

(THIS POLICY DOES NOT HAVE THE FORCE OF LAW)

Guidance for Compliance with Total Organic Carbon (TOC) Monitoring and Removal Requirements for Non-Conventional Filtration Treatment at Surface Water Treatment Plants

Division: DDAGW
Number: WQ-14-001
Category: Water Quality - Policy
Status: Final
Issued: January 14, 2008

I. Purpose

The purpose of this document is to provide guidance for the staff of the Division of Drinking and Ground Waters (DDAGW) and public water systems (PWS) regarding Total Organic Carbon (TOC) compliance monitoring and removal requirements for non-conventional treatment at surface water treatment plants pursuant to Ohio Administrative Code (OAC) 3745-81-77.

II. Background

OAC 3745-81-77 requires Step 1 TOC removal of surface water treatment plants utilizing conventional filtration treatment. TOC removal is a treatment technique for control of disinfection byproducts, namely Total Trihalomethanes (TTHM) and five Haloacetic Acids (HAA5). OAC 3745-81-01 (O) defines conventional filtration treatment as a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial removal of particles. Other types of filtration treatment are currently available in the water industry through various proprietary alternative treatment technologies (e.g. pressurized package treatment plants using multiple filters with varying sizes of media) and alternative filtration technologies (e.g., microfiltration, nanofiltration, etc.).

Per OAC 3745-81-77, conventional filtration treatment systems must remove a minimum required percentage of TOC based upon raw TOC and alkalinity and treated TOC concentrations. These parameters are to be monitored monthly, at a minimum, and compliance calculations are to be reported quarterly on Ohio EPA Form 5115. Compliance with the TOC treatment technique is determined by the running annual average of the monthly results, calculated quarterly. Alternative compliance criteria, such as raw or treated Specific Ultraviolet Absorption (SUVA), are also provided by rule and can be substituted in place of the TOC value.

Failure to meet the minimum TOC removal specified in the Step 1 table in OAC Rule 3745-81-77 constitutes a treatment technique violation. In addition to the public notice requirements, the system is required to conduct a jar test study to determine alternate minimum TOC removal (Step 2) requirements. The purpose of the jar test is to determine what level of enhanced coagulation or enhanced softening can be provided to reasonably reduce treated water TOC levels. Enhanced coagulation and softening involve increased dosages of alum or lime for cumulative increases in TOC removal to a point of specified

minimum return. Based upon the jar test results, this new Step 2 TOC removal percentage becomes the minimum removal requirement by which the plant is evaluated for TOC compliance calculations. It should be noted Step 2 enhanced coagulation or enhanced softening may be required even if the PWS is in compliance with the TTHM or HAA5 maximum contaminant levels (MCLs).

Enhanced coagulation and enhanced softening were developed specifically for conventional filtration treatment systems where rapid mix and flocculation were followed by gravity sedimentation; this is the normal treatment scheme for most surface water plants. However, some plants which do not use this conventional scheme can be adversely affected by practicing enhanced coagulation or enhanced softening as these treatment techniques were not intended to be utilized in non-conventional filtration treatment systems. For example, some systems do not use gravity sedimentation for particulate removal; instead liquid alum and a polymer chemical are dosed at optimum conditions to create pin floc removed through a pressurized clarifying filter. Enhanced coagulation in this treatment scheme could easily lead to floc particle formation larger than what the system is designed to filter. Prematurely clogged filters and shorter filter runs are likely to result under enhanced coagulation conditions. Similar operating problems are anticipated for other forms of alternate treatment technologies or filtration systems.

Due to the potential operational problems involved with non-conventional filtration treatment systems, DDAGW is issuing this document to clarify the following issues:

- What is the definition of conventional filtration treatment relative to TOC removal compliance?
- Should non-conventional filtration treatment systems be required to monitor for TOC and/or be required to ensure the minimum TOC removal is met?
- What actions should be required of non-conventional filtration treatment systems in the event the TTHM and/or HAA5 MCL is violated?

III. Guidance

The following guidance should be followed for determining compliance with OAC 3745-81-77.

- A. Conventional filtration treatment consists of a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial removal of particles, in accordance with OAC 3745-81-01 (O). Treatment schemes which do not include all of these processes should not be considered conventional filtration treatment. These ■non-conventional filtration treatment• systems include proprietary systems (e.g. pressurized package treatment plants using multiple filters with varying sized of media) and alternative filtration systems (e.g., microfiltration, nanofiltration, etc.).

- B. Surface water systems which utilize non-conventional filtration treatment are not required to monitor for TOC and related parameters for compliance with the TOC removal requirements of OAC 3745-81-77.
- C. Compliance with Step 1 and Step 2 TOC removal is not required of non-conventional filtration treatment systems. Compliance calculations for the TOC removal treatment technique will not be done for non-conventional filtration treatment systems. However, if TOC data is collected, the PWS should keep the data on-site and available for inspection by DDAGW.
- D. Compliance with the TTHM and HAA5 MCL will continue to apply to conventional and non-conventional filtration treatment systems. This includes public noticing, monitoring requirements (e.g., sample monitoring plans and sample locations), analytical, and compliance calculation requirements. Treatment which meets the best available technology (BAT) requirements for TTHM/HAA5 removal (e.g. activated carbon filtration will still be applicable for conventional and non-conventional filtration treatment systems.
- E. If a non-conventional filtration treatment system exceeds the TTHM and/or HAA5 MCL, it is recommended the system consider preparing a Distribution System Optimization Plan (DSOP). Guidelines for preparing a DSOP are contained in OAC 3745-81-78. DDAGW recommends the system prepare a DSOP to ensure the PWS has addressed those controllable operations which could result in reduced TTHM/HAA5 concentrations in the distribution system since enhanced coagulation or enhanced softening is not an option. The PWS will be notified in writing by the District Office of the recommendation to submit a DSOP. The notification will be made upon receipt of the TTHM/HAA5 NOV letter issued by Central Office. The DSOP will be submitted to the District Office. Review and recommendation for approval by the director will be conducted by the District Office.

IV. History

The Division of Drinking and Ground Water issued this document in final form on January 14, 2008.

V. Appendix A - Definitions Contained in OAC 3745-81-01

The definitions relevant to the topic of conventional filtration treatment, as contained in OAC 3745-81-01, are shown below for convenience.

(F) "Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

(O) ■Conventional filtration treatment• means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial removal of particles.

(AA) "Enhanced coagulation" means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

(BB) "Enhanced softening" means the improved removal of disinfection byproduct precursors by precipitative softening.

(DD) "Filtration" means a process for removing particles from water by passage through porous media.

(FF) "Flocculation" means a process which enhances agglomeration of particles into larger, more easily settleable particles through gentle stirring.

(MMM) "Sedimentation" means a process for removal of solids before filtration.

(QQQ) "Slow sand filtration" means a process of passing raw water through a porous granular medium, at a rate of less than one hundred fifty gallons per day per square foot of sand area, with substantial removal of particles by physical and biological mechanisms.