



# **The Stage 1 Disinfectants and Disinfection Byproducts Rule**

## **What Does it Mean to You?**

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# Definitions and Abbreviations

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## Definitions

**Enhanced coagulation** ---- the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

**Enhanced softening** ---- the improved removal of disinfection byproduct precursors by precipitative softening.

**Maximum residual disinfectant level (MRDL)** ---- a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects.

**Maximum residual disinfectant level goal (MRDLG)** ---- the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are nonenforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

**SUVA** ---- Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV 254) (in  $m^{-1}$ ) by its concentration of dissolved organic carbon (DOC) (in mg/L).

**Total Organic Carbon (TOC)** ---- total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

## Abbreviations Used in This Document

BAT: Best Available Technology

CDC: Centers for Disease Control and Prevention

CWS: Community Water System

DBP: Disinfection Byproducts

DBPP: Disinfection Byproducts Precursors

EC: Enhanced Coagulation

EPA: United States Environmental Protection Agency

ES: Enhanced Softening

ESWTR: Enhanced Surface Water Treatment Rule

FACA: Federal Advisory Committee Act

FR: Federal Register

GAC10: Granular Activated Carbon with ten minute empty bed contact time and 180 day reactivation frequency

GWR: Ground Water Rule

GWUDI: Ground Water Under the Direct Influence of Surface Water

HAA5: Haloacetic Acids (five)(chloroacetic acid, dichloroacetic acid, trichloroacetic acid, bromoacetic acid and dibromoacetic acid)

ICR: Information Collection Rule (issued under section 1412(b) of the SDWA)

IESWTR: Interim Enhanced Surface Water Treatment Rule

Log Inactivation: Logarithm of ( $N_0/N_T$ )

Log: Logarithm (common, base 10)  
LT1ESTWR: Long-Term 1 Enhanced Surface Water Treatment Rule  
LT2ESWTR: Long-Term 2 Enhanced Surface Water Treatment Rule  
MCL: Maximum Contaminant Level  
MCLG: Maximum Contaminant Level Goal  
M-DBP: Microbial and Disinfectants/Disinfection Byproducts  
mg/L: Milligrams per Liter  
MR: Monitoring/Reporting  
MRDL: Maximum Residual Disinfectant Level  
MRDLG: Maximum Residual Disinfectant Level Goal  
NIPDWR: National Interim Primary Drinking Water Regulation  
NSCEP: National Service for Environmental Publications  
NTIS: National Technical Information Service  
NTNCWS: Non-Transient Non-Community Water System  
PWS: Public Water System  
PWSS: Public Water Supply Supervision Program  
Reg. Neg.: Regulatory Negotiation  
SDWA: Safe Drinking Water Act, or the “Act,” as amended 1996  
SDWIS: Safe Drinking Water Information System  
Subpart H: PWS using surface water or ground water under the direct influence of surface water  
SUVA: Specific Ultraviolet Absorbance  
SWTR: Surface Water Treatment Rule  
TCR: Total Coliform Rule  
TNCWS: Transient Non-Community Water Systems  
TOC: Total Organic Carbon  
TTHM: Total Trihalomethanes (chloroform, bromdichloromethane, dibromochloromethane, and bromoform)

# 1. Introduction

## *Purpose of the Guide*

The purpose of this guide is to detail the regulatory requirements of the Stage 1 Disinfectants/Disinfection Byproducts Rule (Stage 1 DBPR). The Stage 1 DBPR, published in the Federal Register on December 16, 1998 (63 FR 69390; [www.epa.gov/OGWDW/ndbp/dbpfr.html](http://www.epa.gov/OGWDW/ndbp/dbpfr.html); 66 FR 3770; [www.epa.gov/safewater/ndbp/iesfr.html](http://www.epa.gov/safewater/ndbp/iesfr.html)), is the first part of a series of rules, the “Microbial-Disinfectants/Disinfection Byproducts Cluster” (M-DBP Cluster), to be published over the next several years that are intended to control microbial pathogens while minimizing the public health risks of disinfectants and disinfection byproducts (DBPs). The Stage 1 DBPR specifically addresses risks associated with disinfectants and DBPs. This rule was published concurrently with the Interim Enhanced Surface Water Treatment Rule (IESWTR), which addresses control of microbial pathogens.

## *Background*

The 1974 Safe Drinking Water Act (SDWA) called for EPA to regulate drinking water by creating the national interim primary drinking water regulations (NIPDWR). In 1979, the first interim standard addressing DBPs was set for total trihalomethanes (TTHMs), a group of four volatile organic chemicals which form when disinfectants react with natural organic matter in the water.

Although SDWA was amended slightly in 1977, 1979, and 1980, the most significant changes to the 1974 law occurred when SDWA was reauthorized in 1986. Disease-causing microbial contamination had not been sufficiently controlled under the original Act. To safeguard public health, the 1986 Amendments required EPA to set health goals, or maximum contaminant level goals (MCLGs) and maximum contaminant levels (MCLs) for 83 named contaminants. EPA was also required to establish regulations within certain time frames, require disinfection of all public water supplies, specify filtration requirements for nearly all water systems that draw their water from surface sources, and develop additional programs to protect ground water supplies.

In 1989, EPA issued two important National Primary Drinking Water Regulations (NPDWR): The Total Coliform Rule (TCR) and the Surface Water Treatment Rule (SWTR). The TCR and SWTR provide the foundation for the M-DBP Cluster and are summarized below.

The TCR covers all public water systems. Since coliforms are easily detected in water, they are used to indicate a water system’s vulnerability to pathogens in the water. In the TCR, EPA set a MCLG of zero for total coliforms. EPA also set a MCL for total coliforms. If more than 5.0 percent of the samples contain coliforms within a month, water system operators must report this violation to the state and the public. In addition, sanitary surveys are required every five or ten years (depending on the quality of the source water) for every system that collects fewer than five samples per month (typically systems that serve less than 4,100 people).

EPA issued the SWTR in response to Congress’ mandate requiring disinfection, and where necessary, filtration of systems that draw their water from surface sources before distribution. The SWTR applies to all systems that use surface water or ground water under the direct influence of surface water (GWUDI). The rule sets MCLGs for *Legionella*, *Giardia lamblia*, and viruses at zero since any exposure to these contaminants presents some level of health risk.

Specifically, the rule requires that a surface water system have sufficient treatment to reduce the source water concentration of *Giardia lamblia* and viruses by at least 99.9 percent (3 log) and 99.99 percent (4 log), respectively. A detectable disinfection residual must be maintained throughout the entire distribution system. For systems that filter, the adequacy of the filtration process is determined by measuring the turbidity of the treated water since high levels of turbidity often indicate that the filtration process is not working properly. The goal of the SWTR is to reduce risk to less than one infection per

year per 10,000 people. However, the SWTR does not account for systems with high pathogen concentrations that, when treated at the levels required under the rule, still may not meet this health goal, and the rule does not specifically control for the protozoan *Cryptosporidium*.

In 1990, EPA's Science Advisory Board, an independent panel of experts established by Congress, cited drinking water contamination as one of the most important environmental risks and indicated that disease-causing microbial contaminants (*i.e.*, bacteria, protozoa, and viruses) are probably the greatest remaining health-risk management challenge for drinking water suppliers. Data from the Centers for Disease Control (CDC) confirm this concern and indicate that between 1980 and 1994, 379 waterborne disease outbreaks were reported, with over 500,000 cases of disease. During this period, a number of agents were implicated as the cause, including protozoa, viruses, bacteria, and several chemicals. Most of the cases (but not the outbreaks) were associated with surface water, including a single outbreak of cryptosporidiosis in Milwaukee (over 400,000 cases).

In response to these findings, the SDWA was further amended in 1996 to improve public health protection by incorporating new data on the adverse health effects of contaminants, the occurrence of contaminants in public water systems, and the estimated reduction in health risks that would result from further regulation. The Act also increased scientific research requirements and emphasized cost-benefit analyses in the regulatory decision process.

Based on prevailing scientific data, the M-DBP Cluster is intended to control microbial pathogens while minimizing the public health risk from disinfectants and DBPs. Since multiple threats require multiple barriers, the IESWTR and Stage 1 DBPR expand on the foundation of the TCR, SWTR, and TTHM standards to target health risk outliers unaddressed by prior regulations.

The TTHM NPDWR of 1979 set a standard for TTHMs only for public water systems (PWSs) serving 10,000 or more people. The Stage 1 DBPR builds on the TTHM Rule by lowering the MCL and widening the range of affected systems to include all PWSs that add a disinfectant. Therefore, EPA believes that the promulgation of the Stage 1 DBPR will significantly decrease the risks posed by DBPs and disinfectants by covering many PWSs not currently regulated for TTHM or other DBPs.

Many water systems treat their water with a chemical disinfectant in order to inactivate pathogens that cause disease. The public health benefits of common disinfection practices are significant and well-recognized; however, disinfection poses risks of its own. While disinfectants are effective in controlling many harmful microorganisms, they react with organic and inorganic matter (disinfection byproduct precursors—DBPPs) in the water and form DBPs, some of which pose health risks at certain levels. Since the discovery of chlorination byproducts in drinking water in 1974, numerous toxicological studies have been conducted that show some DBPs to be carcinogenic and/or cause reproductive or developmental effects in laboratory animals. Additionally, exposure to high levels of disinfectants over long periods of time may cause health problems, including damage to blood and kidneys. While many of these studies have been conducted at high doses, the weight-of-evidence indicates that DBPs present a potential public health problem that must be addressed. One of the most complex questions facing water supply professionals is how to reduce risks from disinfectants and DBPs while providing increased protection against microbial contaminants. Much of the population is exposed to these risks; therefore, a substantial concern exists.

To address this concern, the Stage 1 DBP Rule updates and supersedes the 1979 TTHM standard by lowering the MCL for TTHMs and establishing maximum residual disinfection level (MRDL) limits for chlorine, chloramines, and chlorine dioxide and new MCLs for chlorite, bromate, and haloacetic acids (HAA5) for all community water systems and nontransient noncommunity water systems that add a chemical disinfectant for either primary or residual treatment. In addition, the Stage 1 DBP Rule requires conventional filtration systems to remove specified percentages of organic materials measured as total organic carbon (TOC) that may react with disinfectants to form DBPs.



By building on the foundation set forth by the original SDWA, the quality of drinking water has improved and public health protection has increased. The IESWTR and Stage 1 DBP Rules are part of a series of rules designed to expand on the foundation of prior rulemaking efforts. By encompassing previously unaddressed health risks from microbials and disinfection byproducts, the M-DBP Cluster continues to maximize drinking water quality and public health protection.

### ***Development of the Rule***

The new rules are a product of 6 years of collaboration among the water supply industry, environmental and public health groups, and local, state, and federal governments. EPA first launched a rule-making process in 1992 and convened a Regulatory Negotiation (RegNeg) Advisory Committee under the Federal Advisory Committee Act (FACA), representing a range of stakeholders affected by possible regulation. The 1996 SDWA Amendments required EPA to develop rules to balance the risks between microbial pathogens and disinfection byproducts.

In 1997, a similar FACA process was implemented with the Microbial-Disinfectants/Disinfection Byproducts (M-DBP) Advisory Committee. The M-DBP Committee convened to collect, share, and analyze new information available since 1994, review previous assumptions made during the RegNeg process, as well as build consensus on the regulatory implications of this new information. Negotiations resulted in the following three proposals:

- C A staged approach to regulation of DBPs (referred to as the Stage 1 and Stage 2 DBPRs) incorporating Maximum Contaminant Levels (MCLs), Maximum Residual Disinfectant Levels (MRDLs), and treatment technique requirements;
- C A companion Interim Enhanced Surface Water Treatment Rule (IESWTR) designed to improve control of microbial pathogens and prevent inadvertent reductions in microbial safety as a result of DBP control efforts; and,
- C An Information Collection Rule (ICR) to collect information necessary to reduce many key uncertainties prior to subsequent negotiations for the Stage 2 DBPR.

### ***Benefits of the Rule***

The Stage 1 DBPR is expected to reduce the risks associated with exposure to disinfectants and DBPs. The MCLs will reduce exposure to specific DBPs from the use of ozone (byproduct: bromate), chlorine dioxide (byproduct: chlorite), and chlorine (byproducts: TTHM and five Haloacetic Acids—(HAA5)). In addition, the implementation of a treatment technique (enhanced coagulation/ enhanced softening) will reduce overall exposure to the broad range of non-specified DBPs. In the Regulatory Impact Analysis for the Stage 1 DBPR, EPA estimated that the rule will result in a national annual average reduction in TTHM levels of 24 percent. As many as 140 million people will have increased protection from DBPs and their potential health risks, including bladder cancer and adverse developmental and reproductive health effects.

## **2. Applicability and Compliance Dates**

The 1979 Total Trihalomethane (TTHM) Rule requirements apply only to systems serving 10,000 or more people. The Stage 1 Disinfectants and Disinfection Byproducts Rule (DBPR) covers a larger number of PWSs, applying to *all* community water systems (CWSs) and nontransient noncommunity water systems (NTNCWSs) *which add a chemical disinfectant to the water in any part of the drinking water treatment process*. In addition, certain requirements apply to transient noncommunity water systems (TNCWSs) that use chlorine dioxide.

Subpart H systems (PWSs that use that use surface water or ground water under the direct influence of surface water—GWUDI—as a source) serving 10,000 or more people must comply with the requirements of the Stage 1 DBPR no later than January 2002. Subpart H systems that serve fewer than 10,000 people, and all affected ground water systems, must comply with the requirements no later than January 2004.

The timetable for the Stage 1 DBPR is presented in Table 1. The Stage 1 DBPR and the IESWTR were published simultaneously to address the inherent tradeoffs between protection from microbial contamination and the potential health effects from disinfectants and their byproducts. These rules are the first in a series of rules that will continue to address the public health concerns associated with microbial pathogens and chemical disinfectants.

**Table 1: Timetable for the Stage 1 DBPR Requirements**

Date	DBPR Requirement
December 16, 1998	Rule is published in Federal Register [63 FR 241 69390].
February 16, 1999	60-day legal challenge period ends.
February 16, 1999	Methods specified in 40 CFR 141.131 for analyzing disinfection byproducts, disinfection residuals, and DBP precursors are approved for use [40 CFR 141.131(a)].
January 1, 2001	Large Subpart H systems should begin monitoring to determine Step 1 TOC removal before the compliance date.
January 1, 2002	Large Subpart H CWSs and NTNCWSs must comply with the MCLs for TTHM, HAA5, bromate, and chlorite [40 CFR 141.64(b)(1)].
January 1, 2002	Large Subpart H CWSs and NTNCWSs must comply with the MRDLs for chlorine, chloramines, and chlorine dioxide [40 CFR 141.65(b)(1)].
January 1, 2002	Large Subpart H TNCWSs that use chlorine dioxide must comply with the MRDL for chlorine dioxide [40 CFR 141.65(b)(2)].
January 1, 2002	Requirements of Subpart L generally apply to large Subpart H CWSs and NTNCWs [40 CFR 141.130(b)(1)]. <ul style="list-style-type: none"> <li>• Monitoring requirements.</li> <li>• Reporting and recordkeeping requirements.</li> <li>• Compliance.</li> <li>• Treatment technique for control of DBP precursors.</li> </ul>
January 1, 2003	Small Subpart H systems should begin monitoring to determine Step 1 TOC removal before the compliance date.
December 31, 2003	Systems which received an extension from the state to install GAC or membranes must comply with the Stage 1 DBPR [40 CFR 141.64(b)(2)].
January 1, 2004	Small Subpart H and all ground water CWSs and NTNCWSs must comply with the MCLs for TTHM, HAA5, bromate, and chlorite [40 CFR 141.64(b)(1)].
January 1, 2004	Small Subpart H and all ground water CWSs and NTNCWSs must comply with the MRDLs for chlorine, chloramines, and chlorine dioxide [40 CFR 141.65(b)(1)].
January 1, 2004	Small Subpart H and all ground water TNCWSs that use chlorine dioxide must comply with the MRDL for chlorine dioxide [40 CFR 141.65 (b)(2)].

Date	DBPR Requirement
January 1, 2004	Requirements of Subpart L generally apply to small Subpart H and all ground water CWSs and NTNCWs [40 CFR 141.130(b)(1)]. <ul style="list-style-type: none"> <li>• Monitoring requirements.</li> <li>• Reporting and recordkeeping requirements.</li> <li>• Compliance.</li> <li>• Treatment technique for control of DBP precursors.</li> </ul>
June 30, 2005	Systems that made a clear and irrevocable financial commitment before the applicable compliance date to install technologies that limit TTHM and HAA5 to 0.040 mg/L and 0.030 mg/L, respectively, must have these technologies installed and operating. [40 CFR 141.135(a)(2)(iii)].

### 3. Summary of regulatory requirements

#### *MCLGs and MCLs for disinfection byproducts*

The Stage 1 DBPR sets maximum contaminant level goals (MCLGs) for some of the regulated DBPs, a more stringent maximum contaminant level (MCL) for TTHM, and new MCLs for HAA5, bromate, and chlorite. MCLGs are set at concentrations at which no known or anticipated adverse health effects are expected to occur. They are non-enforceable public health goals. MCLs are enforceable contaminant standards that are feasible to achieve and measure.

These MCLs, along with the MRDLs and treatment technique explained in the following paragraphs, will help reduce exposure to DBPs and disinfectants and their associated health risks.

Disinfection Byproduct	MCLG (mg/L)	MCL (mg/L)
<b>Total Trihalomethanes (TTHM)</b>		<b>0.080</b>
Chloroform		
Bromodichloromethane	zero	
Bromoform	zero	
Dibromochloromethane	0.06	
<b>Five Haloacetic Acids (HAA5)</b>		<b>0.060</b>
Monochloroacetic Acid		
Dichloroacetic Acid	zero	
Trichloroacetic Acid	0.3	
Monobromoacetic Acid		
Dibromoacetic Acid		
<b>Chlorite</b>	<b>0.8</b>	<b>1.0</b>
<b>Bromate</b>	<b>zero</b>	<b>0.010</b>

Compliance for TTHM and HAA5 MCLs is based on a running annual arithmetic average, computed quarterly, of quarterly averages of all samples. Compliance for the chlorite MCL is based on an arithmetic average of each three sample set taken in the distribution system. Compliance for the bromate MCL is based on a running annual arithmetic average, computed quarterly, of monthly samples.

***MRDLGs and MRDLs for disinfectant residuals***

To protect against potential health risks caused by high levels of residual disinfectants, the Stage 1 DBPR sets the following maximum residual disinfectant level goals (MRDLGs) and maximum residual disinfectant levels (MRDLs). Like MCLGs and MCLs, respectively, MRDLGs are non-enforceable, while MRDLs are enforceable.

<b>Disinfectant</b>	<b>MRDLG (mg/L)</b>	<b>MRDL (mg/L)</b>
Chlorine	4 (as Cl <sub>2</sub> )	4.0 (as Cl <sub>2</sub> )
Chloramines	4 (as Cl <sub>2</sub> )	4.0 (as Cl <sub>2</sub> )
Chlorine Dioxide	0.8	0.8

Systems using chlorine or chloramines may temporarily increase residual disinfectant levels to an appropriate level protect to public health in order to address specific microbiological contamination problems. These problems may be caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events. This option is NOT available for the use of chlorine dioxide.

Compliance for chlorine and chloramine MRDLs is based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples. Compliance for the chlorine dioxide MRDL is based on consecutive daily samples.

***Treatment technique for disinfection byproduct precursors***

The rule includes a treatment technique that applies to Subpart H systems using conventional filtration treatment. The treatment technique was established because disinfectants can react with disinfection byproduct precursors (DBPPs) to form both regulated and non-regulated DBPs. The treatment technique requirements in the rule are designed to provide public health protection by minimizing the production of all DBPs. Compliance with the treatment technique can be achieved by removing specified percentages of Total Organic Carbon (TOC) using enhanced coagulation or enhanced softening. Alternatively, systems may comply by showing they meet alternative compliance criteria. For example, systems which have a low level of TOC in their source or treated water (less than 2.0 mg/L) meet alternative compliance criteria.

***Best available technology (BAT)***

EPA has specified the Best Available Technology (BAT) for each MCL and MRDL established in the rule. These technologies and methods are believed to be effective in controlling chemicals in drinking water while remaining economically feasible for PWSs to employ. PWSs must use the specified BAT if they wish to qualify for variances. Otherwise, systems are not required to install BAT and may use any technology to achieve compliance.

Chemical		Best Available Technology
DBPs	TTHM and HAA5	Enhanced coagulation or granular activated carbon (GAC 10), with chlorine as the primary and residual disinfectant
	Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels
	Bromate	Control of ozone treatment process to reduce production of bromate
Disinfectants	Chlorine, chloramine, and chlorine dioxide	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels

### ***Public water system recordkeeping and reporting requirements***

For each disinfectant, contaminant, contaminant group, and treatment technique, EPA has developed routine compliance monitoring schemes to be protective of acute and chronic health concerns. The compliance monitoring requirements vary by the size and type of system, the treatment employed, and the disinfectant used. In many cases, systems may reduce monitoring frequencies after establishing a baseline.

Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which the samples were collected. Those required to sample less frequently than quarterly must report to the state within 10 days after the end of each monitoring period in which samples were collected. Systems that are required to conduct additional monitoring because of the disinfectant used (e.g., chlorine dioxide) are subject to additional reporting requirements if certain chemical levels are measured.

### ***Laboratory methods and certification***

The rule specifies analytical methods for measuring each relevant water quality parameter, disinfectant, contaminant, and DBPP. Consistent with current regulations, only certified laboratories can analyze samples for compliance with the MCLs. However, chlorite measured at the entrance to the distribution systems is a trigger, not an MCL compliance sample, and may be analyzed by a party approved by the state. For disinfectants and other specified parameters that EPA believes can be adequately measured by other than certified laboratories, and for which there is good reason to allow on-site analysis (e.g., for samples that may deteriorate before reaching a certified laboratory), EPA is requiring that analyses be conducted by a party approved by the state.

## **4. Additional information**

A series of guidance manuals have been developed to support the Interim Enhanced Surface Water Treatment Rule and the Stage 1 Disinfectants/Disinfection Byproducts Rule. The manuals will aid EPA, state agencies and affected public water systems in implementing the two interrelated rules, and will help to ensure that implementation among these groups is consistent. The manuals are available on EPA's website at [www.epa.gov/safewater/mdbp/implement.html](http://www.epa.gov/safewater/mdbp/implement.html). Additional information on ordering these manuals is provided below.

### **Guidance Manual for Enhanced Coagulation and Enhanced Precipitative Softening (EPA 815-R-99-012)**

**Objective:** To assist utilities in implementing, monitoring, and complying with the treatment technique requirements in the final Stage 1 Disinfectants and Disinfection Byproducts Rule and to provide guidance to state staff responsible for implementing the treatment requirements.

**Contents:** The manual provides detailed information on the total organic carbon (TOC) removal requirement; explains how to set an alternative TOC removal percentage under the Step 2 procedure; details monitoring, reporting, and compliance requirements; and discusses strategies that can be employed to mitigate the potential secondary effects on plant performance due to implementation of the treatment technique.

#### **Alternative Disinfectants and Oxidants Guidance Manual (EPA 815-R-99-014)**

**Objective:** To provide technical data and engineering information on disinfectants and oxidants that are not as commonly used as chlorine, so that systems can evaluate their options for developing disinfection schemes to control water quality problems such as zebra mussels and Asiatic clams, and oxidation to control water quality problems associated with iron and manganese.

**Contents:** The manual discusses six disinfectants and oxidants: ozone, chlorine dioxide, potassium permanganate, chloramines, ozone/hydrogen peroxide combinations, and ultraviolet light. A decision tree is provided to assist in evaluating which disinfectant(s) is most appropriate given certain site-specific conditions (e.g., water quality conditions, existing treatment and operator skill). The manual also contains a summary of existing alternative disinfectants used in the United States and cost estimates for the use of alternative disinfectants.

#### **M/DBP Simultaneous Compliance Manual (EPA 815-R-99-015)**

**Objective:** To assist public water systems on complying simultaneously with various drinking water regulations (e.g., Stage 1 Disinfectants and Disinfection Byproducts Rule, Interim Enhanced Surface Water Treatment Rule, Lead and Copper Rule and the Total Coliform Rule). The manual discusses operational problems systems may encounter when implementing these rules.

**Contents:** The manual provides detailed information on the requirements in the Stage 1 Disinfectants and Disinfection Byproducts Rule and the Interim Enhanced Surface Water Treatment Rule.

To order copies of these guidance manuals you may contact the Safe Drinking Water Hotline at (800) 426-4791 or you may download an electronic version from the OGWDW website at:

[www.epa.gov/safewater/mdbp/implement.html](http://www.epa.gov/safewater/mdbp/implement.html)

Guidance manuals are also available through the National Service Center for Environmental Publications (NSCEP) (free of charge). These documents may also be purchased through National Technical Information Service (NTIS)

NSCEP: 1.800.490.9198

NTIS: 1.800.553.6847

## **5. Detailed regulatory requirements**

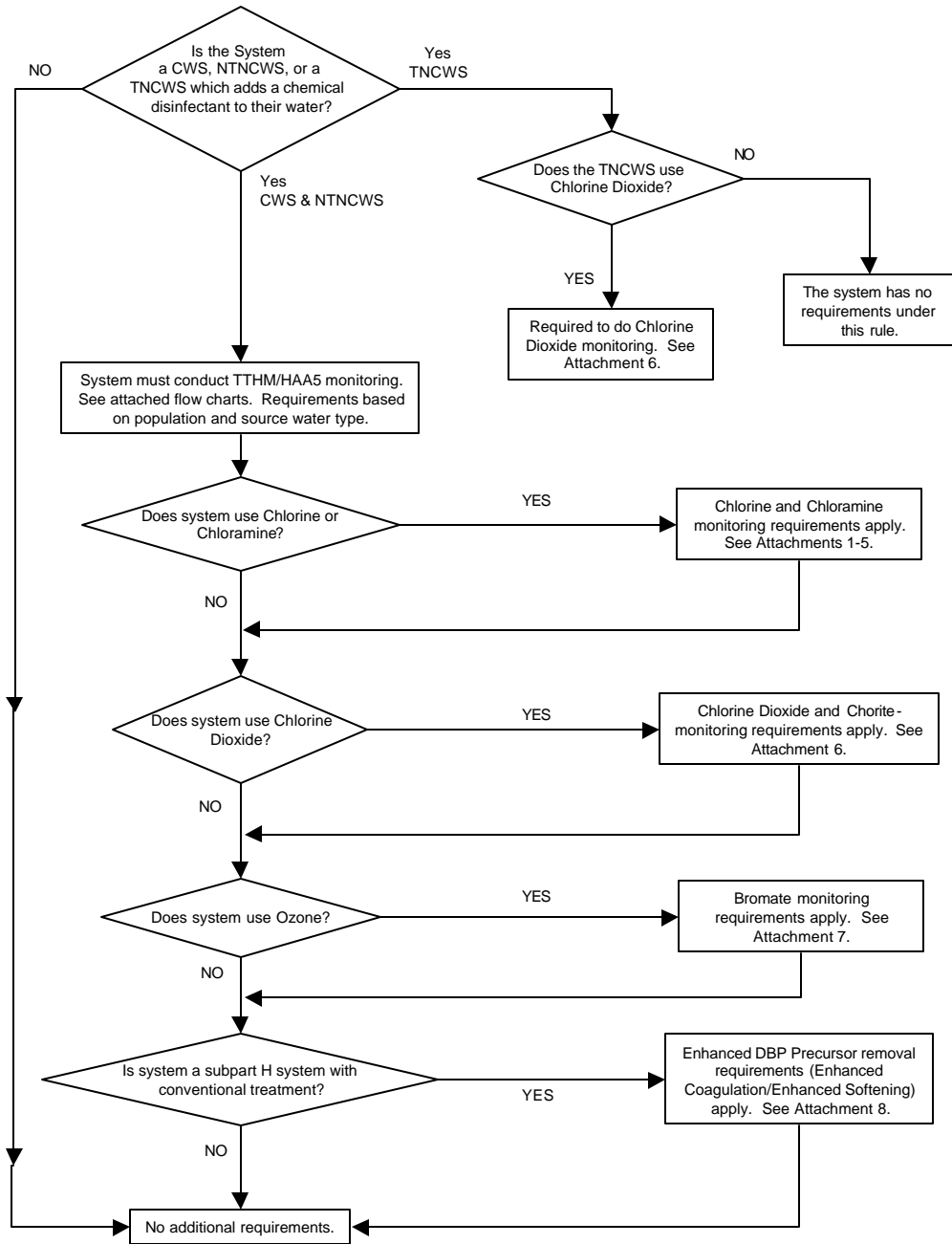
Detailed descriptions of the monitoring and reporting requirements for public water systems (PWSs) are presented in the following section. The Stage 1 DBPR applies to all community water systems and nontransient noncommunity water systems that add a chemical disinfectant or oxidant, as well as transient noncommunity water systems that treat their water with chlorine dioxide. However, systems will monitor at various frequencies depending on type (Subpart H and ground water) and size. Additionally, the type of chemical monitored will also vary depending on system type and the primary disinfectant used. For this reason, tables that outline the monitoring and reporting requirements are presented for each system size and type.

This section is organized so that specific categories of systems can turn right to where their specific requirements are. Keep in mind that some systems may fall into more than one category listed below. The categories of systems are:

- Subpart H systems serving at least 10,000 people (Attachment 1)
- Subpart H systems serving 500-9,999 people (Attachment 2)
- Subpart H systems serving fewer than 500 people (Attachment 3)
- Ground water systems serving at least 10,000 people (Attachment 4)
- Ground water systems serving fewer than 10,000 people (Attachment 5)
- Systems using chlorine dioxide (Attachment 6)
- Systems using ozone (Attachment 7)
- Subpart H systems using conventional filtration treatment (Attachment 8)

Systems should review all the attachments which apply to them to gain a full understanding of how the Stage 1 DBPR will affect them. For example, a surface water system serving 7,000 people using conventional filtration and chlorine dioxide as an oxidant should review Attachments 2, 6, and 8.

### Stage 1 DPBR General Requirements





*I operate a surface water system or ground water system under the direct influence of surface water that serves at least 10,000 people . . .*

***(Attachment 1) I operate a surface water system or ground water system under the direct influence of surface water that serves at least 10,000 people . . .***

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You must conduct the monitoring, compliance determinations, reporting, and recordkeeping specified in this section. In addition, you are required to conduct additional monitoring, compliance determinations, reporting and recordkeeping if you meet any of the following criteria:

- You use chlorine dioxide in treating your water. This includes any use of chlorine dioxide, not just chlorine dioxide used for meeting disinfection requirements. Additional requirements are found in Attachment 6.
- You use ozone in treating your water. This includes any use of ozone, not just ozone used for meeting disinfection requirements. Additional requirements are found in Attachment 7.
- You operate a treatment plant that uses conventional filtration treatment. Additional requirements are found in Attachment 8.

In addition, you must develop and implement a monitoring plan that specifies 1) location and schedules for collecting all required samples, 2) procedures for calculating compliance with MCLs, MRDLs, and treatment techniques, and 3) if receiving water as a consecutive system, or supplying water to a consecutive system, how the entire distribution system is represented. The monitoring plan must be submitted to the state.

***(Attachment 1) I operate a surface water system or ground water system under the direct influence of surface water that serves at least 10,000 people . . .***

***What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?***

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TTHM and HAA5	4 samples per plant per quarter	At least 25% of samples must be at locations representing maximum residence time. Remaining samples must represent average residence time and the entire distribution system (account for number of people served, different sources of water, different treatment methods).
Chlorine and Chloramines	Same time as total coliform samples are taken	Same locations as total coliform samples are taken.

**Notes:**

1. If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

***What REDUCED MONITORING may I conduct under the Stage 1 DBPR?***

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TTHM and HAA5	One sample per plant per quarter	In the distribution system at a location representing maximum residence time.	<ul style="list-style-type: none"> <li>• Source water annual average TOC before any treatment # 4.0 mg/L and</li> <li>• Annual average TTHM # 0.040 mg/L and</li> <li>• Annual average HAA5 # 0.030 mg/L</li> </ul>
Chlorine and Chloramines	No reduced monitoring	NA	NA

***(Attachment 1) I operate a surface water system or ground water system under the direct influence of surface water that serves at least 10,000 people . . .***

***How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs in the Stage 1 DBPR?***

<b>Chemical</b>	<b>Compliance is based on . . .</b>
TTHM and HAA5	<p><b>Running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MCL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If an annual average exceeds the MCL and the system is on reduced monitoring, it must revert to routine monitoring immediately.</li> </ul>
Chlorine and Chloramines	<p><b>Running annual arithmetic average, computed quarterly, of quarterly averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MRDL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If system switches between chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

***What do I have to REPORT to the State under the Stage 1 DBPR?***

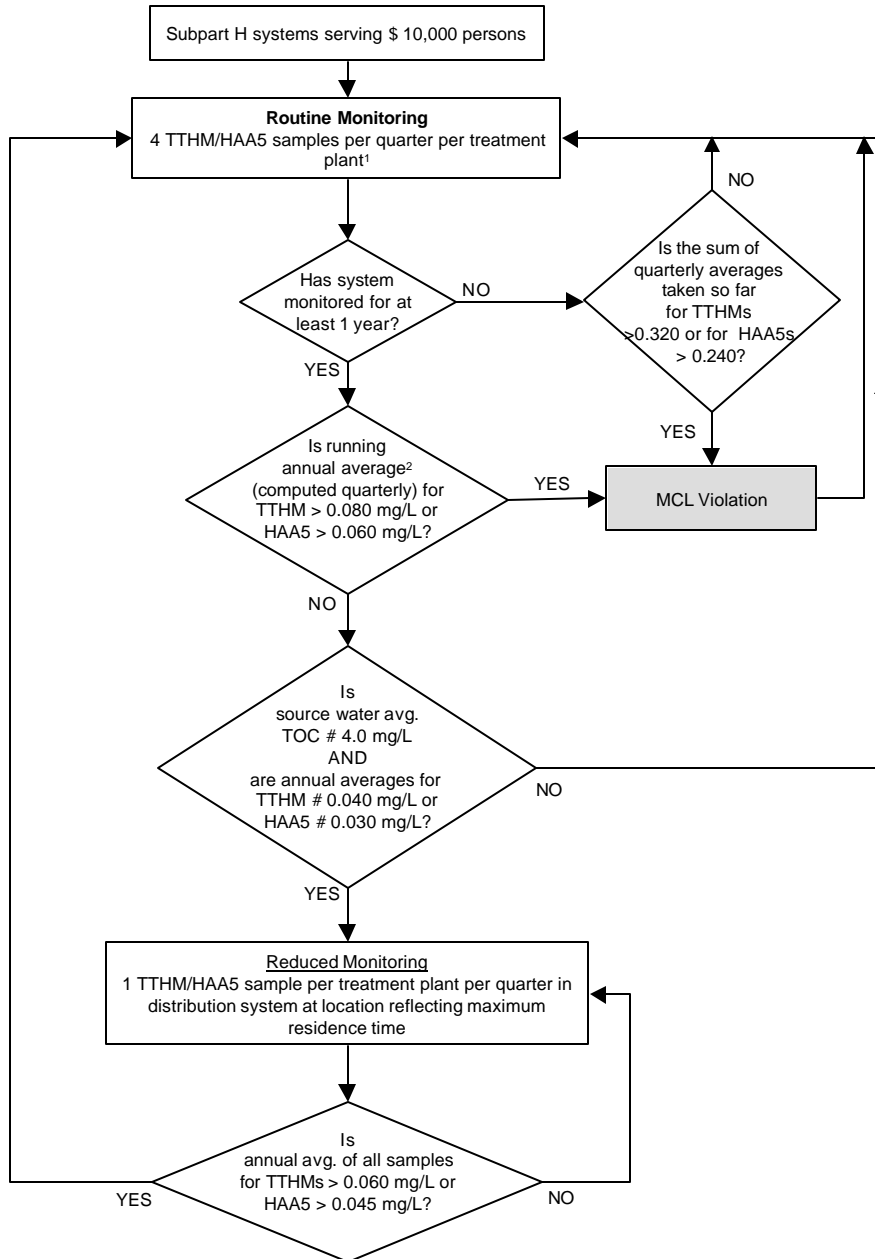
<b>Chemical</b>	<b>What must be reported</b>
TTHM and HAA5	<p>If conducting routine or reduced monitoring:</p> <ul style="list-style-type: none"> <li>• Number of samples taken during last quarter</li> <li>• Location, date, result of each sample taken during last quarter</li> <li>• Arithmetic average of all samples taken in last quarter</li> <li>• Annual arithmetic average of quarterly averages for last 4 quarters</li> <li>• Whether MCL was exceeded (Report violation of the MCL)</li> </ul>
Chlorine and Chloramines	<ul style="list-style-type: none"> <li>• Number of samples taken during each month of last quarter</li> <li>• Monthly arithmetic average of all samples taken in each month</li> <li>• Arithmetic average of all monthly averages for last 12 months</li> <li>• Whether MRDL was exceeded (Report violation of MRDL)</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.

*(Attachment 1) I operate a surface water system or ground water system under the direct influence of surface water that serves at least 10,000 people . . .*

**TTHMs & HAA5 Monitoring Requirements for Subpart H Systems Serving \$10,000 Persons**

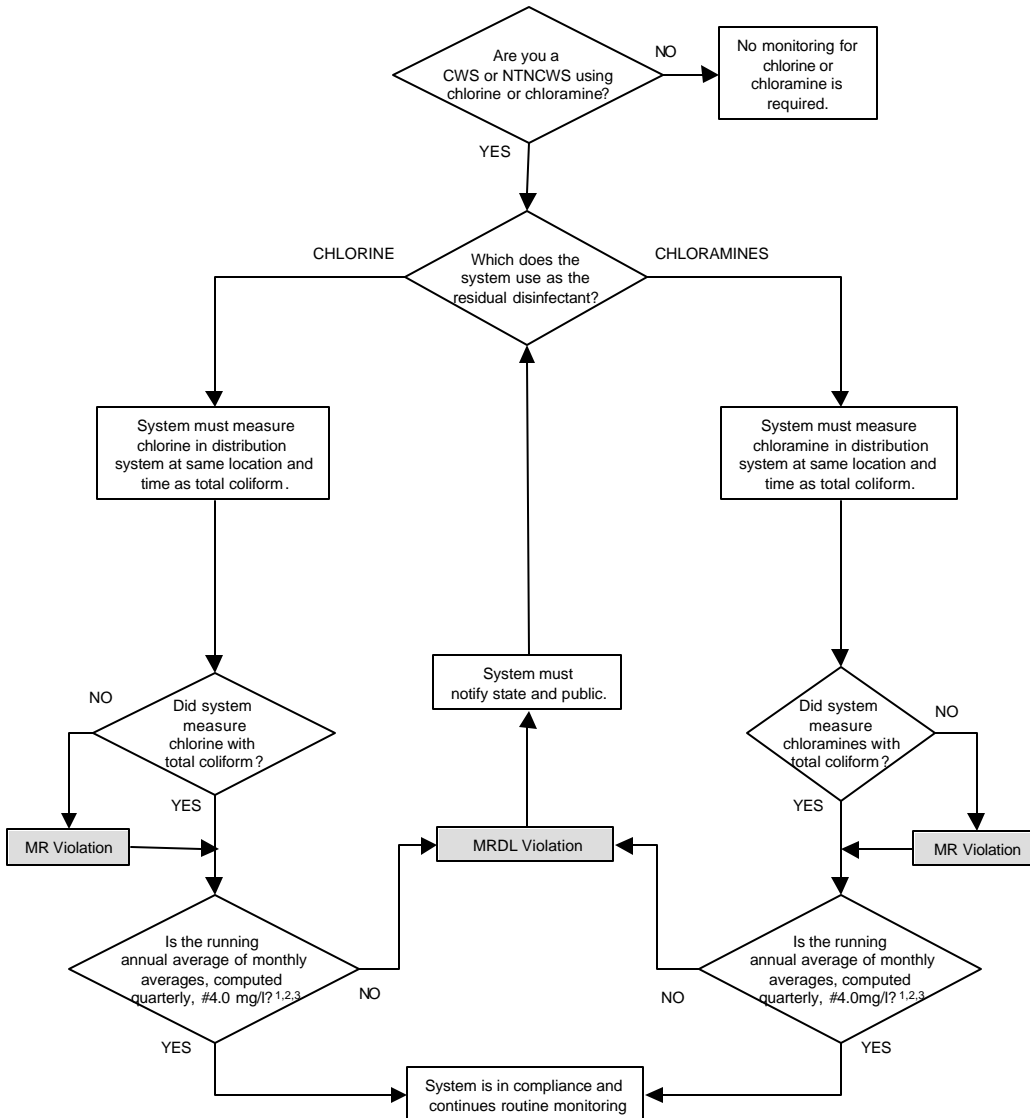


**NOTES**

<sup>1</sup> 3 samples reflect average residence time and 1 sample reflects maximum residence time (at least 25% of samples must reflect maximum residence time).

<sup>2</sup> If PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4 quarter period must be based on average of available data.

**Monitoring Requirements for Chlorine and Chloramine**



**NOTES**

1. Notwithstanding the MRDLs for chlorine and chloramines, systems may increase residual disinfectant levels of chlorine or chloramines in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
2. If system switches between use of chlorine and chloramines, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance.
3. Running annual average is first calculated after first 12 months of monitoring.

***I operate a surface water system or ground water system under the direct influence of surface water that serves 500 to 9,999 people . . .***

*(Attachment 2) I operate a surface water system or ground water system under the direct influence of surface water that serves 500 to 9,999 people . . .*

---

You must conduct the monitoring, compliance determinations, reporting , and recordkeeping specified in this section. In addition, you are required to conduct additional monitoring, compliance determinations, reporting and recordkeeping if you meet either of the following criteria:

- You use chlorine dioxide in treating your water. This includes any use of chlorine dioxide, not just chlorine dioxide used for meeting disinfection requirements. Additional requirements are found in Attachment 6.
- You use ozone in treating your water. This includes any use of ozone, not just ozone used for meeting disinfection requirements. Additional requirements are found in Attachment 7.
- You operate a treatment plant that uses conventional filtration treatment. Additional requirements are found in Attachment 8.

In addition, you must develop and implement a monitoring plan that specifies 1) location and schedules for collecting all required samples, 2) procedures for calculating compliance with MCLs, MRDLs, and treatment techniques, and 3) if receiving water as a consecutive system, or supplying water to a consecutive system, how the entire distribution system is represented. For systems serving more than 3,300 people the monitoring plan must be submitted to the state.



***(Attachment 2) I operate a surface water system or ground water system under the direct influence of surface water that serves 500 to 9,999 people . . .***

***What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?***

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TTHM and HAA5	One sample per plant per quarter	Location representing maximum residence time.
Chlorine and Chloramines	Same time as total coliform samples are taken	Same points as total coliform samples are taken.

**NOTES**

1. If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the entire distribution system (account for number of people served, different sources of water, different treatment methods)

***What REDUCED MONITORING may I conduct under the Stage 1 DBPR?***

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TTHM and HAA5	One sample per plant per year during month of warmest temperature	In the distribution system at a location representing maximum residence time.	<ul style="list-style-type: none"> <li>• Source water annual average TOC before any treatment # 4.0 mg/L and</li> <li>• Annual average TTHM # 0.040 mg/L and</li> <li>• Annual average HAA5 # 0.030 mg/L</li> </ul>
Chlorine and Chloramines	No reduced monitoring	NA	NA

***(Attachment 2) I operate a surface water system or ground water system under the direct influence of surface water that serves 500 to 9,999 people . . .***

***How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs in the Stage 1 DBPR?***

<b>Chemical</b>	<b>Compliance is based on . . .</b>
TTHM and HAA5	<p><b>Running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected (routine monitoring).</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MCL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If an annual average exceeds the MCL and the system is on reduced monitoring, it must revert to routine monitoring immediately.</li> </ul>
Chlorine and Chloramines	<p><b>Running annual arithmetic average, computed quarterly, of quarterly averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MRDL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If system switches between chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

***What do I have to REPORT to the State under the Stage 1 DBPR?***

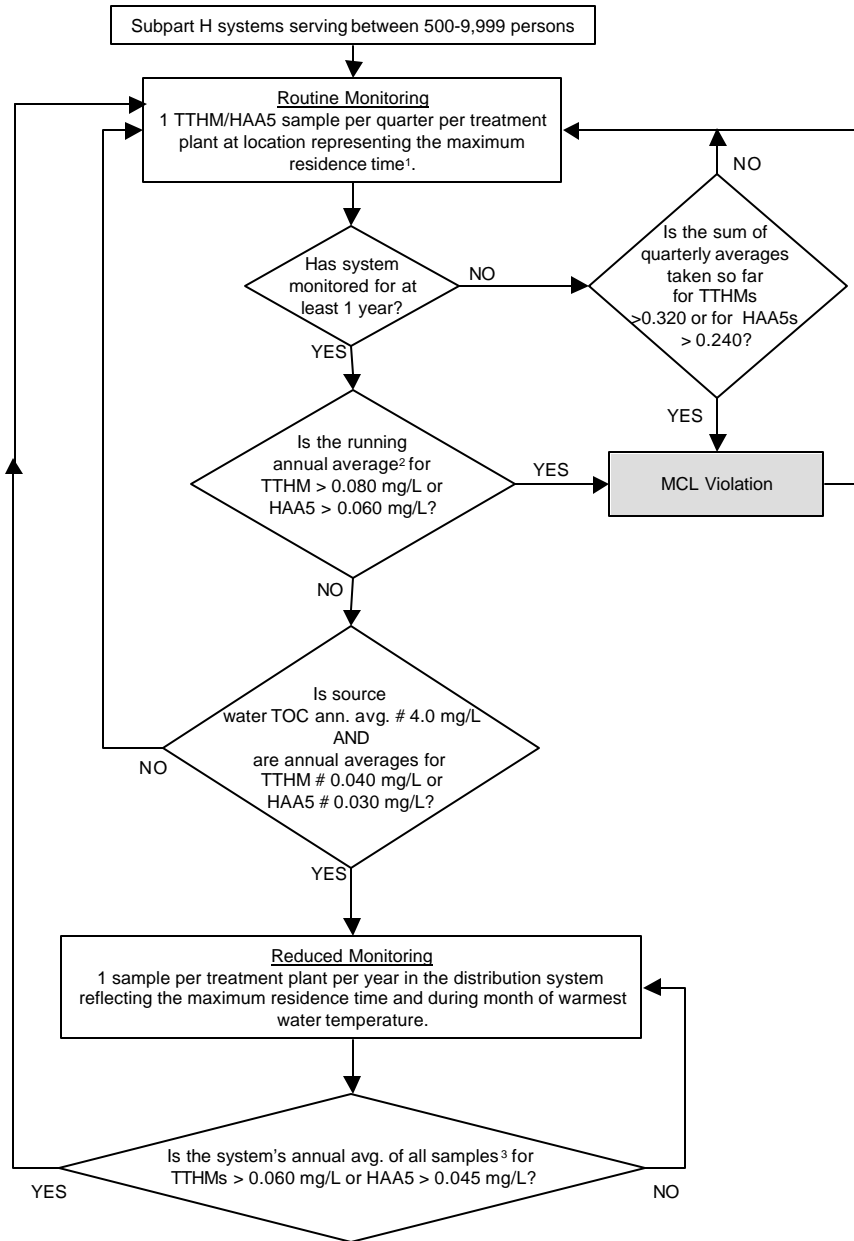
<b>Chemical</b>	<b>What must be reported</b>
TTHM and HAA5	<ul style="list-style-type: none"> <li>• Number of samples taken during last quarter (routine monitoring)</li> <li>• Location, date, result of each sample taken during last quarter</li> <li>• Arithmetic average of all samples taken in last quarter</li> <li>• Annual arithmetic average of quarterly averages for last 4 quarters</li> <li>• Whether MCL was exceeded</li> </ul> <p><i>If conducting reduced monitoring:</i></p> <ul style="list-style-type: none"> <li>• Number of samples taken during last year</li> <li>• Location, date, result of each sample taken during last year</li> <li>• Arithmetic average of all samples taken over last year</li> <li>• Whether MCL was exceeded</li> </ul>
Chlorine and Chloramines	<ul style="list-style-type: none"> <li>• Number of samples taken during each month of last quarter</li> <li>• Monthly arithmetic average of all samples taken in each month</li> <li>• Arithmetic average of all monthly averages for last 12 months</li> <li>• Whether MRDL was exceeded</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.
2. Systems required to sample less frequently than quarterly must report to the state within 10 days after the end of each monitoring period in which samples were collected. The state may choose to perform calculations and determine whether the MCL, MRDL, or treatment technique was met in lieu of having the system report that information.

*(Attachment 2) I operate a surface water system or ground water system under the direct influence of surface water that serves 500 to 9,999 people . . .*

**TTHM & HAA5 Monitoring for Subpart H Systems Serving Between 500-9,999 Persons**



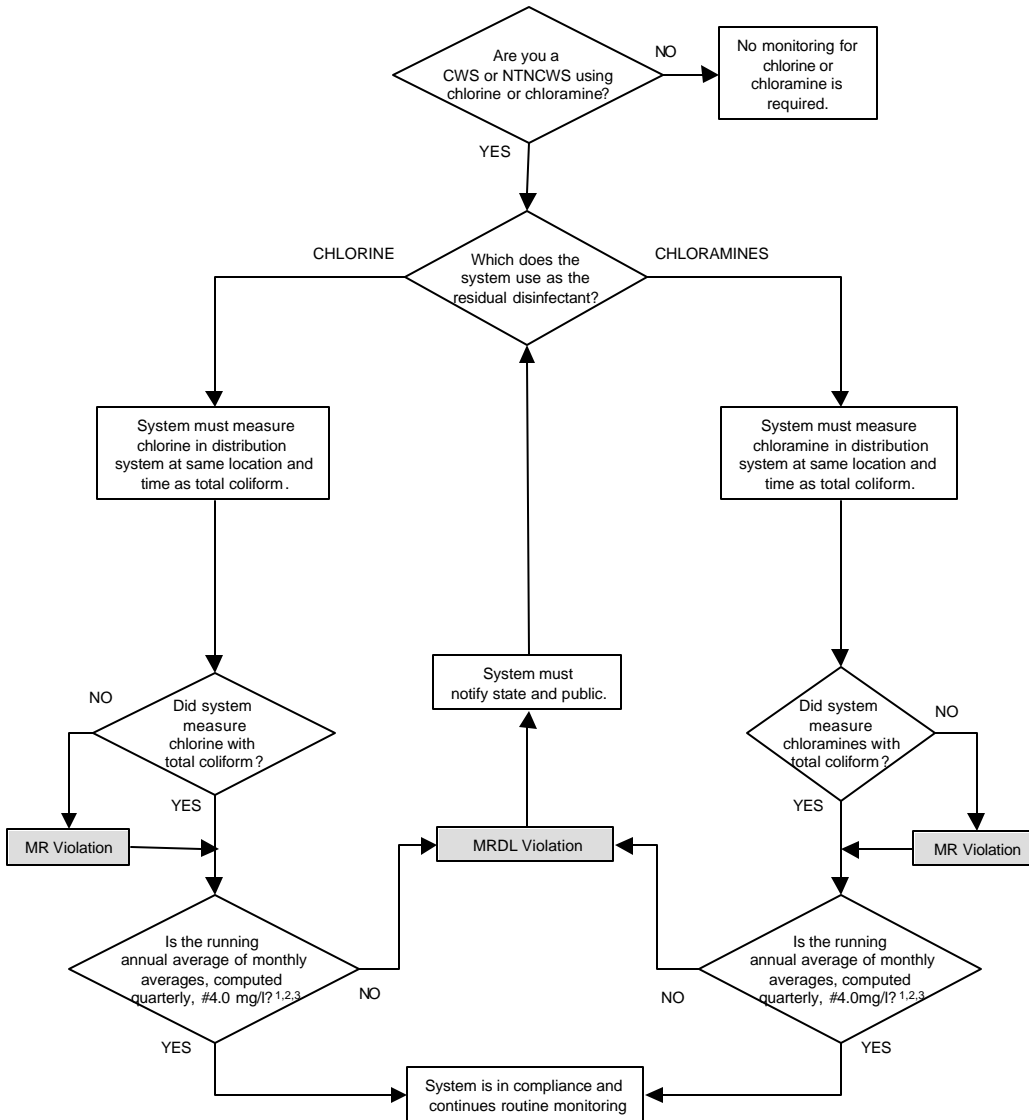
**NOTES**

<sup>1</sup> If more than 1 sample, at least 25% of samples must reflect max residence time.

<sup>2</sup> If PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4 quarter period must be based on average of available data.

<sup>3</sup> Average of all samples taken in the year or the result of the sample for systems which must monitor no more frequently than annually.

**Monitoring Requirements for Chlorine and Chloramine**



**NOTES**

1. Notwithstanding the MRDLs for chlorine and chloramines, systems may increase residual disinfectant levels of chlorine or chloramines in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
2. If system switches between use of chlorine and chloramines, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance.
3. Running annual average is first calculated after first 12 months of monitoring.

***I operate a surface water system or ground water system under the direct influence of surface water that serves fewer than 500 people . . .***

*(Attachment 3) I operate a surface water system or ground water system under the direct influence of surface water that serves fewer than 500 people . . .*

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You must conduct the monitoring, compliance determinations, reporting , and recordkeeping specified in this section. In addition, you are required to conduct additional monitoring, compliance determinations, reporting and recordkeeping if you meet either of the following criteria:

- You use chlorine dioxide in treating your water. This includes any use of chlorine dioxide, not just chlorine dioxide used for meeting disinfection requirements. Additional requirements are found in Attachment 6.
- You use ozone in treating your water. This includes any use of ozone, not just ozone used for meeting disinfection requirements. Additional requirements are found in Attachment 7.
- You operate a treatment plant that uses conventional filtration treatment. Additional requirements are found in Attachment 8.

In addition, you must develop and implement a monitoring plan that specifies 1) location and schedules for collecting all required samples, 2) procedures for calculating compliance with MCLs, MRDLs, and treatment techniques, and 3) if receiving water as a consecutive system, or supplying water to a consecutive system, how the entire distribution system is represented. The monitoring plan must be kept on hand and readily available to the state and public.

*(Attachment 3) I operate a surface water system or ground water system under the direct influence of surface water that serves fewer than 500 people . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TTHM and HAA5	<ul style="list-style-type: none"> <li>One sample per plant per year during month of warmest water temperature - if MCL is exceeded in yearly sample, system goes to increased monitoring of 1 sample per plant per quarter</li> </ul>	Location representing maximum residence time.
Chlorine and Chloramines	Same time as total coliform samples are taken	Same points as total coliform samples are taken.

**NOTES**

1. The system may revert to annual monitoring if the annual average is #40/30 based on at least four quarters of monitoring.
2. If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TTHM and HAA5	No reduced monitoring	NA	NA
Chlorine and Chloramines	No reduced monitoring	NA	NA

***(Attachment 3) I operate a surface water system or ground water system under the direct influence of surface water that serves fewer than 500 people . . .***

***How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs in the Stage 1 DBPR?***

<b>Chemical</b>	<b>Compliance is based on . . .</b>
TTHM and HAA5	<p><b>Average of samples taken in the year.</b></p> <ul style="list-style-type: none"> <li>• If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant. Compliance will be based on 4 quarters of monitoring.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If an annual average exceeds the MCL and the system is on reduced monitoring, it must go to increased monitoring immediately. If a system on increased monitoring exceeds the MCL, it is in violation.</li> </ul>
Chlorine and Chloramines	<p><b>Running annual arithmetic average, computed quarterly, of quarterly averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MRDL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If system switches between chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

***What do I have to REPORT to the State under the Stage 1 DBPR?***

<b>Chemical</b>	<b>What must be reported</b>
TTHM and HAA5	<ul style="list-style-type: none"> <li>• Number of samples taken during last year (or in last quarter if on increased monitoring)</li> <li>• Location, date, result of each sample taken during last year</li> <li>• Arithmetic average of all samples taken over last year</li> <li>• Whether MCL was exceeded</li> </ul>
Chlorine and Chloramines	<ul style="list-style-type: none"> <li>• Number of samples taken during each month of last quarter</li> <li>• Monthly arithmetic average of all samples taken in each month</li> <li>• Arithmetic average of all monthly averages for last 12 months</li> <li>• Whether MRDL was exceeded</li> </ul>

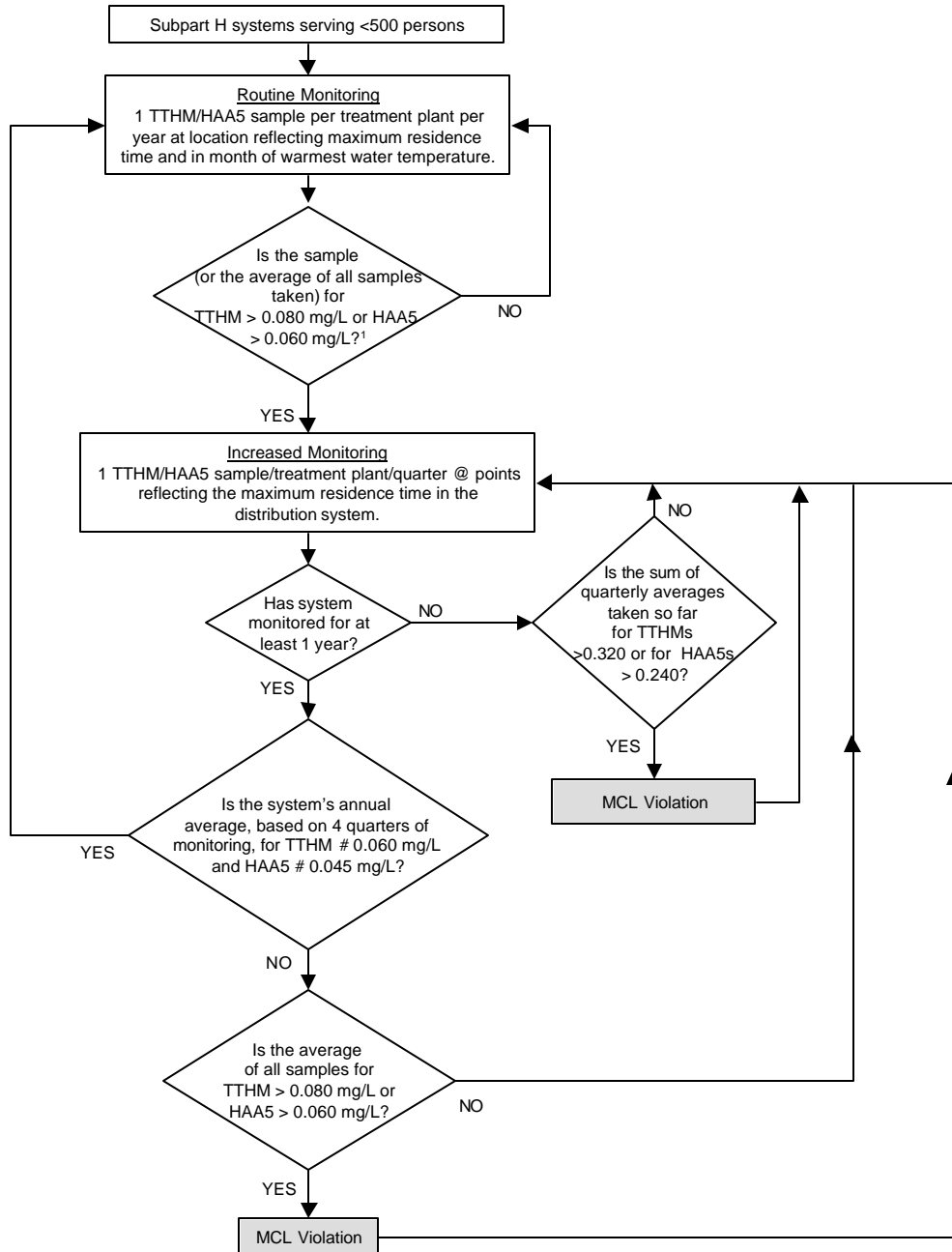
**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.
2. Systems required to sample less frequently than quarterly must report to the state within 10 days after the end of each monitoring period in which samples were collected. The state may choose to perform calculations and determine whether the MCL, MRDL, or treatment technique was met in lieu of having the system report that information.



*(Attachment 3) I operate a surface water system or ground water system under the direct influence of surface water that serves fewer than 500 people . . .*

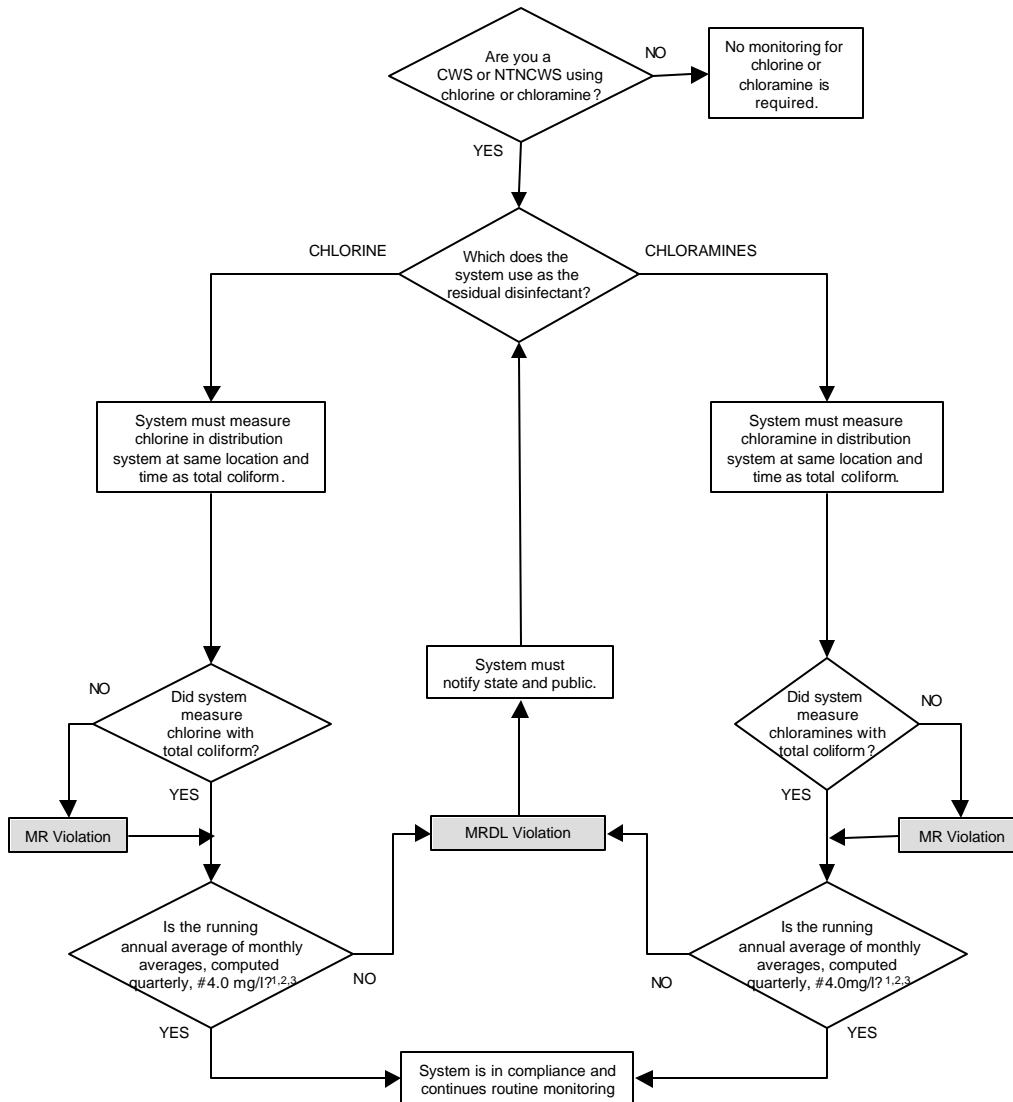
**TTHM & HAA5 Monitoring for Subpart H Systems Serving <500 Persons**



**NOTES**

1) If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

**Monitoring Requirements for Chlorine and Chloramine**



**NOTES**

1. Notwithstanding the MRDLs for chlorine and chloramines, systems may increase residual disinfectant levels of chlorine or chloramines in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
2. If system switches between use of chlorine and chloramines, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance.
3. Running annual average is first calculated after first 12 months of monitoring.

***I operate a ground water system not under the direct influence of surface water that serves at least 10,000 people . . .***

***(Attachment 4) I operate a ground water system not under the direct influence of surface water that serves at least 10,000 people . . .***

---

You must conduct the monitoring, compliance determinations, reporting , and recordkeeping specified in this section. In addition, you are required to conduct additional monitoring, compliance determinations, reporting and recordkeeping if you meet either of the following criteria:

- You use chlorine dioxide in treating your water. This includes any use of chlorine dioxide, not just chlorine dioxide used for meeting disinfection requirements. Additional requirements are found in Attachment 6.
- You use ozone in treating your water. This includes any use of ozone, not just ozone used for meeting disinfection requirements. Additional requirements are found in Attachment 7.

In addition, you must develop and implement a monitoring plan that specifies 1) location and schedules for collecting all required samples, 2) procedures for calculating compliance with MCLs and MRDLs, and 3) if receiving water as a consecutive system, or supplying water to a consecutive system, how the entire distribution system is represented. The monitoring plan must be kept for review by the state and public.

*(Attachment 4) I operate a ground water system not under the direct influence of surface water that serves at least 10,000 people . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TTHM and HAA5	One sample per plant per quarter	Location representing maximum residence time.
Chlorine and Chloramines	Same time as total coliform samples are taken	Same points as total coliform samples are taken.

**NOTES:**

1. Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with state approval.
2. If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TTHM and HAA5	One sample per plant per year during month of warmest water temperature	Location representative of maximum residence time	<ul style="list-style-type: none"> <li>• Annual average TTHM # 0.040 mg/L and</li> <li>• Annual average HAA5 # 0.030 mg/L</li> </ul>
Chlorine and Chloramines	No reduced monitoring	NA	NA

*(Attachment 4) I operate a ground water system not under the direct influence of surface water that serves at least 10,000 people . . .*

**How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs of the Stage 1 DBPR?**

Chemical	Compliance is based on . . .
TTHM and HAA5	<p><b>Running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MCL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If an annual average exceeds the MCL and the system is on reduced monitoring, it must revert to routine monitoring immediately.</li> </ul>
Chlorine and Chloramines	<p><b>Running annual arithmetic average, computed quarterly, of quarterly averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MRDL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If system switches between chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

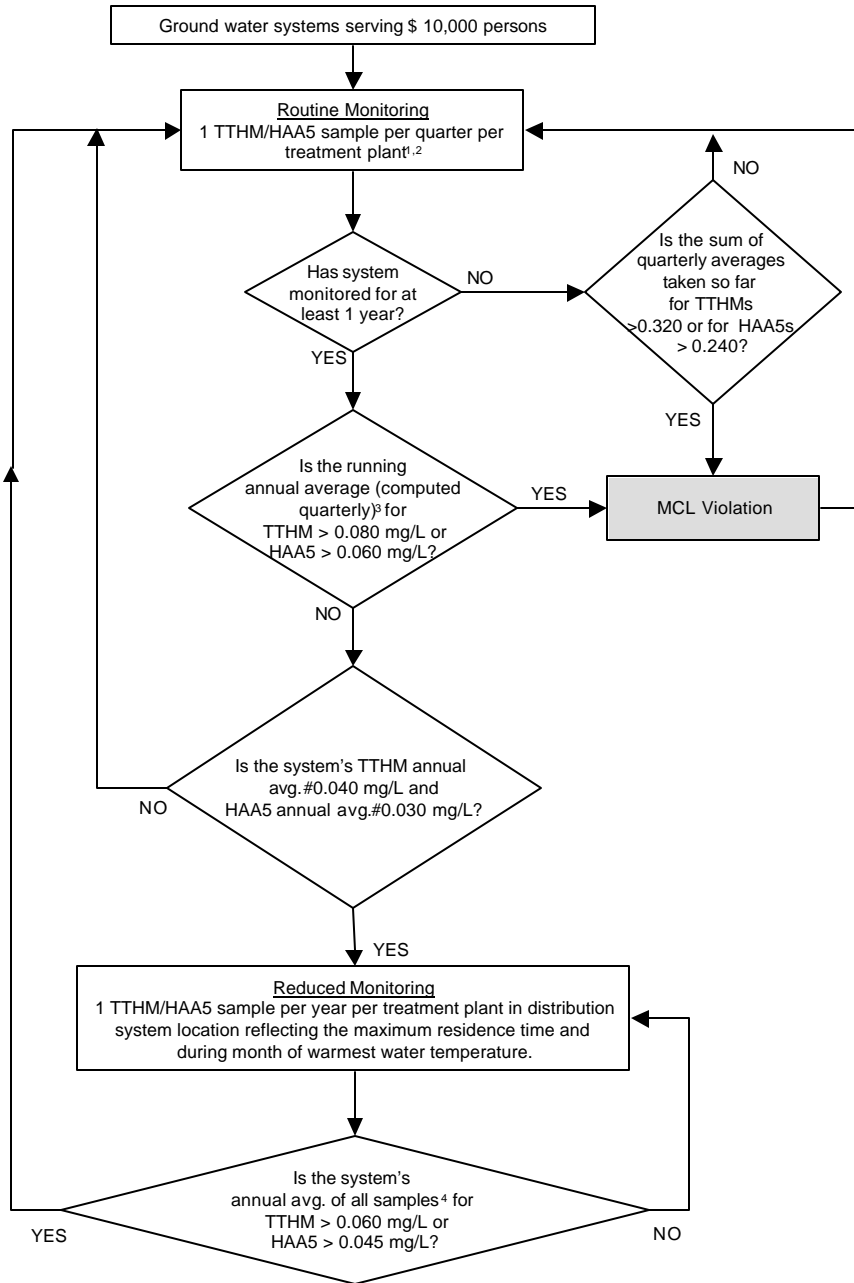
**What do I have to REPORT to the State under the Stage 1 DBPR?**

Chemical	What must be reported
TTHM and HAA5	<ul style="list-style-type: none"> <li>• Number of samples taken during last quarter</li> <li>• Location, date, result of each sample taken during last quarter</li> <li>• Arithmetic average of all samples taken during last quarter</li> <li>• Annual arithmetic average of quarterly arithmetic average for last 4 quarters</li> <li>• Whether MCL was exceeded</li> </ul> <p><i>If conducting reduced monitoring:</i></p> <ul style="list-style-type: none"> <li>• Number of samples taken during last year</li> <li>• Location, date, result of each sample taken during last year</li> <li>• Arithmetic average of all samples taken over last year</li> <li>• Whether MCL was exceeded</li> </ul>
Chlorine and Chloramines	<ul style="list-style-type: none"> <li>• Number of samples taken during each month of last quarter</li> <li>• Monthly arithmetic average of all samples taken in each month</li> <li>• Arithmetic average of all monthly averages for last 12 months</li> <li>• Whether MRDL was exceeded</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.
2. Systems required to sample less frequently than quarterly must report to the state within 10 days after the end of each monitoring period in which samples were collected. The state may choose to perform calculations and determine whether the MCL, MRDL, or treatment technique was met in lieu of having the system report that information.

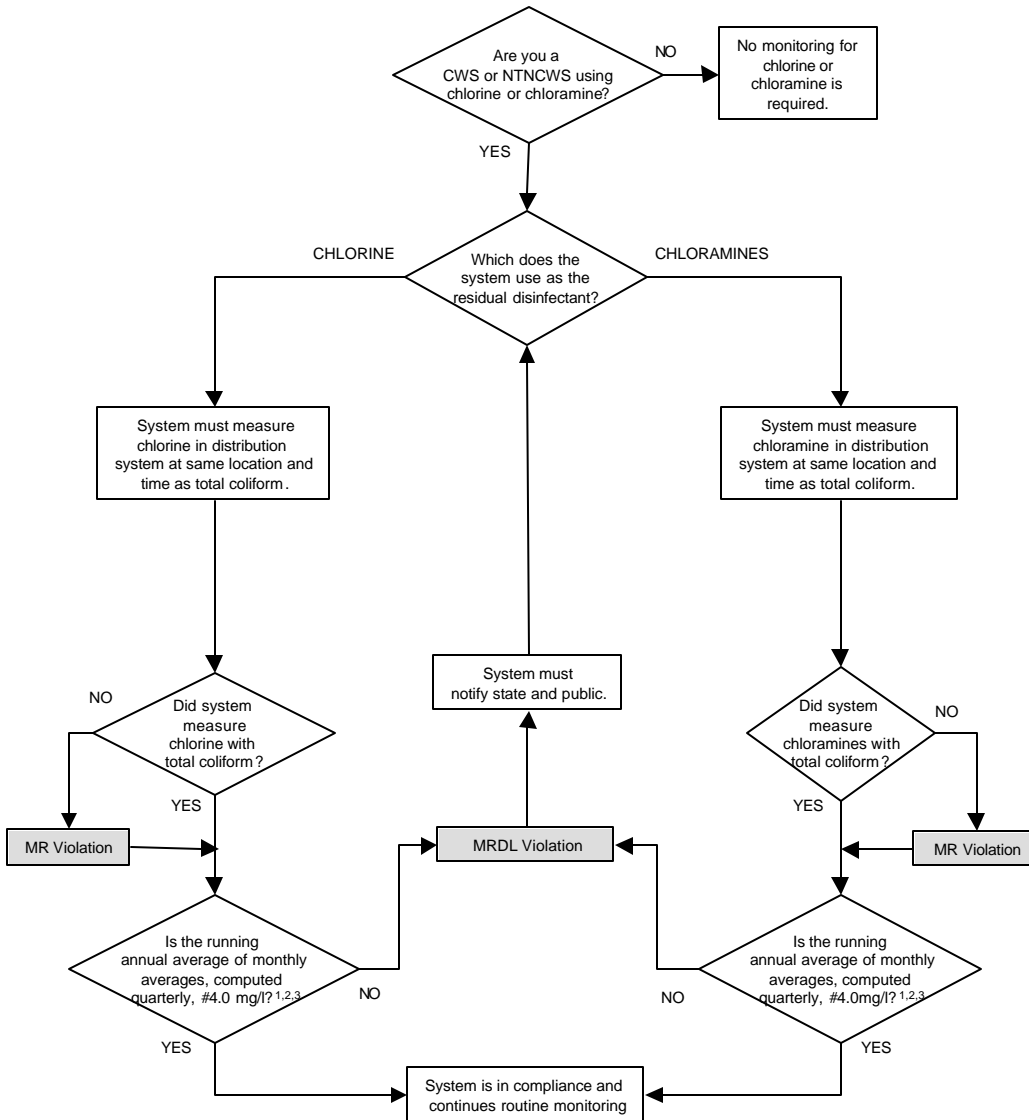
**TTHM & HAA5 Monitoring for Ground Water Systems Serving \$ 10,000 Persons**



**NOTES**

- 1) If more than 1 sample is taken, 25% must reflect maximum residence time.
- 2) Multiple wells drawing water from a single aquifer may be considered one treatment plant.
- 3) If PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4 quarter period must be based on average of available data.
- 4) Average of all samples taken in the year or the result of the sample for systems which must monitor no more frequently than annually.

**Monitoring Requirements for Chlorine and Chloramine**



**NOTES**

1. Notwithstanding the MRDLs for chlorine and chloramines, systems may increase residual disinfectant levels of chlorine or chloramines in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
2. If system switches between use of chlorine and chloramines, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance.
3. Running annual average is first calculated after first 12 months of monitoring.



***I operate a ground water system not under the direct influence of surface water that serves fewer than 10,000 people . . .***

***(Attachment 5) I operate a ground water system not under the direct influence of surface water that serves fewer than 10,000 people . . .***

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You must conduct the monitoring, compliance determinations, reporting , and recordkeeping specified in this section. In addition, you are required to conduct additional monitoring, compliance determinations, reporting and recordkeeping if you meet either of the following criteria:

- You use chlorine dioxide in treating your water. This includes any use of chlorine dioxide, not just chlorine dioxide used for meeting disinfection requirements. Additional requirements are found in Attachment 6.
- You use ozone in treating your water. This includes any use of ozone, not just ozone used for meeting disinfection requirements. Additional requirements are found in Attachment 7.

In addition, you must develop and implement a monitoring plan that specifies 1) location and schedules for collecting all required samples, 2) procedures for calculating compliance with MCLs, MRDLs, and treatment techniques, and 3) if receiving water as a consecutive system, or supplying water to a consecutive system, how the entire distribution system is represented. The monitoring plan must be made available for review by the state and public.

*(Attachment 5) I operate a ground water system not under the direct influence of surface water that serves fewer than 10,000 people . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TTHM and HAA5	One sample per plant per year during month of warmest water temperature	Location representing maximum residence time.
Chlorine and Chloramines	Same time as total coliform samples are taken	Same points as total coliform samples are taken.

**NOTES:**

- Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with state approval.
- If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TTHM and HAA5	One sample per plant per 3-year cycle during month of warmest water temperature	Location representative of maximum residence time.	<ul style="list-style-type: none"> <li>Annual average TTHM # 0.040 mg/L &amp; annual average HAA5 # 0.030 mg/L for 2 consecutive years; OR</li> <li>Annual average TTHM # 0.020 mg/L &amp; annual average HAA5 # 0.015 mg/L for 1 year</li> </ul>
Chlorine and Chloramines	No reduced monitoring	NA	NA

*(Attachment 5) I operate a ground water system not under the direct influence of surface water that serves fewer than 10,000 people . . .*

**How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs of the Stage 1 DBPR?**

Chemical	Compliance is based on . . .
TTHM and HAA5	<p><b>Average of samples taken in the year.</b></p> <ul style="list-style-type: none"> <li>• If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If an annual average exceeds the MCL and the system is on reduced monitoring, it must go to increased monitoring immediately. If a system on increased monitoring exceeds the MCL, it is in violation.</li> </ul>
Chlorine and Chloramines	<p><b>Running annual arithmetic average, computed quarterly, of quarterly averages of all samples collected.</b></p> <ul style="list-style-type: none"> <li>• If annual arithmetic average of quarterly averages covering any consecutive 4-quarter period exceeds the MRDL, then the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> <li>• If system switches between chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

**What do I have to REPORT to the State under the Stage 1 DBPR?**

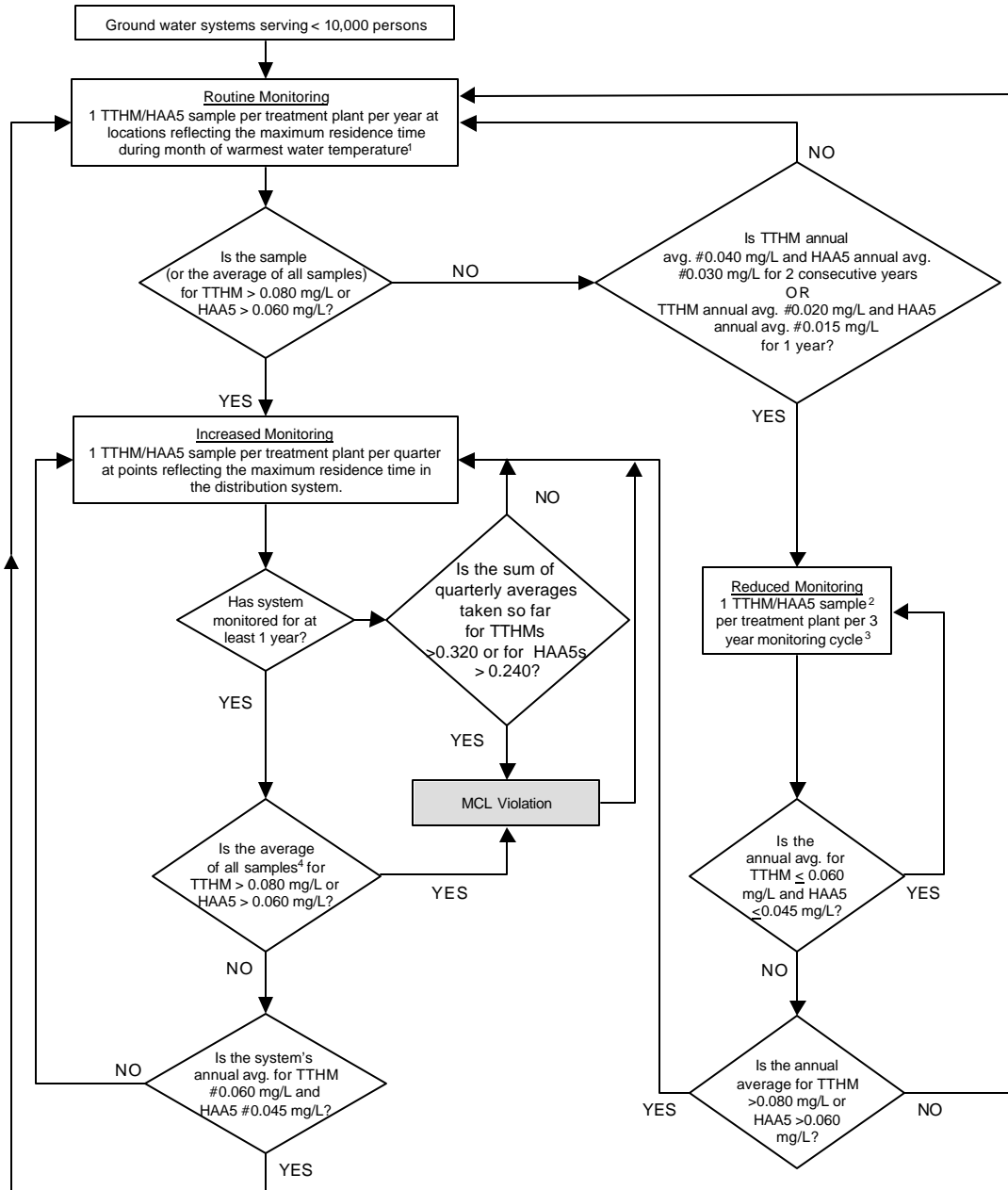
Chemical	What must be reported
TTHM and HAA5	<ul style="list-style-type: none"> <li>• Number of samples taken during last year</li> <li>• Location, date, result of each sample taken during last year</li> <li>• Arithmetic average of all samples taken over last year</li> <li>• Whether MCL was exceeded</li> </ul> <p><i>If conducting reduced monitoring:</i></p> <ul style="list-style-type: none"> <li>• Location, date, result of last sample taken</li> <li>• Whether MCL was exceeded</li> </ul>
Chlorine and Chloramines	<ul style="list-style-type: none"> <li>• Number of samples taken during each month of last quarter</li> <li>• Monthly arithmetic average of all samples taken in each month</li> <li>• Arithmetic average of all monthly averages for last 12 months</li> <li>• Whether MRDL was exceeded</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.
2. Systems required to sample less frequently than quarterly must report to the state within 10 days after the end of each monitoring period in which samples were collected. The state may choose to perform calculations and determine whether the MCL, MRDL, or treatment technique was met in lieu of having the system report that information.

*(Attachment 5) I operate a ground water system not under the direct influence of surface water that serves fewer than 10,000 people . . .*

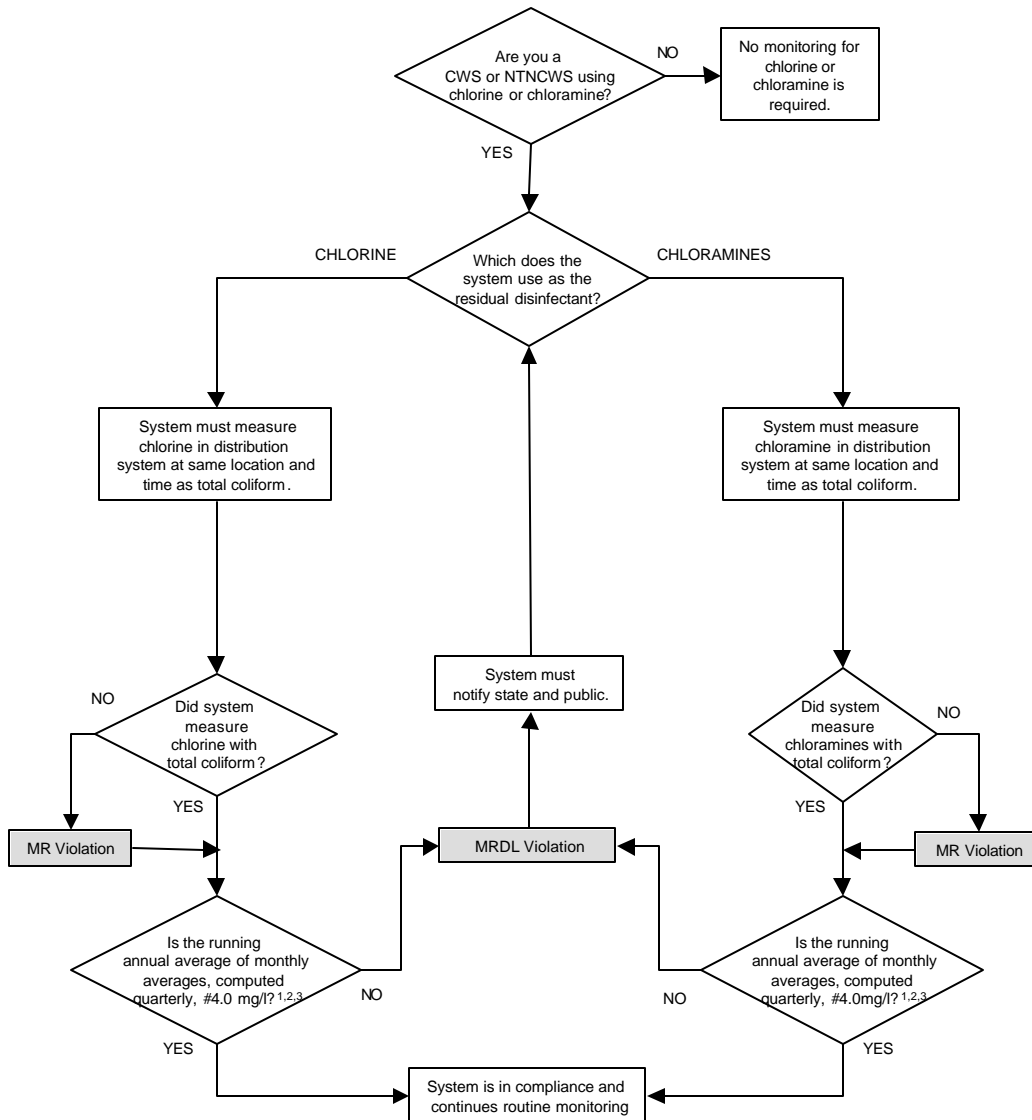
**TTHM & HAA5 Monitoring for Ground Water Systems Serving < 10,000 Persons**



**NOTES**

- 1) If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.
- 2) Samples must be taken during month of warmest water temperature at location representing the maximum residence time.
- 3) 3 year cycle begins on January 1 following the quarter in which system qualifies for reduced monitoring.
- 4) If PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4 quarter period must be based on average of available data.

**Monitoring Requirements for Chlorine and Chloramine**



**NOTES**

1. Notwithstanding the MRDLs for chlorine and chloramines, systems may increase residual disinfectant levels of chlorine or chloramines in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems.
2. If system switches between use of chlorine and chloramines, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance.
3. Running annual average is first calculated after first 12 months of monitoring.

*I operate a treatment plant that uses chlorine dioxide. . .*

*(Attachment 6) I operate a treatment plant that uses chlorine dioxide . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
Chlorite	Daily	Entrance to the distribution system.
	One 3-sample set per month	Near first customer, location representative of average residence time, location representative of maximum residence time in distribution system.
	Additional: On any day following any daily sample that exceeds 1.0 mg/L, system must take 3 samples	Near first customer, location representative of average residence time, location representative of maximum residence time in distribution system. The system may use results to meet monthly 3-sample set monitoring requirement if the monthly 3-sample set has not yet been taken.
Chlorine Dioxide	Daily	Entrance to the distribution system.
	Additional: For any daily sample that exceeds the MRDL, system must take 3 samples	<ul style="list-style-type: none"> <li>• For chlorine dioxide, chloramines, or chlorine used to maintain disinfectant residual and <b>NO</b> booster chlorination: all samples as close as possible to first customer at intervals of at least 6 hours</li> <li>• If chlorine is used to maintain disinfectant residual <b>AND</b> booster chlorination: as close as possible to first customer, location representative of average residence time, as close as possible to end of distribution system</li> </ul>

**NOTES:**

1. Not required for transient noncommunity water systems

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
Chlorite (daily)	No reduced monitoring	NA	NA
Chlorite (monthly)	One 3-sample set per quarter	Near first customer, location representative of average residence time, location representative of maximum residence time in distribution system.	<ul style="list-style-type: none"> <li>• No daily sample has exceeded the MCL</li> <li>• No additional monitoring has been required</li> <li>• No quarterly sample exceeds the MCL</li> </ul>
Chlorine Dioxide	No reduced monitoring	NA	NA

**NOTES:**

1. Not required for transient noncommunity water systems



*(Attachment 6) I operate a treatment plant that uses chlorine dioxide . . .*

**How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the MCLs and MRDLs of the Stage 1 DBPR?**

<b>Chemical</b>	<b>Compliance is based on . . .</b>
Chlorite	<p><b>Average of 3-sample sets.</b></p> <ul style="list-style-type: none"> <li>• If arithmetic average of any 3-sample set in the month exceeds the MCL, the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> </ul>
Chlorine Dioxide— Acute Violation	<p><b>Consecutive daily samples collected.</b></p> <ul style="list-style-type: none"> <li>• If any daily sample taken at entrance to distribution system exceeds 0.8 mg/L, and on the following day 1 or more of the 3 samples taken in the distribution system exceeds 0.8 mg/L, the system is in acute violation.</li> <li>• The system must take immediate corrective action to lower the level of chlorine dioxide below 0.8 mg/L, notify the public and report to the state.</li> <li>• Failure to take samples in the distribution system following an exceedance of the MRDL at the entrance to the distribution system is also an acute violation. System must notify public of acute violation.</li> </ul>
Chlorine Dioxide— Nonacute Violation	<p><b>Consecutive daily samples collected.</b></p> <ul style="list-style-type: none"> <li>• If any two consecutive daily samples taken at entrance to distribution system exceed 0.8 mg/L, and all distribution system samples are below 0.8 mg/L, the system is in nonacute violation.</li> <li>• The system must take immediate corrective action to lower the level of chlorine dioxide below 0.8 mg/L, notify the public and report to the state.</li> <li>• Failure to take samples at the distribution system entrance following an exceedance of the MRDL is also a violation. System must notify public of nonacute violation.</li> </ul>

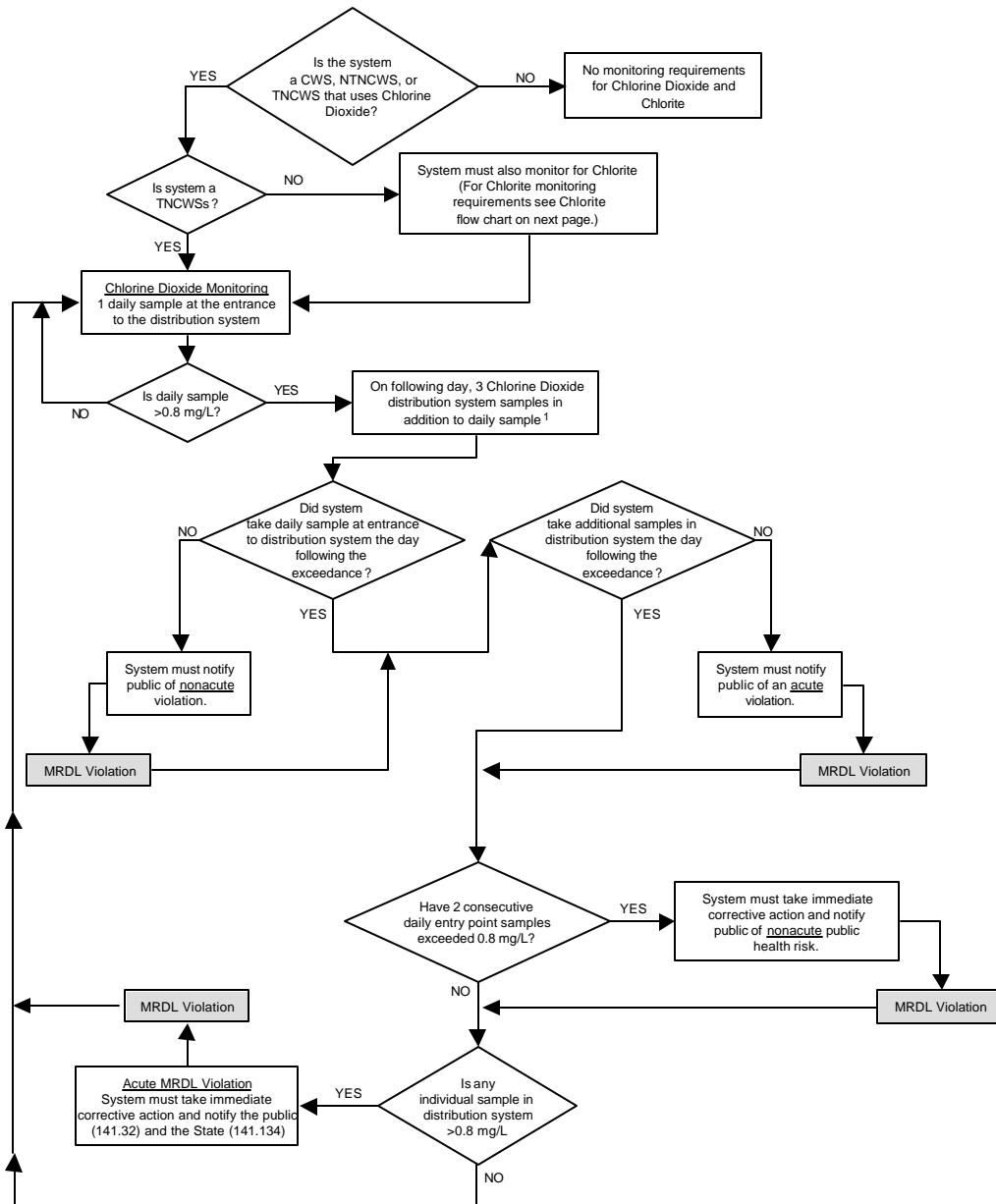
**What do I have to REPORT to the State under the Stage 1 DBPR?**

<b>Chemical</b>	<b>What must be reported</b>
Chlorite	<ul style="list-style-type: none"> <li>• Number of samples taken each month for last 3 months</li> <li>• Location, date, result of each sample taken during last quarter</li> <li>• For each month in the reporting period, the arithmetic average of all samples taken in the month</li> <li>• Whether MCL was exceed based on 3-sample set average and in which month it was exceeded.</li> </ul>
Chlorine Dioxide	<ul style="list-style-type: none"> <li>• Dates, results, locations of samples taken during last quarter</li> <li>• Whether MRDL was exceeded</li> <li>• Whether MRDL was exceeded in any two consecutive daily samples and whether resulting violation was acute or nonacute</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.

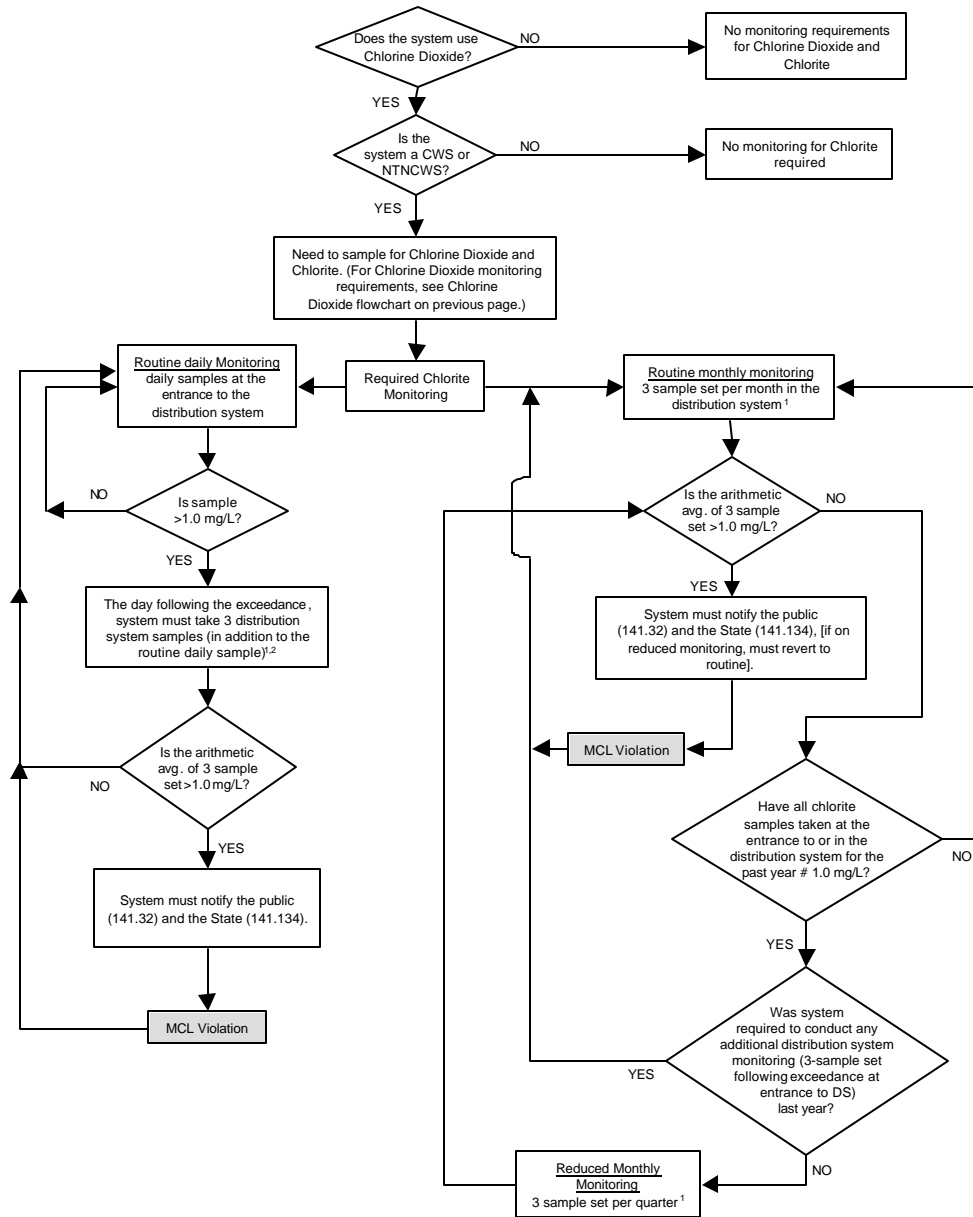
**Chlorine Dioxide Monitoring for Systems Using Chlorine Dioxide**



**NOTES**

1) If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system (DS), or if chlorine is used to maintain a disinfectant residual in the DS and there are no disinfection addition points (i.e., no booster chlorination) after the entrance to the DS, the system must take 3 samples as close to the first customer as possible, at intervals of at least every 6 hours. If chlorine is used to maintain a disinfectant residual in the DS and there are one or more booster chlorination stations, the system must take one sample as close to the 1st customer as possible, one in a location representative of average residence time, and one as close to the end of the distribution system as possible.

**Chlorite Monitoring Requirements for Systems Using Chlorine Dioxide**



**Note:**

1) The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system.

2) If the system has not performed the routine monthly sampling for chlorite, they can use this 3 sample set for their monthly chlorite samples.

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*I operate a treatment plant that uses ozone . . .*

*(Attachment 7) I operate a treatment plant that uses ozone . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
Bromate	One sample per ozone plant per month	Entrance to the distribution system.
Bromide	One sample per ozone plant per month	In source water (only required if the system wishes to qualify for reduced bromate monitoring).

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
Bromate	One sample per ozone plant per quarter	Entrance to the distribution system.	<ul style="list-style-type: none"><li>Annual average source water bromide concentration &lt; 0.05 mg/L</li></ul>
Bromide	No reduced monitoring if wishing to conduct reduced bromate monitoring	NA	NA

**NOTES:**

1. System must resume monthly bromate monitoring if running annual average of source water bromide  $\geq 0.05$  mg/L.

*(Attachment 7) I operate a treatment plant that uses ozone . . .*

**How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the bromate MCL in the Stage 1 DBPR?**

Chemical	Compliance is based on . . .
Bromate	<p><b>Running annual arithmetic average, computed quarterly, of monthly samples (or average of all samples taken during the month if more than 1 sample was collected).</b></p> <ul style="list-style-type: none"> <li>• If average of samples covering any consecutive 4-quarter period exceeds the MCL, the system is in violation.</li> <li>• The system must notify the public and report to the state if in violation.</li> </ul>

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the MCLs or MRDLs, this failure to monitor will be treated as a violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.
3. If during the first year of monitoring, any individual quarter's average will cause the running annual average of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

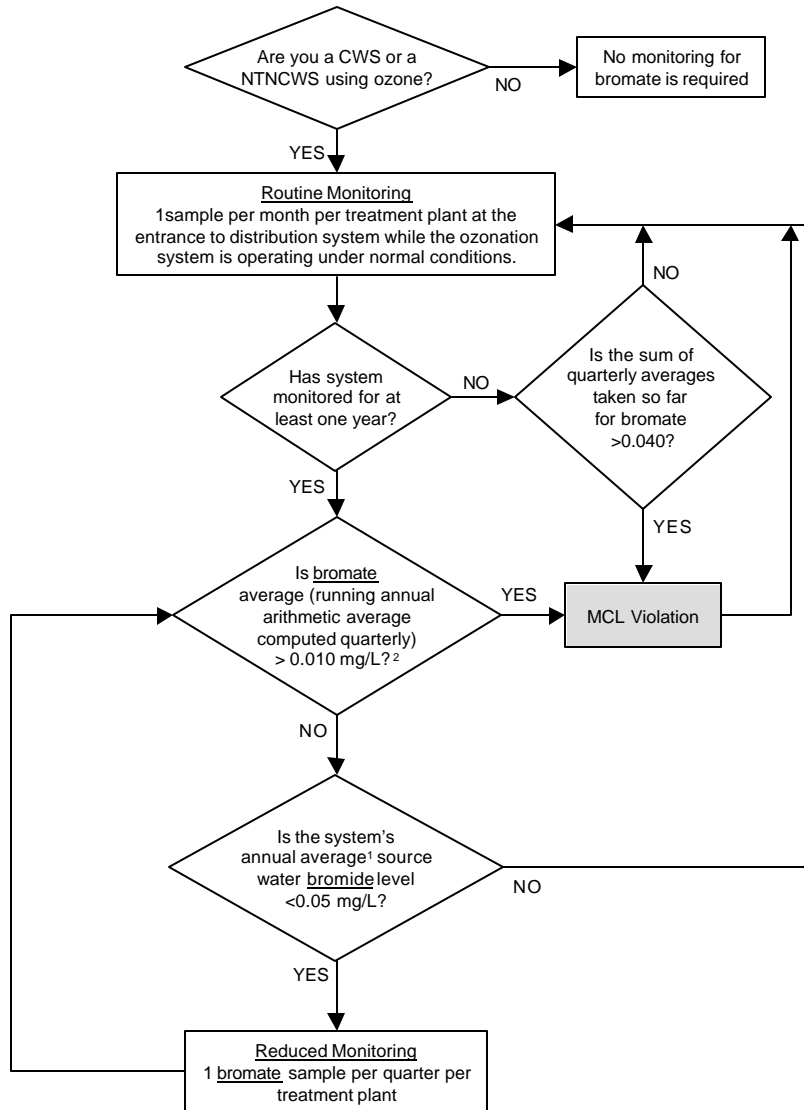
**What do I have to REPORT to the State under the Stage 1 DBPR?**

Chemical	What must be reported
Bromate	<ul style="list-style-type: none"> <li>• Number of samples taken during last quarter</li> <li>• Location, date, result of each sample taken during last quarter</li> <li>• Arithmetic average of monthly arithmetic averages of all samples taken in last year</li> <li>• Whether MCL was exceeded</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.

**Monitoring Requirements for Bromate for Systems using Ozonation**



Notes:  
 1) The average is based upon representative monthly bromide measurements for one year (in months where more than one sample is taken, use the average of all samples taken during the month).  
 2) If a PWS fails to complete 12 mos of monitoring, compliance must be based on average of available data.



***I operate a surface water system or ground water system under the direct influence of surface water and operate a conventional filtration treatment plant . . .***

### ***Enhanced Coagulation and Enhanced Precipitative Softening Treatment Technique***

#### **What is the goal of enhanced coagulation and enhanced precipitative softening?**

The goal of enhanced coagulation and precipitative softening is to provide additional removal of the natural organic material (referred to as total organic carbon or “TOC”) that is a precursor to DBP formation. TOC and disinfectants commonly used in drinking water treatment can combine to form DBPs. Adding additional amounts of coagulant or lime to coagulation or softening treatment trains, respectively, can increase the amount of TOC removed and thereby lower DBP levels in finished water.

#### **Which public water systems does the treatment technique apply to?**

The treatment technique applies to Subpart H systems (systems using surface water or groundwater under the direct influence of surface water) that use conventional treatment. Conventional treatment is defined in §141.2 as a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

#### **How is the treatment technique implemented by public water systems?**

Public water systems (PWSs) that use conventional treatment are required to remove a percentage of TOC from the raw water. The percent removal is based on raw water TOC and alkalinity levels. A pair of TOC samples must be taken simultaneously in the raw water and no later than the combined filter effluent at least once per month to calculate the percent removal and demonstrate compliance via a running annual average. PWS unable to meet the required TOC removal may set an alternative TOC percent removal based on jar or pilot testing that reflects the treatability of their water. PWSs may also use one of the alternative compliance criteria to demonstrate compliance.

#### **When is the treatment technique effective?**

The treatment technique is effective for systems serving 10,000 or more people in January 2002. The effective date for systems serving under 10,000 people is January 2004.

*(Attachment 8) I operate a surface water system or ground water system under the direct influence of surface water and operate a conventional filtration treatment plant . . .*

**What ROUTINE MONITORING must I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>
TOC and Alkalinity (conventional treatment)	One paired TOC sample per plant per month One alkalinity sample per plant per month at same time as source water TOC sample is taken	<p><b>TOC (paired samples)</b></p> <ul style="list-style-type: none"> <li>• In source water prior to any treatment</li> <li>• No later than the point of combined filter effluent turbidity monitoring and representative of filtered water</li> </ul> <p><b>Alkalinity</b></p> <ul style="list-style-type: none"> <li>• Same location as source water TOC sample is taken.</li> </ul>

**What REDUCED MONITORING may I conduct under the Stage 1 DBPR?**

<b>Chemical</b>	<b>Frequency</b>	<b>Where monitoring must be conducted</b>	<b>Conditions for reduced monitoring</b>
TOC and Alkalinity (conventional treatment)	One paired TOC sample per plant per quarter  One alkalinity sample per plant per quarter at same time as source water TOC sample is taken	<p><b>TOC (paired samples)</b></p> <ul style="list-style-type: none"> <li>• In source water prior to any treatment</li> <li>• No later than the point of combined filter effluent turbidity monitoring and representative of filtered water</li> </ul> <p><b>Alkalinity</b></p> <ul style="list-style-type: none"> <li>• Same location as source water TOC sample is taken.</li> </ul>	Average treated water TOC < 2.0 mg/L for 2 consecutive years or <1.0 mg/L for 1 year

***(Attachment 8) I operate a surface water system or ground water system under the direct influence of surface water and operate a conventional filtration treatment plant . . .***

***How do I DETERMINE IF MY SYSTEM IS IN COMPLIANCE with the TOC removal requirements of the Stage 1 DBPR?***

Chemical	Compliance is based on . . .
TOC (conventional treatment)	"Step 1" or "Step 2" removal targets or alternative compliance criteria (see flowcharts for determining TOC compliance)

**NOTES:**

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with the treatment technique, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.

***What do I have to REPORT to the State under the Stage 1 DBPR?***

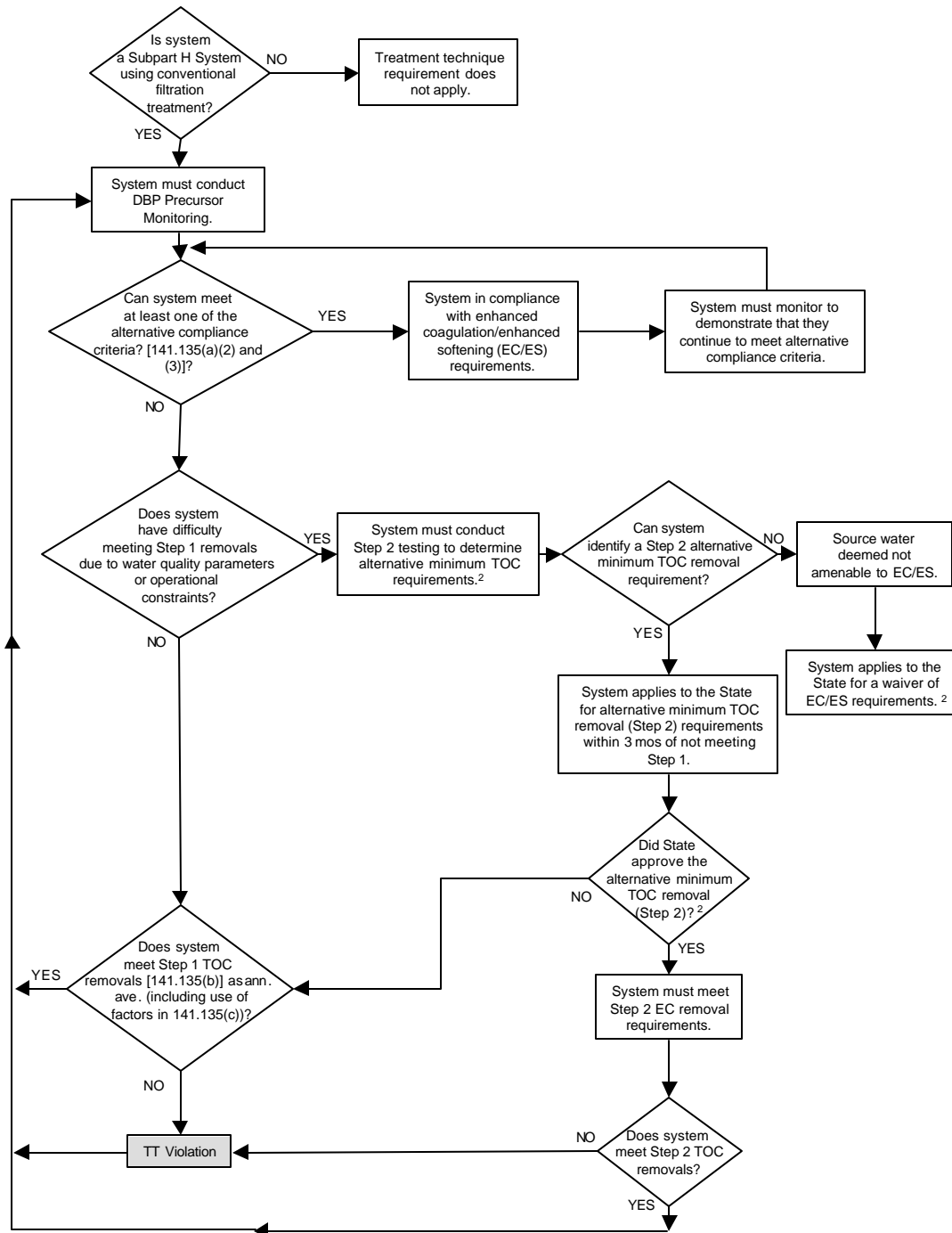
Chemical	What must be reported
TOC and Alkalinity (conventional treatment)	<ul style="list-style-type: none"> <li>• Number of paired samples taken during last quarter</li> <li>• Location, date, result of each paired sample and associated alkalinity taken during last quarter</li> <li>• For systems using Step 1 or Step 2, enhanced coagulation or enhanced softening               <ul style="list-style-type: none"> <li>• For each month in the reporting period, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal</li> <li>• Calculations for determining compliance with the TOC percent removal requirements</li> </ul> </li> <li>• For systems using an alternative compliance criterion               <ul style="list-style-type: none"> <li>• Running annual arithmetic average of source water SUVA or treated water SUVA if using this criterion for alternative compliance</li> <li>• Running annual arithmetic average based on monthly average of source or treated water TOC if using this criterion for alternative compliance</li> <li>• Running annual arithmetic average of source water alkalinity or treated water alkalinity if using this criterion for alternative compliance</li> <li>• Running annual average for both TTHM and HAA5 if using this criterion for alternative compliance</li> <li>• Running annual average of amount of magnesium hardness removal if using this criterion for alternative compliance</li> <li>• Whether system is in compliance with particular alternative compliance criterion</li> </ul> </li> <li>• Whether system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements for the last 4 quarters</li> </ul>

**NOTES:**

1. Systems required to sample quarterly or more frequently must report to the state within 10 days after the end of each quarter in which samples were collected.

*(Attachment 8) I operate a surface water system or ground water system under the direct influence of surface water and operate a conventional filtration treatment plant . . .*

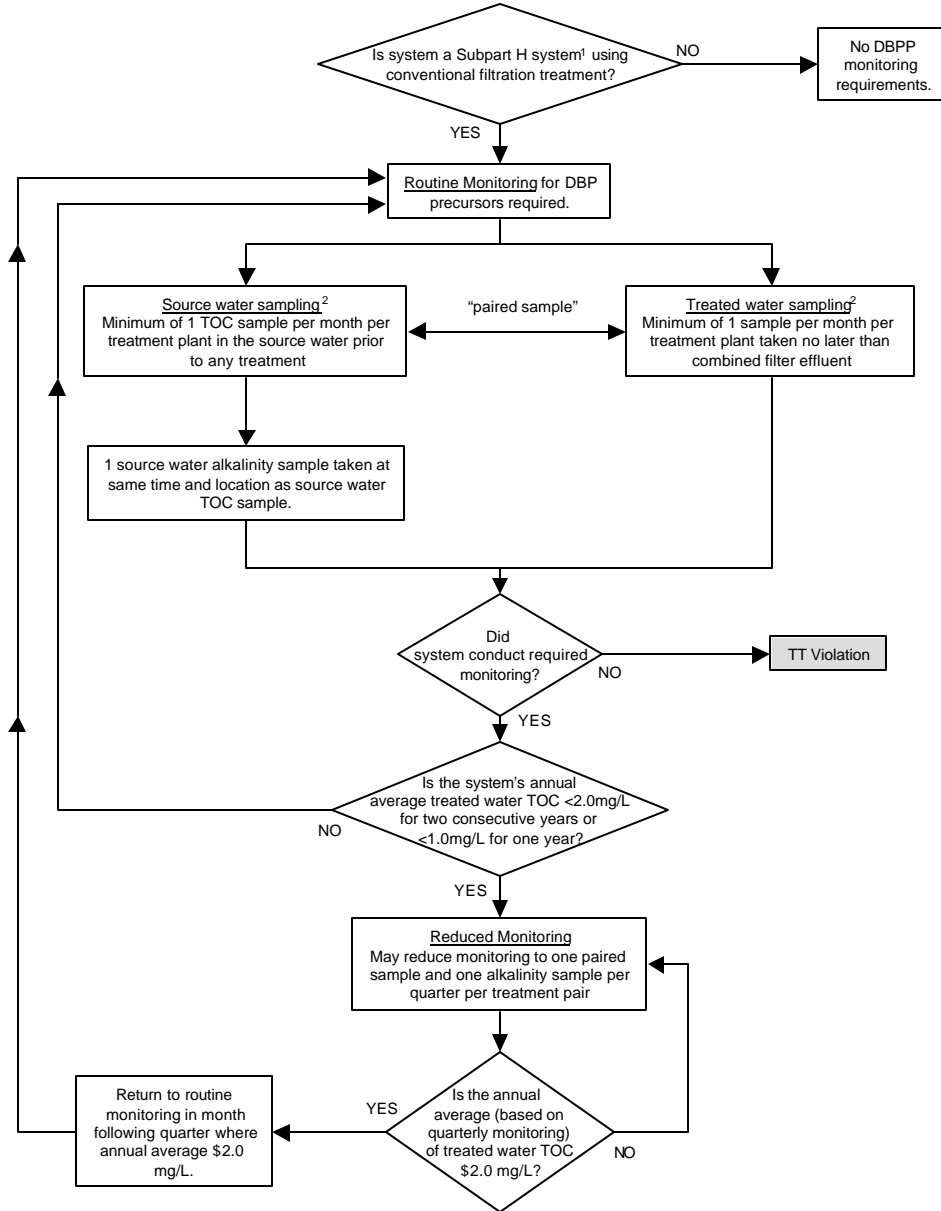
**Disinfection Byproducts Precursor Removal Treatment Technique**



Notes:  
 1) Subpart H = Public water systems using surface water or ground water under the direct influence of surface water.  
 2) Until the state approves alternate Step 2, system must meet Step 1 removals.

*(Attachment 8) I operate a surface water system or ground water system under the direct influence of surface water and operate a conventional filtration treatment plant . . .*

**Monitoring Requirements for Disinfection Byproduct Precursors (DBPP)**



Notes:

- 1.) Subpart H = Public water systems using surface water or ground water under the direct influence of surface water.
- 2.) The source water and the treated water samples are referred to as "paired samples" and are to be taken simultaneously