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Disinfectants/Disinfection Byproducts Rule
Information for Consecutive Water Systems that do not add disinfectants

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Preparing Distribution System Optimization Plans
Fact Sheet for complying with OAC 3745-81-78(G)(2)

Background

Ohio Administrative Code (OAC) 3745-81-78 requires all consecutive water systems that receive water from a surface water system and do not add booster chlorination to comply with action levels for Total Trihalomethanes (TTHMs) and the five Haloacetic Acids (HAA5). These systems were required to begin monitoring for TTHMs and HAA5s on a quarterly basis on January 1, 2002. Two years of monitoring have been completed, and a number of systems have exceed the action levels for TTHMs and/or HAA5s (80 µg/L and 60 µg/L, respectively).

As a result of exceeding the action level(s), these systems must develop and implement a distribution system optimization plan (DSOP), pursuant to OAC 3745-81-78 (F).

Purpose

This document addresses:

- the minimum acceptable components and considerations of a DSOP;
- DSOP submittal requirements;
- timelines for submittal, approval, and implementation.

GUIDANCE

Minimum Acceptable Components and Considerations

Because your water quality is largely dependent upon your supplying system's source and treatment, you are strongly encouraged to communicate with your supplier about optimizing the quality of water delivered to your system. However, there may be operational changes and/or capital improvements to be considered within your distribution system that can enhance your compliance and the final quality of water delivered to your customers. These changes or improvements must be reflected in the DSOP. Below is a summary of the minimum acceptable components and considerations of a DSOP. Note that each system is unique and the list may not be all-inclusive for optimizing your particular distribution system operation and reducing your TTHM and HAA5 concentrations.

1. Determine the location of maximum residence time (i.e., oldest water age), by one or more of the following methods:

- Chlorine residual monitoring throughout the distribution system over a period of time to identify area(s) of consistently low chlorine residual, or
 - Hand calculations to determine water age, or
 - Hydraulic and water quality computer modeling to determine water age and/or water quality deterioration over time
2. Identification of options for improving the operation and design of your distribution system to improve circulation and reduce water age (e.g., looping dead end lines)
 3. Develop an adequate hydrant flushing program or modifying an existing plan
 4. Optimize turnover in water storage tanks (25% minimum each day recommended)
 5. If multiple sources are used, vary the percentage of source water used based on the potential to form disinfection byproducts
 6. Develop a schedule indicating when operational improvements and capital improvements will be completed.

Several software programs are available to assist with computer modeling. US EPA has developed a free model which can be downloaded at <http://www.epa.gov/ordntrnt/ORD/NRMRL/wswrd/dw/epanet.html>. Whether a computer model needs to be developed and the degree of detail such a model would need must be decided by the public water system (probably with help from a consultant). Generally, a model should be developed for systems with adequate financial resources (i.e., larger systems) if a model doesn't already exist. Also, if the water system determines significant capital improvements may be needed, such as looping or line extensions, developing a computer model may be necessary to screen and/or prioritize these improvements. You may also wish to develop a model, or utilize an existing model, to evaluate the merits of altering flow patterns through valve changes.

Development and implementation of a hydraulic model is the preferred method of determining water age. However, it is anticipated that most systems, particularly smaller systems, will be able to determine the maximum residence time through the monitoring or calculation options. Based upon the location of the maximum residence time, strategies for improving system operations to minimize TTHM/HAA5 formation can be formulated, including those identified in items 2, 3, and 4 above. Calculation and monitoring tools that can be used to determine the maximum residence time and corrective strategies may also include the following:

1. If available, review historical distribution system chlorine residual values as reported on the Plant - Distribution System monthly operating report (EPA 5002) to help estimate the location of maximum residence time based upon these results (direct or averaged values). Additional chlorine residual tests may be needed in critical areas to provide further information.
2. If available, use the Drinking Water Distribution Report to determine the areas affected by poor tank turnover.
3. Estimate your system's area of low water use to determine areas of maximum water age. This may be accomplished using a distribution map and identifying the numbers of customers in given areas. Additional useful information that could also be used include size and length of distribution lines and the type and number of customers on those lines. Billing records could also be used to refine or validate estimates of water

use in low flow areas. Very skeletonized hydraulic models could also be used for some distribution systems.

4. Utilize existing TTHM and HAA5 results to determine or validate areas of suspected low usage and/or maximum residence time.

DSOP Submittal Requirements

The DSOP is considered a General Plan for improvements to a public water system. General Plans receive approval by the director of Ohio EPA. If the General Plan conclusions indicate system infrastructure improvements are required, detail plans for these improvements must also be approved by the director of Ohio EPA before they can be constructed. Therefore, a complete DSOP submittal will include the following:

- Three (3) copies of the General Plan
- Review fee of \$150.00 payable to "Treasurer, State of Ohio"
- Water Supply Data Sheet

The DSOP must include a signature of approval by a person in responsible charge of the public water system, or his/her designated representative. Additionally, if the preparation of the DSOP involves an expenditure of public funds in excess of \$5,000.00, Ohio Revised Code Section 4733.17 requires the plan be prepared by a Professional Engineer licensed in the State of Ohio.

Timelines for Submittal, Approval, and Implementation.

The DSOP must be submitted to your Ohio EPA district office within six (6) months of being notified of the TTHM/HAA5 action level exceedance. Ohio EPA will review the DSOP and either have comments to be addressed or will recommend the DSOP for approval by the director. Approved DSOP recommendations must be fully implemented within three (3) years of the date of action level exceedance.

We encourage you to stay informed of the new regulations and resulting implementation issues by participating in the public comment process, attending drinking water conferences and seminars, reading U.S. EPA updates as they become available, and visiting Ohio EPA's web site at www.epa.ohio.gov/ddagw. You may also wish to contact your district representative for additional assistance.