report log inactivation

# Applicability

- Disinfectant residual requirements in the distribution system apply to all 1,982 community water systems, and 822 noncommunity water systems that have installed disinfection for a total of 2,804 water systems
- The CT/log inactivation monitoring and reporting requirements apply to all 353 filter plants which are operated by 319 water systems

# Estimated Costs

- CT/Log Inactivation Monitoring at EP:
  - Cost to upgrade to electronic recording devices @ \$1,500 for 25% of systems using strip chart recorders (29 systems)
  - $29 \times \$1,500 = \$43,500$
- Disinfectant Residuals in Distribution System:
  - Costs for automatic flushers ~ \$2,000
  - Costs for booster chlorination stations ~ \$200,000 - \$250,000
  - Total estimated capital costs for 20% of large systems (6) = \$780,000



# Rulemaking Process

- Received DEP regional staff input in Jan. 2014.
- This proposed rulemaking was originally included in the Pre-Draft Proposed Revised Total Coliform Rule (RTCR) -- presented to TAC on 6/18 and 9/23/2014.
- On 4/21/2015, the EQB approved the proposed RTCR with modifications – which included splitting out the “non-RTCR” provisions for additional stakeholder input.

# Rulemaking Process

- TAC meetings were convened on 5/18, 5/26, 6/16 and 6/30/2015 to gather additional stakeholder input – 14 water systems and organizations delivered presentations.
- Two additional meetings were held with large water systems on 6/29 and 7/16/2015.
- TAC provided a final set of recommendations on 7/15/2015.

# Rulemaking Process

- Proposed Rulemaking was presented to the EQB on November 17, 2015
- The EQB unanimously approved the proposed rulemaking with conditions.
  - a 60-day public comment period,
  - two public hearings,
  - and meeting with stakeholders to discuss the cost of implementation of this rule and the scientific evidence for it.

# Rulemaking Process

- Proposed rulemaking was published in *PA Bulletin* on 2/20/2016 for 60-day public comment period
- Three public hearings were held on 3/28, 4/5 & 4/7 – 6 people provided testimony
- Comment period ended on 4/19/2016 – 21 people provided comments

# Rulemaking Process

## Stakeholder workgroup:

- Serena DiMagno – WWOAP
- Jeff Hines – The York Water Company
- Penny McCoy – PRWA
- Michael McFadden (Capital Region Water) – AWWA
- Mary Neutz – Suez Water
- Steve Tagert – Aqua Pa
- Tony Bellitto (North Penn Water Authority) – PMAA
- David Runkle - Carlisle Borough Municipal Authority
- David Katz and Gary Burlingame – Philadelphia Water Department

# Rulemaking Process

## Stakeholder workgroup presentations:

- Presentations from:
  - [Cost and Benefits for the Disinfection Requirement Rule – Philadelphia Water](#)
  - [Primer on DPD Chlorine Method Detection Limits](#)
  - [AQUA PA Disinfection Residual Measurements Presentation](#)
  - [Disinfection Requirements Rule Presentation](#)
  - [Comments on Legionella and Legionnaires Disease](#)

# Rulemaking Process

## Stakeholder workgroup concerns:

- There is no direct public health issue being addressed by the proposed rule.
- The group does not agree that the minimum residual should be set at 0.2 mg/L. The minimum residual should be set at 0.1 mg/L
- Concerned that the increased residual monitoring (from once/ month to once/week) will increase small system operating costs.

# Rulemaking Process

Stakeholder workgroup concerns:

- The stated compliance benefits in the proposed rule are unfounded and the associated compliance costs are dramatically underestimated.
- Disinfection byproducts (DBPs) are likely to increase at some utilities as a result of increasing the distribution disinfection residual to 0.2 mg/L.



# Rulemaking Process

Stakeholder workgroup concerns:

- Concern that the increased residual monitoring (from once/ month to once/week) will increase small system operating costs.
- Requiring water utilities to issue Tier 2 PN for failing to meet 0.2 mg/L will unnecessarily erode public confidence in water quality.

# Schedule and Next Steps

- The public comment period for IRRC ended on 5/19/2016
- DEP is currently reviewing comments from the public and the data from the work group.
- We need more data.
- DEP will prepare C&R document and draft final rulemaking, likely late this year.



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