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Environmental Quality Board

Harrisburg, PA 17105-8477

<http://www.ahs.dep.pa.gov/eComment/>

Comments to EQB on the Disinfection Requirements Rule from Aqua Pennsylvania, Inc.

**PROPOSED RULEMAKING**  
[ 25 PA. CODE CH. 109 ]  
**Disinfection Requirements Rule**  
[46 Pa.B. 857]  
[Saturday, February 20, 2016]

This year marks Aqua's 130-year anniversary of protecting and providing water service in the communities we serve. Our history dates back to 1886, when a group of professors were granted a charter to supply water to the residents of Springfield Township, Delaware County.

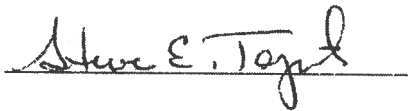
Today, Aqua provides water and wastewater services to approximately 3 million people in 8 states. Our mission is *Protecting and providing Earth's most essential resource*. At Aqua America, we know that water is a precious resource – one that plays a critical role in sustaining life. We take seriously our responsibility to protect and provide this essential resource.

The largest of Aqua's holdings are in Pennsylvania, where we provide water service to approximately 1.4 Million residents. Aqua operates more than 115 public water systems in Pennsylvania and has had staff provide input to DEP during the development of the Disinfection Requirements Rule. Aqua Pennsylvania operates water systems of all sizes and uses both chloramines and free chlorine as secondary disinfection. We are pleased to have been involved with the stakeholder group and meetings convened by DEP. In the spirit of cooperation and a common purpose, we offer comments on the proposed regulation.

Outline of Comments

- Proposal of  $\geq 0.1$  mg/L as 95th percentile for systems collecting  $\geq 40$  samples per month and 75<sup>th</sup> percentile for systems collecting  $< 40$  samples per month.
- The issuance of excessive and unnecessary Public Notices will erode consumer confidence in the absence of an actual public health problem.

- The Department's expected rate of compliance based on system-wide monthly averages of disinfectant residual is difficult to justify. Aqua is providing some actual chlorine residual data to illustrate a wider range of data more typical in water distribution systems.
- Measuring chlorine residual in the field by the DPD method is at the heart of the proposed regulation. The sensitivity of the analytical method, even under ideal conditions, is not expected to be able to reliably determine chlorine residuals at the current Chapter 109 definition of "detectable", 0.02 mg/L. Aqua supports an on-going investigation of the method and provides experimental data to support a Minimum Reporting Level in the range of 0.1 – 0.2 mg/L total chlorine.
- Costs and time involved to implement the proposed requirements are substantial and it is likely that the Department severely underestimated the impact on water systems.
- Guidance documents are important and need to be developed with stakeholder input.



Steve E. Tagert

President

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## **Detailed Comments**

### Support for March 30<sup>th</sup> Proposal on Minimum Disinfectant Residual

We support the establishment of a minimum disinfectant residual of  $\geq 0.1$  mg/L in 95 % of samples (for systems collecting 40 or more samples per month). This proposal would provide a 5-fold increase in the existing definition of “detectable” from 0.02 mg/L to 0.1 mg/L. However, our preference would be to separate this new Pennsylvania performance standard from the definition of “detectable” under the Surface Water Treatment Rule. That might provide a mechanism to decouple the Public Notice requirement from this guideline to help water systems improve performance in distribution systems. This would be more in-line with a “find and fix” approach.

Aqua recommends that the Department and other stakeholders follow and participate in a national discussion on science-based measurements of chlorine residual.

### Potential for Issuance of Excessive and Unnecessary Public Notices

Requiring water utilities to issue Tier 2 Public Notices (PNs) for failing to meet a minimum disinfectant residual at 0.2 mg/L will unnecessarily erode public confidence in water quality. The Department has not adequately built a scientific case by identifying health risks that are associated with a specific concentration of disinfectant. Many utilities will likely have difficulty meeting a minimum of 0.2 mg/L, which could result in Tier 2 PNs being issued 30 days after the low chlorine situation. In a review of historic chlorine residual within Aqua’s Main System, there would be a significant decrease in the number of PNs that might need to be issued if the minimum residual was set at 0.1 mg/L rather than 0.2 mg/L. The minimization of PNs would be another justification for setting the minimum residual at 0.1 mg/L and allowing Heterotrophic Plate Count as an alternative compliance method.

### Inappropriate Use of Monthly Averages to Assess Compliance with Minimum Disinfectant Residual.

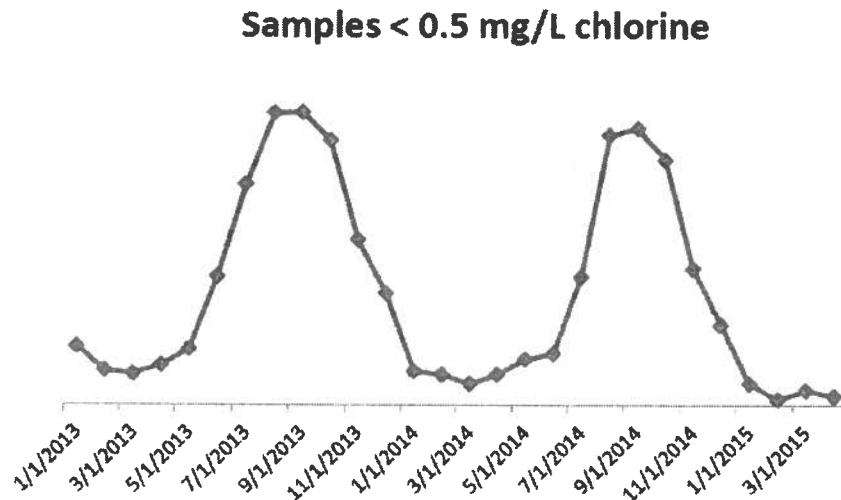
The evolution of the Disinfection Requirements Rule has allowed Aqua to examine data with various targets for minimum chlorine residual. What began as a pre-draft proposal with a minimum chlorine residual of 1 mg/L in chloraminated systems evolved to discussions of 0.5 mg/L and then to the official proposal at a concentration of 0.2 mg/L total chlorine.

Aqua was able to review segments of chlorine residual data in many water systems over a variety of time periods. In the largest segment of data on Aqua’s largest system, more than 11 years’ worth of chlorine residuals was examined. All of these data were associated with compliance samples collected for the Total Coliform Rule.

Over the period of time from 2004 to 2014, more than 36,500 compliance distribution samples were collected in the Aqua PA Main System. During this period of time, approximately 5% of the samples had concentrations at or below 0.2 mg/L total chlorine. See Attachment 1. Although these are historic data, an implication of the proposed regulation would be the potential need to issue many Public Notices. Aqua believes that the Department has failed to provide adequate scientific rationale to justify improved public health protection based on an increase in chlorine residual from 0.02 to 0.2 mg/L.

The Department's use of monthly average chlorine residual data was generally acknowledged to be a weak justification for estimating a high level of compliance. Aqua feels that some water systems will have difficulty complying with the proposed minimum disinfection residual. A reliance on average monthly chlorine residual results fails to recognize the wide variation that is possible- especially in medium to large distribution systems.

For example, it is well known that chlorine residuals tend to decline in warm weather. As presented to the TAC Board during 2015, the graph below illustrates a variation in chlorine residuals during the warmer months. The proportion of samples with lower chlorine residual can be significantly higher during the summer and early fall. It is expected that even with water systems working hard to improve chlorine residuals in the distribution system, it is likely that similar trends will continue.



#### Detection and Quantification. Need for Scientifically Sound Citation

The Department seeks comment on a *true detectable residual*. The proposal concluded that “...true detectable residual is likely somewhere between 0.1—0.2 mg/L.”

Although Aqua agrees with the concept that a scientifically sound reporting level is in the range of 0.1 – 0.2 mg/L, a major reference cited by the Department appears to be from the

gray literature and does not appear to be a peer-reviewed document. It is not clear why the Department put so much emphasis on the 2015 Hach primer.

For many years the term ML was used in the Clean Water Act to define a quantification term known as Minimum Level. It appears that the Minimum Level (an EPA term) and Method Limit (term used in the primer) are essentially the same thing and may be the result of a typographical error.

We suggest that the Department find and reference a stronger citation to back up, what appears to be a key feature of the proposed rule. There is an entire body of literature and series of reports from the FACA process that attempted to refine detection and quantification. One such report was the *Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs*, submitted to EPA in December 2007.

#### Laboratory Experiments to Evaluate Performance of Analytical Method

Aqua Pennsylvania conducted laboratory experiments in 2015 to help inform the conversation on detectable disinfectant concentrations. These experiments were conducted as part of an effort with Philadelphia Water and Corona Environmental Consulting to assess the variability of chlorine residual measurements. Summaries of these data have already been presented elsewhere by Jeffrey Rosen and Dr. Tim Bartrand of Corona.

These experiments were conducted by 3 chemists in Aqua's Water Quality Laboratory in Bryn Mawr. They were done under ideal (laboratory) conditions and not in the field. All measurements were conducted with the same instrument (Hach Pocket Colorimeter II). None of these chemists routinely conduct these measurements in the field. No attempt was made to investigate interferences; all spiked samples were prepared with reagent water in the laboratory.

Overall, Aqua's laboratory conducted almost 200 determinations of total chlorine residual by the DPD method. Hach reagents were used. Solutions were prepared from Hach Quality Control standards.

- 199 measurements
- 3 analysts
- 7 spike concentrations: 0.02 mg/L to 0.65 mg/L total chlorine
- While method performance generally improved as spike concentration increased, there was no clear degradation of performance at a specific concentration. The range of 0.1 – 0.2 mg/L was not unreasonable as a Minimum Reporting Level.
- These data should be viewed as one piece of information on the topic. A much larger project and national discussion of a "true detectable residual" is needed.

Calculations derived from the chlorine residual experiments are included as Attachment 2.

Extensive Costs of Implementing Proposed Regulation

Aqua has estimated costs to comply with the proposed regulation. It is clear that the costs are going to be substantial and that the Department significantly underestimated compliance costs. Aqua operates more than 115 drinking water systems across the state. Because of the vast size of Aqua PA's Main System, significant capital improvements will be needed. Aqua's Main System in southeastern Pennsylvania uses chloramines as a secondary disinfectant and has done so for decades. Although the cost estimate below covers all of Aqua PA, most of the costs would be for Aqua's systems in the southeastern portion of the state.

Over the last few years, Aqua has implemented capital and operational changes both at treatment facilities as well as in various distribution systems. This has included a use of best practices to improve the quality of water with respect to chlorine residual. The costs associated with these changes are presented below.

<b>Aqua Pennsylvania Systems</b>	<b>Cost Estimate</b>
<b>2014-2016 Capital</b>	<b>\$ 4,500,000</b>
<b>Estimated Future Capital</b>	<b>\$ 4,100,000</b>
<b>Total Capital</b>	<b>\$ 8,600,000</b>
<b>Annual Expenses</b>	<b>\$ 400,000</b>

Efforts associated with these costs include:

- Evaluation of water quality
- Entry point or interconnect improvements
- Distribution system costs / regulator valves / SCADA upgrades
- Storage tank costs: booster pumps, tank mixers, mixing pumps, inlet/outlet riser assemblies
- Flushing costs, unidirectional flushing, autoflushers
- Laboratory costs for increased monitoring of nitrification indicators

Attachment 3 indicates the impact of Aqua's efforts in working toward meeting anticipated new disinfection residual requirements. Note that the most recent data show improvement in Total Chlorine Residuals (higher residuals). This is illustrated by a shift in the percentile curves to the right.

### Extended Timeframe for Implementation

The Department requested comment on whether a delay in implementation might be appropriate after promulgation. Aqua supports a deferred effective date of at least 6 months (12 months would be more reasonable) to give water systems sufficient time to implement capital projects and time to transition operational changes without being penalized.

For more than two years, Aqua has made operational modifications related to potential changes in disinfection residual requirements. These on-going modifications are part of efforts to continuously improve operations. Topics of simultaneous compliance with other regulations must also be considered. Even a 12 month deferral in effective date of the proposed regulation may not be enough for some systems to fully consider appropriate operational modifications.

### Guidance Manuals

While the proposed rule provides direction, the guidance manuals that will eventually be published by DEP will be at least as important as the regulation. We urge the Department to generate these manuals with flexibility and practicality in mind. There are few one-size-fits-all solutions when it comes to disinfectant residual.

We urge the Department to have an open dialogue with stakeholders during the development of guidance manuals so that the published product is workable by water utilities of all sizes, configuration, and disinfection practices.

For example, a Nitrification Control Plan is a good idea for chloraminated systems. The regulation and guidance manual must not be prescriptive, however. Flexibility in guidance is critical to allow water operators an opportunity to use their professional judgement in developing and implementing a plan that makes sense for their system.

Attachment 1

**Historic Chlorine Residuals in Aqua PA Main System**

Aqua Pennsylvania, Inc.

Main System Data Over 11 Year Period:

2004 - 2014

Includes more than 36,500 samples

<b>Percentile</b>	<b>Total Chlorine Residual, mg/L</b>
95th	2.02
90th	1.83
50th	1.19
39th	1.01
38th	0.99
10th	0.33
5th	0.21
4th	0.18
3rd	0.16
2nd	0.13
1st	0.1



Attachment 2

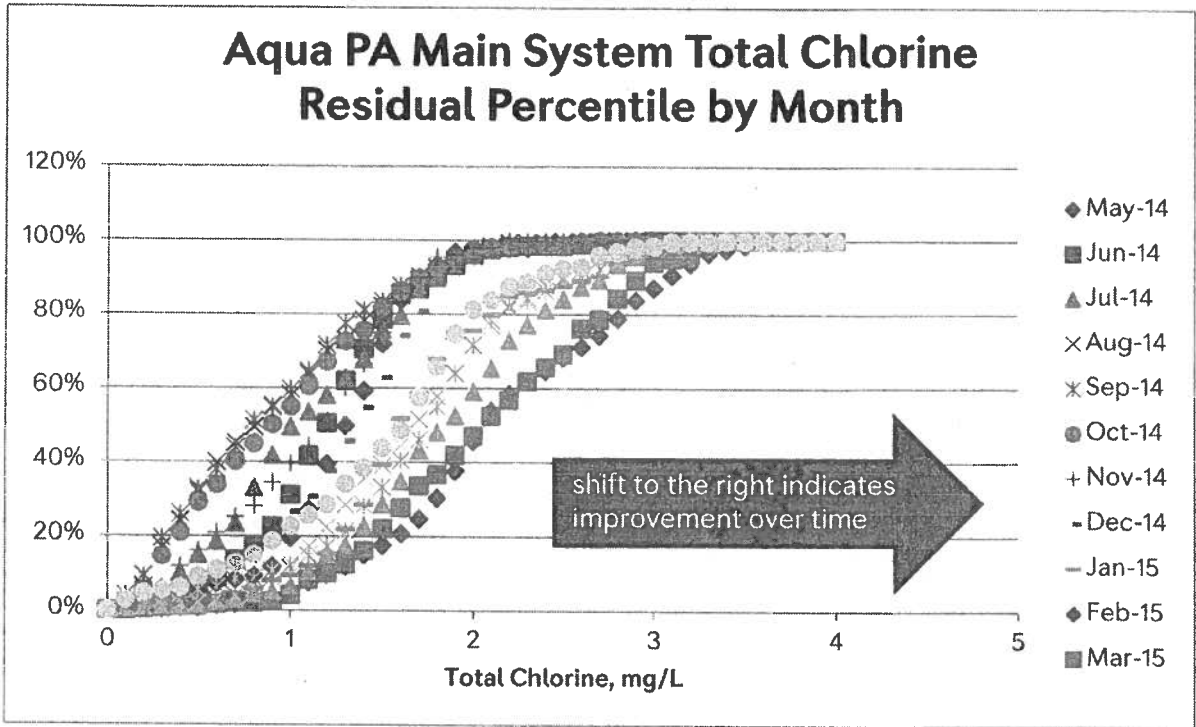
**Aqua Pennsylvania, Inc.  
Experiments Designed to Estimate an MRL for Total Chlorine  
Residual by DPD Method**

All Determinations: May - July 2015

Concentration, mg/L

	Replicates	% Recovery	% RSD	Calculated MDL, mg/L
0.02	9	211	20	0.024
0.02	8	225	12	0.016
0.06	7	143	13	0.036
0.1	5	86	16	
0.1	5	90	8	
0.1	8	116	12	
0.1	8	121	11	0.041
0.1	8	134	6	0.022
0.1	9	124	4	0.015
0.13	7	138	25	0.143
0.2	9	129	19	0.14
0.2	9	109	2	0.01
0.2	5	93	3	
0.2	5	91	2	
0.2	9	109	3	0.019
0.2	9	126	6	0.045
0.2	8	109	5	0.034
0.2	9	104	5	0.032
0.3	9	111	6	0.06
0.3	9	89	18	0.138
0.3	5	93	2	
0.3	7	94	3	0.024
0.3	9	98	3	0.025
0.3	8	105	4	0.039
0.3	8	113	1	0.014
0.65	7	104	4	0.094

Attachment 3



Capital investment and system improvements implemented over the last few years have improved the average Total Chlorine Residual and reduced the percentage of samples with Total Chlorine Residual  $\leq 0.2$  mg/L between 2014 and 2015 for both system A and B. Despite the significant investment, and on-going improvements, work remains on system B. Therefore, a 6-month period to implement improvements may not be enough time for some water systems to achieve compliance with the proposed regulation.

