Ohio Administrative Code

Rule 3745-81-77 Treatment techniques for control of disinfection byproduct (DBP) precursors.

Effective: August 7, 2025

(A) Surface water community and nontransient noncommunity public water systems using conventional filtration treatment shall operate with enhanced coagulation or enhanced softening to achieve the TOC per cent removal levels specified in paragraph (F) of this rule unless the system meets at least one of the alternative compliance criteria listed in paragraph (D) or (E) of this rule.

(B) Surface water systems using conventional filtration treatment shall comply with the following monitoring requirements for disinfection byproduct precursors (DBPP).

(1) Routine monthly monitoring: public water systems using surface water as a source which use conventional filtration treatment shall monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All public water systems required to monitor under this paragraph shall also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems shall monitor for alkalinity in the source water prior to any treatment. Public water systems shall take one paired sample and one source water alkalinity sample every thirty days per plant at a time representative of normal operating conditions and influent water quality. The thirty day monitoring frequency may be extended or reduced by three days to allow for unplanned circumstances that prevent monitoring precisely thirty days apart, as long as the samples are collected during each calendar month.

(2) Reduced quarterly monitoring: public water systems using surface water as a source with an average treated water TOC of less than 2.0 mg/l for two consecutive years, or less than 1.0 mg/l for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant every ninety days. The ninety day monitoring frequency may be extended or reduced by five days to allow for unplanned circumstances that prevent monitoring precisely ninety days apart, as long as the samples are collected during each calendar quarter. The public water system shall revert to routine monitoring in the month following the quarter when the

running annual average treated water TOC greater than or equal to 2.0 mg/l.

(C) Public water systems may begin monitoring twelve months prior to the compliance date for the system, to determine whether step 1 TOC removals can be met. This monitoring is not required and failure to monitor during this period is not a violation. However, any public water system that does not monitor during this period, and then determines in the first twelve months after the compliance date that the system is not able to meet the step 1 requirements in paragraph (F)(2) of this rule and shall apply for alternate minimum TOC removal (step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (step 2) requirements as allowed by paragraph (F)(3) of this rule and is in violation of the treatment technique for TOC removal of this rule. Public water systems may apply for alternate minimum TOC removal (step 2) requirements any time after the compliance date.

(D) Alternative compliance criteria for enhanced coagulation and enhanced softening systems. Surface water systems using conventional filtration treatment may use one or more of the alternative compliance criteria in paragraphs (D)(1) to (D)(7) of this rule to comply with this rule in lieu of complying with paragraph (F) of this rule. Public water systems shall still comply with the monitoring requirements of paragraph (B) of this rule.

(1) The system's source water TOC level, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.

(2) The system's treated water TOC level, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, calculated quarterly as a running annual average.

(3) The system's source water TOC level, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code, is greater than 60.0 mg/l (as $CaCO_3$), calculated quarterly as a running annual average and the TTHM and HAA5 running annual averages are no greater than 0.040 mg/l and 0.030 mg/l, respectively.

(4) The system's source water TOC level, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than 4.0 mg/l, calculated quarterly as a running annual average; the source water alkalinity, measured according to rule 3745-81-27 of the Administrative Code, is greater than 60.0 mg/l (as $CaCO_3$), calculated quarterly as a running annual average and the system has made a clear and irrevocable financial commitment to use technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/l and 0.030 mg/l, respectively. Systems shall submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the director for approval. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.

(5) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/l and 0.030 mg/l, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(6) The system's source water SUVA, prior to any treatment and analyzed monthly following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, calculated quarterly as a running annual average.

(E) Additional alternative compliance criteria for softening systems. Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (F)(2) of this rule may use the alternative compliance criteria in paragraph (E)(1) or (E)(2) of this rule in lieu of complying with paragraph (F) of this rule. Systems shall still comply with monitoring requirements in paragraph (B) of this rule.

(1) Softening that results in lowering the treated water alkalinity to less than 60.0 mg/l (as $CaCO_3$), analyzed monthly following the methods referenced in rule 3745-81-27 of the Administrative Code and calculated quarterly as a running annual average.

(2) Softening that results in removing at least 10.0 mg/l of magnesium hardness (as $CaCO_3$), analyzed monthly following the methods referenced in rule 3745-81-27 of the Administrative Code

and calculated quarterly as an annual running average.

(F) Enhanced coagulation and enhanced softening performance requirements.

(1) Public water systems shall achieve the per cent reduction of TOC specified in paragraph (F)(2) of this rule between the source water and the combined filter effluent, unless the director approves a system's request for alternate minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule.

(2) Required step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code. Systems practicing softening are required to meet the step 1 TOC reductions in the far-right column (source water alkalinity >120 mg/l) for the specified source water TOC:

Source-water TOC, mg/l	Source-water alkalinity, mg/l as $CaCO_3$	0 - 60 (Per cent)	>60 - 120 (Per cent)
>120[3] (Per cent)	>2.0 - 4.0	35.0	25.0
15.0	>4.0 - 8.0	45.0	35.0
25.0	>8.0	50.0	40.0

[1] Systems meeting at least one of the conditions in paragraphs (D)(1) to (D)(7) of this rule are not required to operate with enhanced coagulation.[2] Softening systems meeting one of the alternative compliance criteria in paragraphs (E)(1) and (E)(2) of this rule are not required to operate with enhanced softening.[3] Systems practicing softening shall meet the TOC removal requirements in this column.

(3) Surface water conventional treatment systems that cannot achieve the step 1 TOC removals required by paragraph (F)(2) of this rule due to water quality parameters or operational constraints shall apply to the director, within three months of failure to achieve the TOC removals required by paragraph (F)(2) of this rule, for approval of alternative minimum TOC removal (step 2) requirements submitted by the system. If the director approves the alternative minimum TOC removal (step 2) requirements, the director may make those requirements retroactive for the purposes of determining compliance. Until the director approves the alternate minimum TOC removal (step 2)

requirements, the system shall meet the step 1 TOC removals contained in paragraph (F)(2) of this rule.

(4) Alternate minimum TOC removal (step 2) requirements. Applications made to the director by enhanced coagulation systems for approval of alternative minimum TOC removal (step 2) requirements under paragraph (F)(3) of this rule shall include, at a minimum, results of bench- or pilot-scale testing conducted under paragraphs (F)(6) to (F)(9) of this rule. The submitted bench- or pilot-scale testing shall be used to determine the alternate enhanced coagulation level.

(5) Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in paragraphs (F)(6) to (F)(9) of this rule such that an incremental addition of 10.0 mg/l of alum (or equivalent amount of ferric salt) results in a TOC removal of less than or equal to 0.3 mg/l. The per cent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the director, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (F)(2) of this rule. This requirement will be effective until such time as the director approves a new value based on the results of a new bench- or pilot-scale test. Failure to achieve alternative minimum TOC removal levels as set by the director is a violation of the Administrative Code primary drinking water regulations for control of disinfection byproduct precursors.

(6) Bench- or pilot-scale testing of enhanced coagulation shall be conducted by using representative water samples and adding 10.0 mg/l increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation step 2 target pH shown in the following table:

Alkalinity (mg/l as $CaCO_3$)	Target pH
0 - 60	5.5
>60 - 120	6.3
>120 - 240	7.0
>240	7.5

(7) For waters with alkalinities of less than 60.0 mg/l for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system shall add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/l per 10.0 mg/l alum added (or equivalent addition of iron coagulant) is reached.

(8) The system may operate at any coagulant dose or pH necessary (consistent with other state primary drinking water regulations) to achieve the minimum TOC per cent removal approved under paragraph (F)(3) of this rule.

(9) If the TOC removal is consistently less than 0.3 mg/l of TOC per 10.0 mg/l of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the director for a waiver of enhanced coagulation requirements.

(G) Compliance calculations: surface water systems other than those identified in paragraph (D) or (E) of this rule shall comply with requirements contained in paragraph (F)(2) or (F)(3) of this rule. Systems shall calculate compliance quarterly, beginning after the system has collected twelve months of data, by determining a running annual average using the following method:

(1) Determine actual monthly TOC per cent removal. This is equal to: (1.0 - (treated water TOC/source water TOC)) x 100.0.

(2) Determine the required monthly TOC per cent removal (from either the table in paragraph (F)(2) of this rule or from paragraph (F)(3) of this rule).

(3) Divide the value determined according to paragraph (G)(1) of this rule by the value determined according to paragraph (G)(2) of this rule.

(4) Add together the results of paragraph (G)(3) of this rule for the last twelve months and divide by twelve.

(5) If the value calculated in paragraph (G)(4) of this rule is less than 1.00, the system is not in

compliance with the TOC per cent removal requirements.

(6) Systems may use the provisions in paragraphs (G)(7) to (G)(11) of this rule in lieu of the calculations in paragraphs (G)(1) to (G)(5) of this rule to determine compliance with TOC per cent removal requirements.

(7) In any month that the system's treated or source water TOC level, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than 2.0 mg/l, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(8) In any month that a system practicing softening removes at least 10.0 mg/l of magnesium hardness (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(9) In any month that the system's source water SUVA, prior to any treatment and analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(10) In any month that the system's finished water SUVA, analyzed following the methods referenced in rule 3745-81-27 of the Administrative Code, is less than or equal to 2.0 l/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(11) In any month that a system practicing enhanced softening lowers alkalinity below 60.0 mg/l (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (G)(3) of this rule).

(12) Surface water systems using conventional treatment may also comply with the requirements of this rule by meeting the criteria in paragraph (D) or (E) of this rule.

(H) Treatment technique requirements for DBP precursors. The director identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water

treatment and distribution systems: for surface water systems using conventional treatment, enhanced coagulation or enhanced softening.

(I) Each public water system required to monitor under this rule shall develop and implement a monitoring plan. The public water system shall maintain the plan and make the plan available for inspection by the director and the general public no later than thirty days following the applicable compliance dates in this rule. All surface water systems serving more than three thousand three hundred people shall submit a copy of the monitoring plan to the director no later than the date of the first report required under paragraph (G) of rule 3745-81-75 of the Administrative Code. The director may also require any other public water system to submit such a plan. After review, the director may require changes in any plan elements to ensure monitoring will be adequate for required compliance determinations. The public water system shall modify the plan as required by the director. The plan shall include how the public water system will calculate compliance with the treatment technique for disinfection byproduct precursors. Failure to sample according to the monitoring plans is monitoring violation.