



Disinfectants and Disinfection Byproducts Rules

(Stage 1 and Stage 2)

What Do They Mean to You?

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Contents

Contents	i
Definitions and Acronyms	ii
Definitions.....	ii
Acronyms	iii
1. Introduction.....	1
Purpose of the Guide.....	1
Background	1
2. Applicability and Compliance Dates	2
3. Summary of Regulatory Requirements.....	3
MRDLGs and MRDLs for disinfectants only; MCLGs and MCLs for disinfection byproducts.....	3
Monitoring plan.....	4
Laboratory methods and certification	4
Monitoring	4
Compliance	4
Public water system recordkeeping and reporting requirements.....	5
Operational evaluation levels.....	5
Best available technology	6
Treatment technique for disinfection byproduct precursors.....	6
4. Additional Information	7
5. Detailed Regulatory Requirements	7
Attachment 1: CWSs and NTNCWSs use a primary or residual disinfectant other than ultraviolet (UV) light or deliver water that has been treated with a primary or residual disinfectant other than UV light.....	9
Attachment 2: TTHM and HAA5 monitoring for systems that deliver water that has been treated with a disinfectant other than UV light	13
Attachment 3: CWSs and NTNCWSs that deliver water that has been treated with chlorine or chloramines	27
Attachment 4: Systems that deliver water that has been treated with chlorine dioxide.....	29
Attachment 5: Systems that deliver water that has been treated with ozone	33
Attachment 6: Subpart H systems that operate a conventional filtration treatment plant.....	35

Definitions and Acronyms

Definitions

Combined distribution system (CDS) – the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive some or all of their finished water from those wholesale systems.

Consecutive system – a public water system (PWS) that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Dual sample set – a set of two samples collected at the same time and same location, with one sample analyzed for total trihalomethanes (TTHM) and the other analyzed for five haloacetic acids (HAA5).

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

Enhanced softening – the removal of disinfection byproduct precursors by precipitative softening.

Locational running annual average (LRAA) – the average of analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

Log – Logarithm (common, base 10).

Log inactivation – Logarithm of (N0/NT).

Maximum contaminant level (MCL) – the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to maximum contaminant level goals (MCLGs) as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

Maximum contaminant level goal (MCLG) – the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals.

Maximum residual disinfectant level (MRDL) – the maximum level of a disinfectant added for water treatment that may not be exceeded without an unacceptable possibility of adverse health effects. MRDLs are enforceable standards analogous to MCLs.

Maximum residual disinfectant level goal (MRDLG) – the maximum level of a disinfectant added for water treatment at which no known or anticipated health effects 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 disinfectant for control of waterborne microbial contaminants.

Running annual average (RAA) – the average of all sample analytical results taken during the previous four calendar quarters.

Specific Ultraviolet Absorption (SUVA) – Specific Ultraviolet Absorption at 254 nanometers (nm) is 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 (in milligrams per liter).

Subpart H – a public water system (PWS) using surface water or ground water under the direct influence of surface water.

Total Organic Carbon (TOC) – total organic carbon in milligrams per liter is 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.

Acronyms

BAT: Best Available Technology
CDS: Combined Distribution System
CWS: Community Water System
DBP: Disinfection Byproducts
DBPP: Disinfection Byproducts Precursors
DBPR: Disinfectants and Disinfection Byproducts Rule
EC: Enhanced Coagulation
EPA: United States Environmental Protection Agency
ES: Enhanced Softening
FR: *Federal Register*
GAC10: Granular Activated Carbon with 10-minute empty bed contact time and 180-day reactivation frequency
GAC20: Granular Activated Carbon with 20-minute empty bed contact time and 240-day reactivation frequency
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)
IDSE: Initial Distribution System Evaluation
LRAA: Locational Running Annual Average
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
nm: Nanometer
NOM: Naturally Occurring Material – A DBPP
NTNCWS: Nontransient Noncommunity Water System
OEL: Operational Evaluation Level
PWS: Public Water System
RAA: Running Annual Average
RTCR: Revised Total Coliform Rule
SDWA: Safe Drinking Water Act
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
TNCWS: Transient Noncommunity Water System

TOC: Total Organic Carbon

TTHM: Total Trihalomethanes (chloroform, bromodichloromethane, dibromochloromethane and bromoform)

UV: Ultraviolet

1. Introduction

Purpose of the Guide

The purpose of this guide is to provide an overview of the regulatory requirements of the Stage 1 and Stage 2 Disinfectants and Disinfection Byproducts Rules (DBPRs). The Stage 1 DBPR was published in the *Federal Register* on December 16, 1998 and the Stage 2 DBPR was published in the *Federal Register* on January 4, 2006. The U.S. Environmental Protection Agency (EPA) website provides links to the original rule language as well as the most recent guidance documents and other information (<https://www.epa.gov/dwreginfo/stage-1-and-stage-2-disinfectants-and-disinfection-byproducts-rules>). With these rules EPA set enforceable limits for disinfectants and disinfection byproducts (DBPs), created monitoring requirements and specify planning and reporting procedures. This guide presents an overview of the rule requirements as well as attachments that provide detailed descriptions of the rule requirements for water systems according to system size, source water type and disinfectant used. Water system operators and other readers should look at the short overview sections (Sections 1-4) at the beginning of this guide and then turn to the specific attachment in Section 5 that apply to their water system.

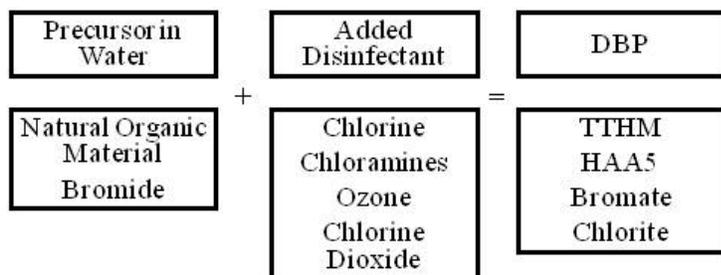
Background

The 1974 Safe Drinking Water Act (SDWA) required EPA to regulate drinking water. Although the SDWA was amended slightly in 1977, 1979 and 1980, the most significant changes occurred when SDWA was reauthorized in 1986. 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 contaminants. EPA also was required to establish regulations, require disinfection of water systems (all those using surface water and as necessary, those using ground water), specify filtration requirements for nearly all water systems that draw their water from surface sources and develop additional programs to protect ground water supplies.

THE STAGE 1 AND STAGE 2 DBPRs ARE INTENDED TO HELP CONTROL PATHOGENS WHILE MINIMIZING THE PUBLIC HEALTH RISK FROM DISINFECTANTS AND DBPs.

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 (such as, bacteria, protozoa and viruses) are the greatest remaining health-risk challenge for drinking water suppliers. Water systems add disinfectants to reduce the risk of these contaminants, but the disinfectants react with naturally occurring materials (NOMs) in the water to form DBPs.

DBP formation is influenced by several factors, including precursor concentrations and water temperature. For instance, DBPs formed from NOMs are produced at a higher rate as the temperature of



the water increases. This usually leads to higher disinfectant demand and higher total trihalomethanes (TTHM) and five haloacetic acid (HAA5) concentrations during summer months and in warmer climates. The Stage 1 and Stage 2 DBPRs are intended to minimize the public health risk from DBPs and disinfectants that are used to control pathogens. By

building on the foundation set forth by the original SDWA, the quality of drinking water has improved and public health protection has increased.

To address the complex balance between water disinfection risks and benefits, EPA established maximum residual disinfectant levels (MRDLs) for chlorine, chloramines and chlorine dioxide, and MCLs for DBPs (chlorite, bromate, TTHM and HAA5). The Stage 1 and Stage 2 DBPRs require all community water systems (CWSs) and nontransient noncommunity water systems (NTNCWSs) that use a primary or residual disinfectant other than ultraviolet (UV) light or deliver water that has been treated with a primary or residual disinfectant other than UV light to comply with all monitoring requirements associated with the:

- MCL for TTHM and HAA5.
- MRDL for chlorine or chloramines.
- MCL for bromate (for systems that use ozone).
- MRDL for chlorine dioxide (for systems that use chlorine dioxide).
- MCL for chlorite (for systems that use chlorine dioxide).

Transient noncommunity water systems (TNCWSs) that use chlorine dioxide, must comply with the MRDL for chlorine dioxide. In addition, water systems with a surface or ground water under the direct influence of surface water source (Subpart H systems) that use conventional filtration must comply with the treatment technique requirement and remove NOMs measured as total organic carbon (TOC) that may react with disinfectants to form DBPs.

Following promulgation of the Stage 1 DPBR, EPA determined that the required monitoring sites may not be representative of higher DBP concentrations that occur in distribution systems. Therefore, the Stage 2 DPBR was promulgated to require more consistent and equitable protection from DBPs across the entire distribution system, reduce DBP peaks and ultimately, provide more equitable public health protection. To achieve this CWSs and NTNCWSs that serve 10,000 or more persons were required to conduct an evaluation of their water system's distribution systems. This evaluation, called an Initial Distribution System Evaluation (IDSE), was used to identify the areas in the distribution system with high DBPs concentrations. The sample sites identified in the IDSE are used by CWSs and NTNCWSs as the basis for selecting their TTHM and HAA5 compliance monitoring sites. The IDSE requirement was a one-time requirement and all CWSs and NTNCWSs serving 10,000 or more persons should have completed their IDSE.

This guide addresses the ongoing monitoring required by the Stage 1 and Stage 2 DBPRs.

2. Applicability and Compliance Dates

The Stage 1 DBPR analytical and monitoring requirements for chlorine, chloramines, bromate, chlorine dioxide and chlorite apply to all CWSs and NTNCWSs *that add a chemical disinfectant to the water in any part of the drinking water treatment process*. In addition, certain requirements apply to TNCWSs that use chlorine dioxide. The Stage 2 DBPR analytical and monitoring requirements for TTHM and HAA5 apply to all CWSs and NTNCWSs that either add a primary or residual disinfectant other than UV light, or deliver water that has been treated with a primary or residual disinfectant other than UV light. Consecutive systems that do not add a disinfectant but deliver water that was treated with a disinfectant other than UV light must also comply with the

COMPLIANCE DATES DEPEND ON THE POPULATION SERVED BY THE SYSTEM OR THE LARGEST SYSTEM WITHIN A COMBINED DISTRIBUTION SYSTEM.

Stage 1 DBPR analytical and monitoring requirements for chlorine and chloramines and associated compliance and reporting requirements.

Under the Stage 2 DPBR, compliance dates are dependent on the population served by a system or the population served by the largest system within a combined distribution system (CDS). A CDS is an interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive some or all of their finished water from those wholesale systems.

Table 1 - Stage 2 DBPR TTHM and HAA5 Compliance Monitoring Compliance Dates

IF YOU ARE THIS TYPE OF SYSTEM	YOU MUST HAVE BEGUN COMPLYING WITH SUBPART V TTHM/HAA5 MONITORING BY: ¹
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system	
(1) System serving $\geq 100,000$	April 1, 2012
(2) System serving 50,000-99,999	October 1, 2012
(3) System serving 10,000-49,999	October 1, 2013
(4) System serving $< 10,000$	October 1, 2013 if no <i>Cryptosporidium</i> monitoring is required under Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) OR October 1, 2014 if <i>Cryptosporidium</i> monitoring is required under LT2ESWTR
Other systems that are part of a combined distribution system	
(5) Consecutive system or wholesale system	at the same time as the system with the earliest compliance date in the combined distribution system

3. Summary of Regulatory Requirements

MRDLGs and MRDLs for disinfectants only; MCLGs and MCLs for disinfection byproducts

EPA established maximum residual disinfectant level goals (MRDLGs) and MRDLs for three chemical disinfectants – chlorine, chloramine and chlorine dioxide – and established MCLGs and MCLs for TTHM, HAA5, chlorite and bromate, as described in the tables below. All MCLs and MRDLs are in milligrams per liter (mg/L).

Table 2 - Regulated Disinfectants

Regulated Disinfectants	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 as Cl ₂	4 as Cl ₂
Chloramines	4.0 as Cl ₂	4 as Cl ₂
Chlorine dioxide	0.8 as ClO ₂	0.8 as ClO ₂

¹ The state may grant up to an additional 24 months for compliance with MCLs and operational evaluation levels if the water system is required to make capital improvements to comply with an MCL.

Table 3 - Regulated Contaminants

Regulated Contaminants	MCL (mg/L)	MCLG (mg/L)
TTHM	0.080	Three individual MCLGs were established: Bromodichloromethane at Zero Dibromochloromethane at 0.06 Bromoform at Zero
HAA5	0.060	Two individual MCLGs were established: Dichloroacetic acid at Zero Trichloroacetic acid at 0.3
Bromate (plants that use ozone)	0.010	Zero
Chlorite (plants that use chlorine dioxide)	1.0	0.8

Monitoring plan

Each water system must develop and implement a monitoring plan that details how it will meet all applicable requirements. The monitoring plan must include specific locations and schedules for collecting samples, and how the water system will calculate compliance with MCLs, MRDLs and removal requirements. The monitoring plan must be kept on file for state and public review, and must contain monitoring plans for any other systems in the CDS if the state has allowed combined monitoring.

Laboratory methods and certification

Analysis for DBPs must be conducted by laboratories that have been certified by EPA or the state. Chlorite measured at the entrance to the distribution system 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 on-site (for example, for samples that may deteriorate before reaching a certified laboratory), EPA requires that analyses be conducted by a party approved by the state. Additional information on approved methods can be found on EPA's website at: <https://www.epa.gov/dwanalyticalmethods>.

Monitoring

EPA has developed compliance monitoring schemes for each MRDL, MCL and treatment technique to be protective of acute and chronic health concerns. The compliance monitoring requirements vary by the size and type of the water system, the treatment employed and the disinfectant used. In many cases, water systems may reduce monitoring frequencies after establishing a baseline. In some cases, water systems that exceed an MCL or MRDL may need to increase the number of samples or monitoring frequency.

Compliance

Compliance is based on a running annual average (RAA) calculated quarterly, locational running annual average (LRAA) calculated quarterly, a single sample result or an average of a selected number of samples, depending on which disinfectant or DBP is being monitored.

Water systems must notify the public and report to the state if they are in violation of an MCL, MRDL or treatment technique. If a water system fails to monitor, the system is in violation of the monitoring requirements for each quarter that the monitoring result would have been used in calculating compliance. All violations require public notification.² All samples taken and analyzed under the provisions of the monitoring plan must be included in determining compliance, even if there are more than the minimum required.

A water system is considered in violation if the RAA or LRAA of all samples for a consecutive 4-quarter period exceeds the MCL or MRDL. The system would also be in violation of the MCL or MRDL if they will exceed the MCL or MRDL based on fewer than 4 quarters of data and regardless of the monitoring results of subsequent quarters.

If the sum of 3 quarters of sampling causes a water system to exceed the MCL even with a 4th quarter sample of 0 mg/L, the water system has an MCL violation after 3 quarters. For example, Quarter 1 = 0.009, Quarter 2 = 0.010, Quarter 3 = 0.015; Average = 0.011 for first three quarters. Average exceeds the MCL after 3 quarters, water system is in violation of the MCL.

Public water system recordkeeping and reporting requirements

Water 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. 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 (for example, chlorine dioxide) are subject to additional reporting requirements if certain chemical levels are measured.

Operational evaluation levels

EPA included operational evaluation levels (OELs) for TTHM and HAA5 in order to better track contaminant levels in drinking water. TTHM and HAA5 OELs must be calculated by all water systems required to comply with the TTHM and HAA5 MCLs. An OEL is calculated as the sum of the 2 previous quarters' sample results plus twice the current quarter's result, divided by four to determine an average. An OEL for TTHM is exceeded at any monitoring location where the OEL is greater than 0.080 mg/L. For HAA5, the OEL is exceeded at any monitoring location where the OEL is greater than 0.060 mg/L.

If you exceed an OEL, you must conduct an operational evaluation and submit a written report to the state no later than 90 days after receiving the exceedance result. The evaluation must include an examination of system treatment and distribution practices, including storage tank operations, excess storage capacity, distribution system flushing,

Operational Evaluation Level

$$\frac{(Q_1 + Q_2 + 2Q_3)}{4} < MCL$$

Where Q_1 is the TTHM or HAA5 quarterly sample result from two quarters ago, Q_2 is the result from last quarter, and Q_3 is the most recent result (current quarter) which is then multiplied by 2 to predict possible level for the next quarter.

² Failure to take distribution system samples the day an entry point sample exceeded the chlorine dioxide MRDL is a monitoring violation and requires Tier 1 public notice be provided, not Tier 3 public notice.

changes in sources or source water quality and treatment changes. The report must be made available to the public upon request. The scope of the evaluation may be limited, if the water system is able to identify the cause of the OEL exceedance. EPA developed a guidance manual that describes the requirements for operational evaluations and provides guidance for documenting and reporting OEL exceedances. This guidance manual is available on EPA’s website (<https://www.epa.gov/dwreginfo/stage-1-and-stage-2-disinfectants-and-disinfection-byproducts-rules>).

Best available technology

EPA specified best available technologies (BATs) for each MCL and MRDL. These technologies and methods are believed to be effective in controlling chemicals in drinking water while remaining economically feasible. Public water systems (PWSs) must use the specified BAT if they wish to qualify for variances; otherwise, systems are not required to install a BAT and may use any approved technology to achieve compliance.

Table 4 – DBPRs Best Available Technology Options

Disinfectant or DBP	Contaminant/ Disinfectant	Best Available Technology
DBPs	TTHM and HAA5	Enhanced coagulation or enhanced softening with granular activated carbon with an empty bed contact time of ten minutes (GAC10) or granular activated carbon with an empty bed contact time of 20 minutes (GAC20), with chlorine as the primary and residual disinfectant, or nanofiltration with a maximum filter weight of 1,000 Daltons.
DBPs	Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.
DBPs	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.

Treatment technique for disinfection byproduct precursors

EPA specified a treatment technique that applies to Subpart H systems using conventional filtration treatment. The treatment technique requirements are designed to provide public health protection by minimizing DBP precursors (DBPPs) and thus the production of all DBPs. Compliance with the treatment technique can be achieved by removing specified percentages of TOC using enhanced coagulation or enhanced softening. The required TOC removal is listed in the table below.

Table 5 - Step 1 TOC - Required Percent Removal of TOC

Source Water TOC (mg/L)	Source Water Alkalinity, mg/L as CaCO ₃		
	0-60	> 60-120	>120
> 2.0 to 4.0	35.0%	25.0%	15.0%
> 4.0 to 8.0	45.0%	35.0%	25.0%
> 8.0	50.0%	40.0%	30.0%

When providing TOC removal, Subpart H systems may show that they meet alternative compliance criteria. For example, a system that has less than 2.0 mg/L TOC in its source or treated water meets an alternative compliance criterion. Another criterion allows the system to be in compliance if the RAA of a system's source water TOC is less than 4.0 mg/L, the RAA of source water alkalinity is greater than 60 mg/L, and either the TTHM RAA is less than or equal to 0.040 mg/L and the HAA5 RAA is less than or equal to 0.030 mg/L, or the state has determined that the system has made a clear and irrevocable commitment to installing technology to limit TTHM and HAA5 to those levels. For those systems using Specific Ultraviolet Absorption (SUVA) as an alternative compliance criterion they must be less than or equal to 2.0 L/mg-m, calculated quarterly as a RAA. See Attachment 6 for specific information on alternative compliance criteria.

4. Additional Information

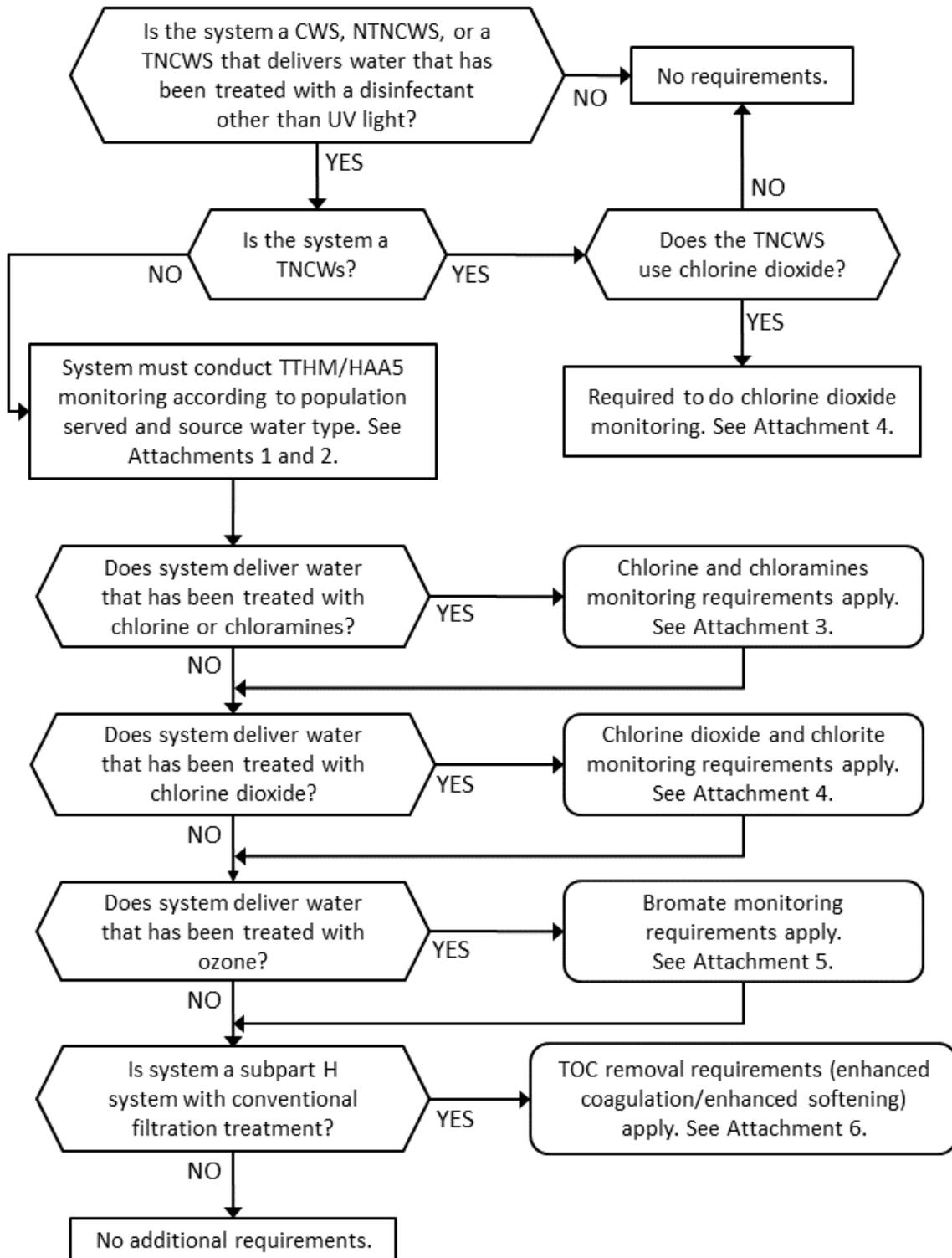
A series of guidance manuals have been developed to support the Stage 1 and Stage 2 DBPR. They are available on EPA's website (<https://www.epa.gov/dwreginfo/stage-1-and-stage-2-disinfectants-and-disinfection-byproducts-rules>) and are also available free of charge through the National Service Center for Environmental Publications (<https://www.epa.gov/nscep>). The manuals can help water system operators, state agencies and EPA implement drinking water regulations consistently and effectively.

5. Detailed Regulatory Requirements

Detailed descriptions of the monitoring requirements for PWSs are presented in the following sections. The Stage 1 and Stage 2 DBPR apply to all CWSs and NTNCWSs that add a disinfectant other than UV light, or deliver water that has been treated with any disinfectant other than UV light, as well as TNCWSs that treat their water with chlorine dioxide. However, systems must monitor at particular frequencies and locations depending on source water type (Subpart H and ground water) and population served by the system. Additionally, monitoring requirements for specific chemicals will vary depending on system type and the primary disinfectant used. For this reason, the monitoring requirements are presented in separate attachments for each system size and type.

This section is organized into separate attachments so that specific categories of systems can turn to their specific requirements. Keep in mind that some systems may fall into more than one category. Use the flowchart on the next page to determine which of the attachments apply to your water system.

Disinfectant and Disinfection Byproduct Rules General Requirements



Attachment 1: CWSs and NTNCWSs use a primary or residual disinfectant other than ultraviolet (UV) light or deliver water that has been treated with a primary or residual disinfectant other than UV light

MONITORING LOCATION SITE SELECTION PROTOCOL

If you treat water with a chemical disinfectant, or deliver water that has been treated with a chemical disinfectant, you must identify in your monitoring plan the locations with representative high TTHM and HAA5 concentrations in your distribution system.

The number of required sampling sites for TTHM and HAA5 compliance monitoring will depend on your source type and population served by the system. Please refer to the appropriate flowchart in this attachment for the number of sample sites that you must identify.

The site selection protocol below explains how you must select your TTHM and HAA5 monitoring locations:

Step #	Criteria	Site
1	Select the location with the highest TTHM LRAA	1st highest TTHM site
2	Select the remaining location with the highest HAA5 LRAA	1st highest HAA5 site
3	For subpart H systems: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest HAA5 LRAA For ground water systems: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest HAA5 LRAA Skip this step if you have no more Stage 1 DBPR sites	1st Stage 1 DBPR site
4	Select the remaining location with the next highest TTHM LRAA	2nd highest TTHM site
5	Select the remaining location with the next highest TTHM LRAA	3rd highest TTHM site
6	Select the remaining location with the next highest HAA5 LRAA	2nd highest HAA5 site
7	For subpart H systems: Select the remaining existing Stage 1 DBPR average residence time compliance monitoring location with the highest TTHM LRAA For ground water systems: Select the remaining existing Stage 1 DBPR maximum residence time compliance monitoring location with the highest TTHM LRAA Skip this step if you have no more Stage 1 DBPR	2nd Stage 1 DBPR site
8	Select the remaining location with the next highest HAA5 LRAA	3rd highest HAA5 site

Notes:

- If you need more compliance monitoring locations, go back to Step 1 of this protocol and repeat the steps until you have selected the required number of total sites.
- You may recommend locations other than those listed in the protocol if you provide a rationale for selecting other locations and your state approves of the alternate locations.

ROUTINE MONITORING

If you treat water with a chemical disinfectant, or deliver water that has been treated with a chemical disinfectant, the number and frequency of TTHM/HAA5 samples you must take depends on your system's source type and the size of the population served. If you are required to monitor quarterly, you

must take dual sample sets every 90 days at each monitoring location included in your monitoring plan. If you are required to monitor TTHM/HAA5 annually, you are only required to take individual samples annually at the locations with the highest TTHM and HAA5 concentrations, respectively.

INCREASED MONITORING

If you monitor annually or less frequently than annually and a TTHM sample exceeds 0.080 mg/L or a HAA5 sample exceeds 0.060 mg/L at any location, you must increase monitoring frequency to dual sample sets once per quarter (taken every 90 days) at all monitoring locations. You may return to routine monitoring if the TTHM LRAA for every monitoring location is less than or equal to 0.060 mg/L and the HAA5 LRAA for every monitoring location is less than or equal to 0.045 mg/L after conducting at least four consecutive quarters of increased monitoring.

REDUCED MONITORING

If you qualify and your state allows, you may be able to reduce your monitoring for TTHM and HAA5 LRAAs. Remember, TTHM and HAA5 monitoring requirements are tied together. In order to reduce the water system's monitoring frequency, your system must meet the qualifications for both TTHM and HAA5 reduced monitoring and the state must approve. In addition, if you exceed the MCL for either TTHM or HAA5 while on reduced monitoring, you must increase or return to routine monitoring for both TTHM and HAA5.

- For qualified systems on **reduced quarterly monitoring**, you may remain on reduced monitoring as long as the TTHM LRAA is less than or equal to 0.040 mg/L and the HAA5 LRAA is less than equal to 0.030 mg/L at each monitoring location.
- For qualified systems on **reduced annual or less frequent monitoring**, you may remain on a reduced monitoring schedule as long as each TTHM sample is less than or equal to 0.060 mg/L and each HAA5 sample is less than or equal to 0.045 mg/L.
- In addition, qualified **Subpart H systems on reduced monitoring** schedule must maintain a source water annual average TOC level, before any treatment, of less than or equal to 4.0 mg/L at each Subpart H treatment plant.

If your system fails to meet the criteria list above at any of the sampling locations, you must return to routine monitoring.

COMPLIANCE

You are in violation if the LRAA for any monitoring location covering any consecutive 4-quarter period exceeds the TTHM MCL of 0.080 mg/L or HAA5 MCL of 0.060 mg/L. If your LRAA, based on fewer than 4 quarters of data exceeds one of the MCLs regardless of the monitoring results of subsequent quarters you would be in violation. If you fail to monitor, you are in violation of the monitoring requirements for each quarter that the missed monitoring result would have been used in the compliance calculation.

You must calculate your LRAA based on the quarterly results at each site for the previous consecutive 4-quarter period.³ The table below provides an example TTHM LRAA calculation (results reported in mg/L). For example, the LRAA for the 4th quarter of 2013 is the average of the quarterly results from

³ Stage 2 DBPR compliance can also be based on a single sample result (if the result is 4 times the MCL). If your system monitors once a year or less often, you should use your single sample result to determine compliance.

quarters 1-4 in 2013. Note that the reported LRAAs for quarters 1-3 in 2013 are based on results from previous quarters not reported on this table.

Table 1.1 - TTHM Monitoring Results

Sample Sites	1st quarter 2013	2nd quarter 2013	3rd quarter 2013	4th quarter 2013	1st quarter 2014	2nd quarter 2014
Site 1 Quarterly Results	0.045	0.060	0.125	0.070	0.041	0.064
Site 1 - LRAA	0.047	0.051	0.074	0.075	0.074	0.075
Site 2 Quarterly Results	0.040	0.055	0.115	0.060	0.044	0.065
Site 2 – LRAA	0.042	0.049	0.071	0.068	0.069	0.071

You must calculate a LRAA for each of the TTHM and HAA5 sample sites.

If an OEL is exceeded at any monitoring location, you must conduct an operational evaluation and submit a written report of the evaluation to the state within 90 days. An OEL exceedance occurs when the sum of the two previous quarters' results plus twice the current quarter's result, divided by four to determine an average, exceeds an MCL.

REPORTING

You must report to the state within 10 days after the end of each quarter. You must report the number of TTHM and HAA5 samples taken during the last 3 months, and the location, date and result of each sample taken during the last quarter. You must report the LRAAs of all quarterly samples, however the state may choose to perform this calculation and determine if the MCL was exceeded. If an LRAA calculation based on fewer than 4 quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, you must submit this information to the state.

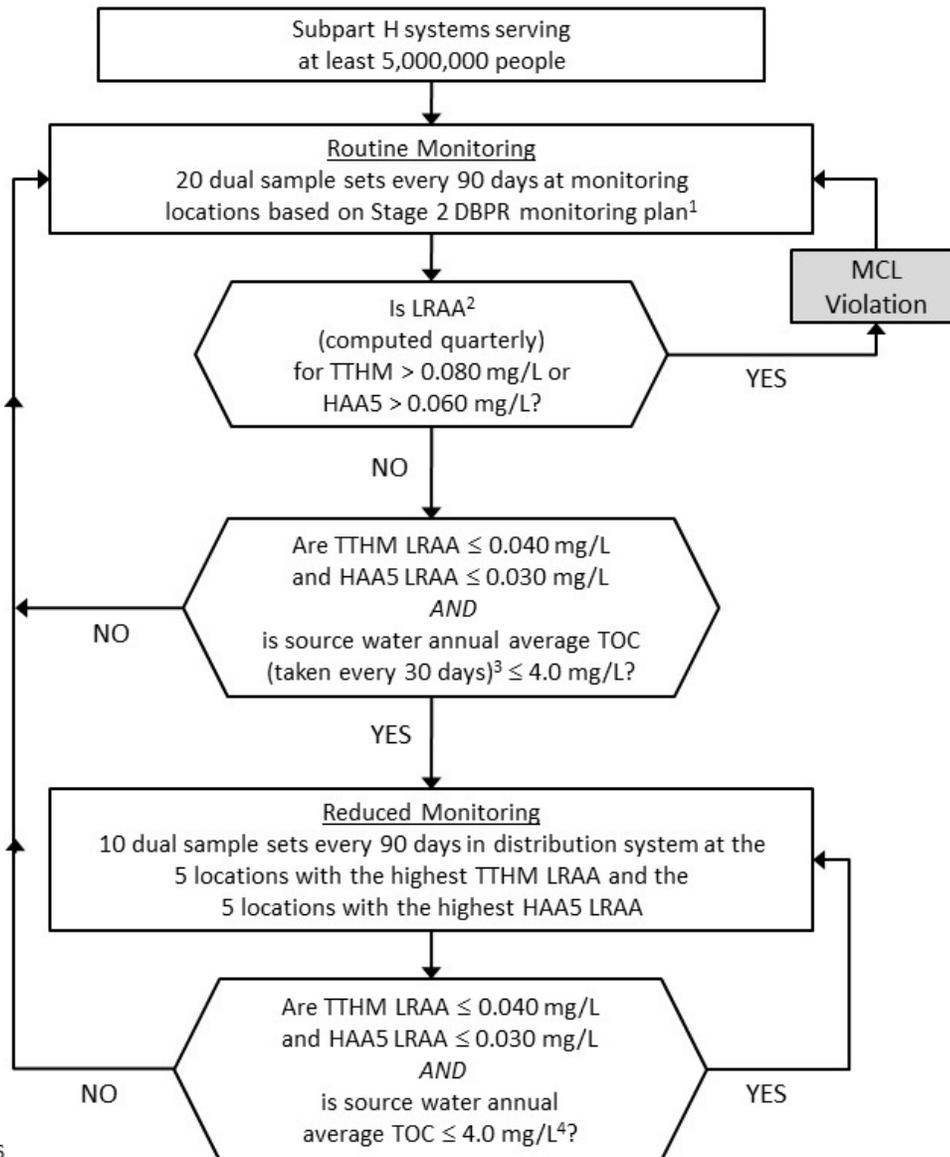
If you are a Subpart H system looking to qualify or remain on reduced monitoring, you must also report your RAA of every 30 days or every 90 days TOC samples and whether or not you exceed 4.0 mg/L.

You must report any OELs that were exceeded, including location, date and the calculated TTHM and HAA5 levels. You must submit a written report to the state no later than 90 days after being notified of the result that causes your system to exceed the OEL.

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Attachment 2: TTHM and HAA5 monitoring for systems that deliver water that has been treated with a disinfectant other than UV light

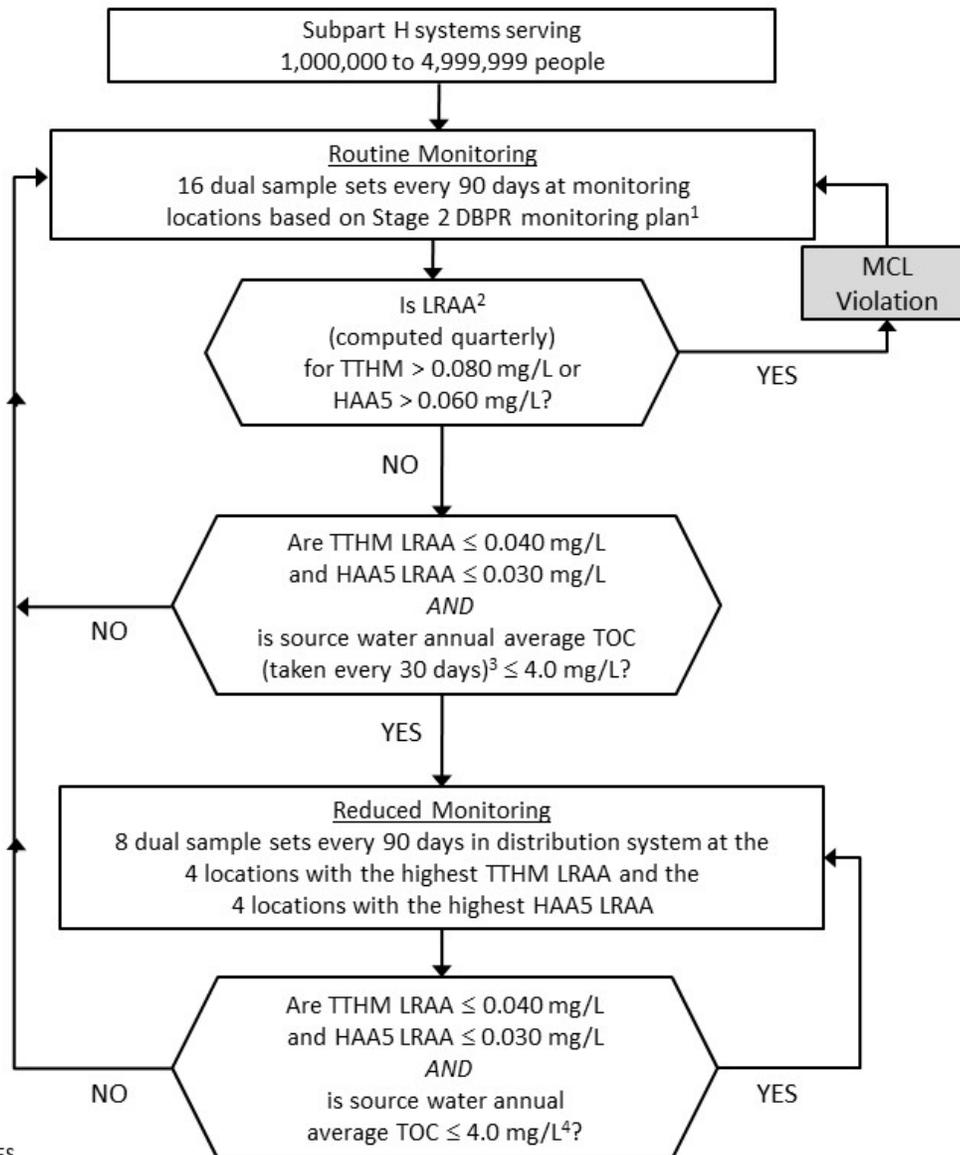
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves at least 5,000,000 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

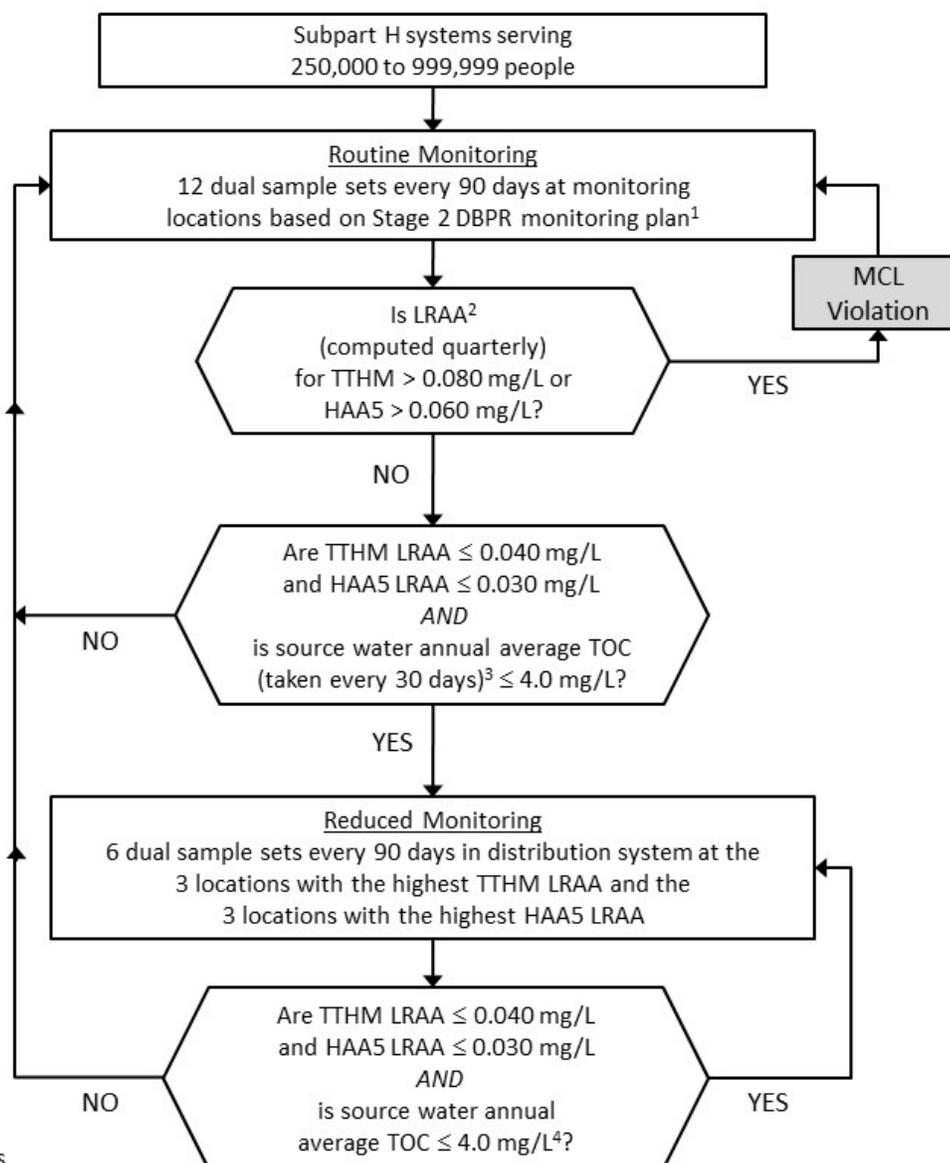
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 1,000,000 to 4,999,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

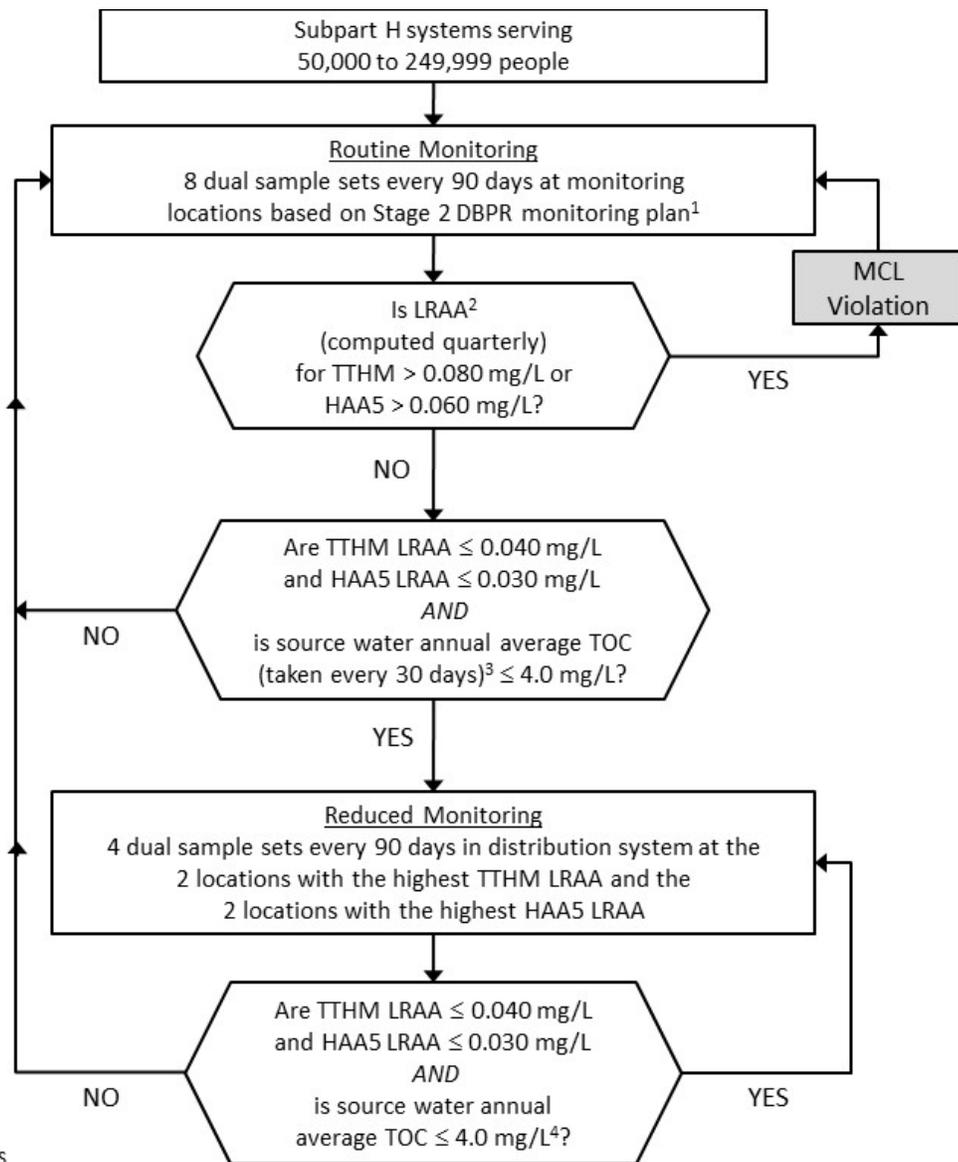
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 250,000 to 999,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

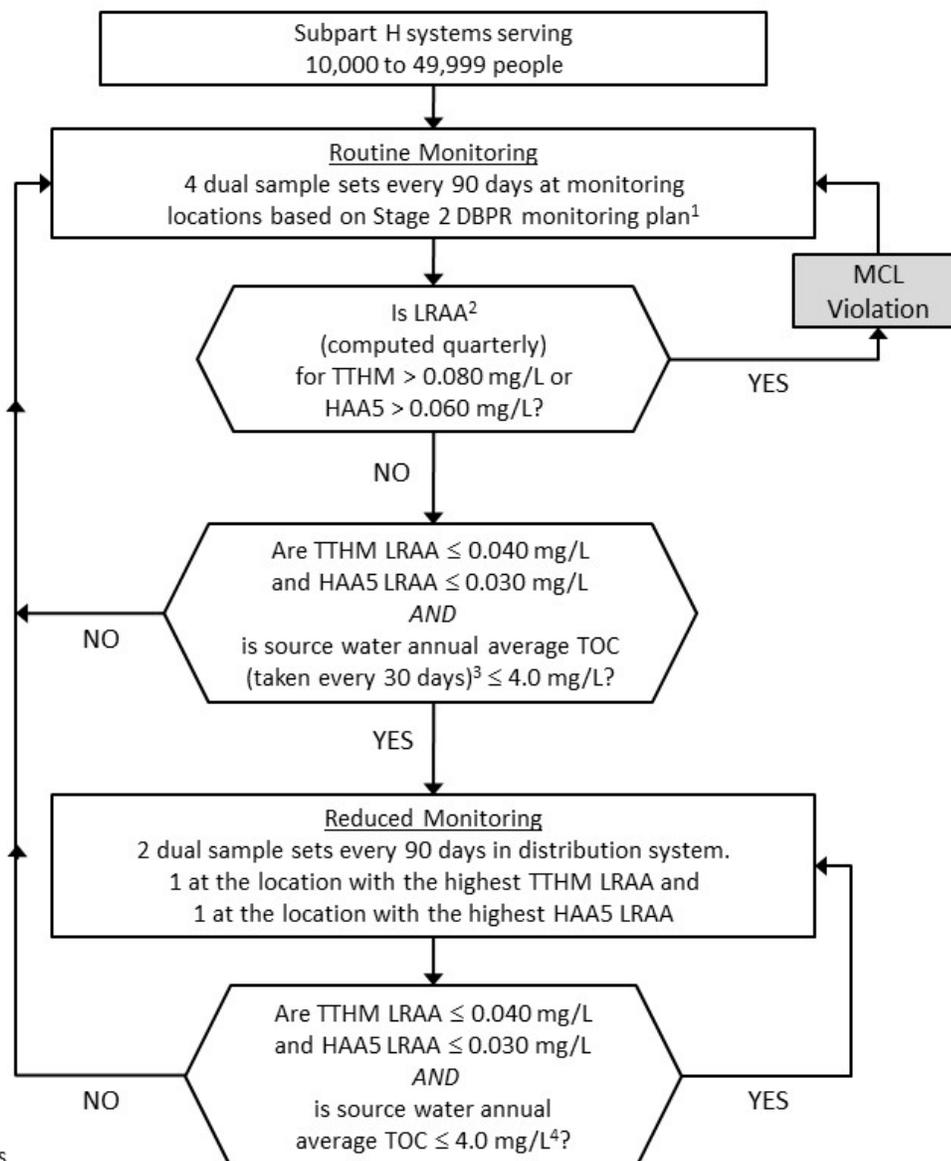
THM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 50,000 to 249,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

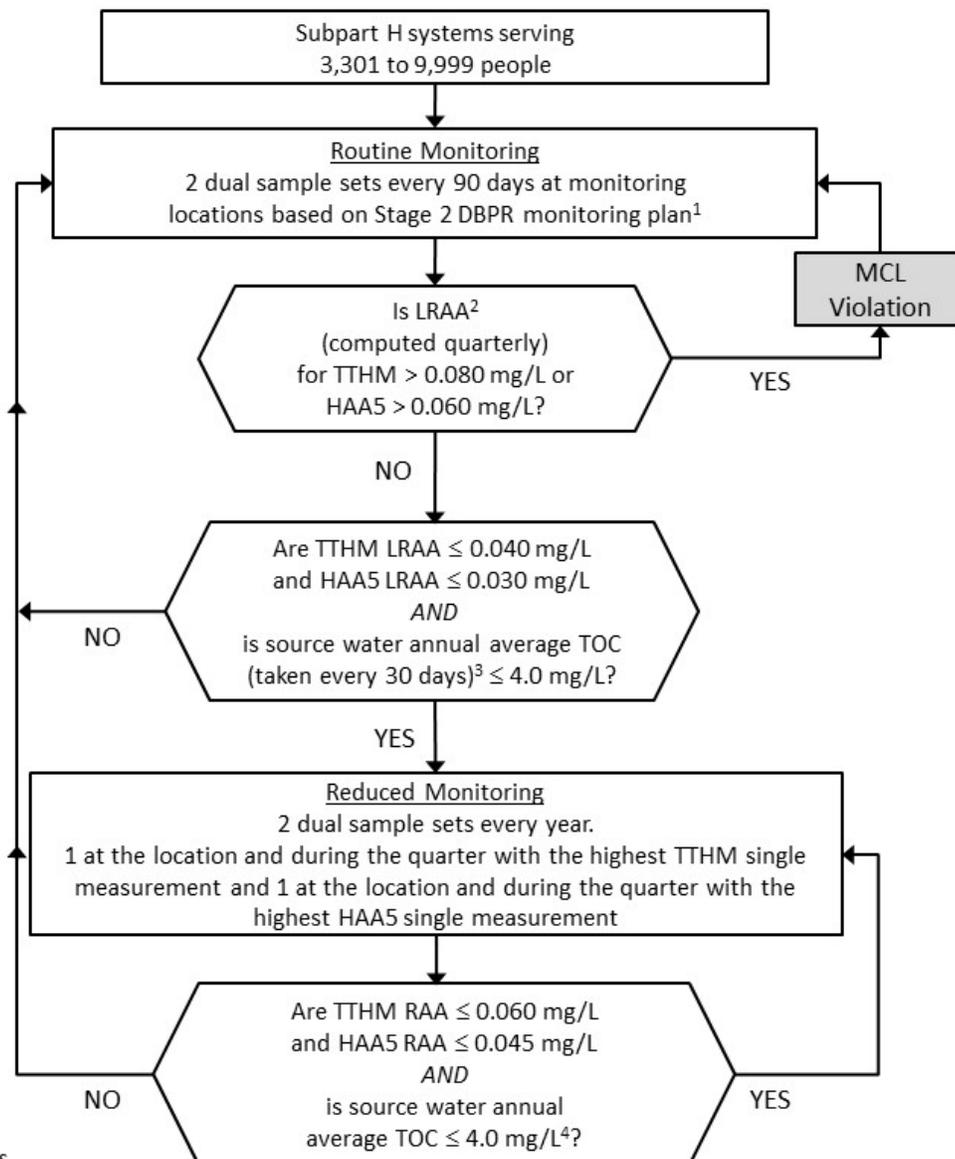
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 10,000 to 49,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

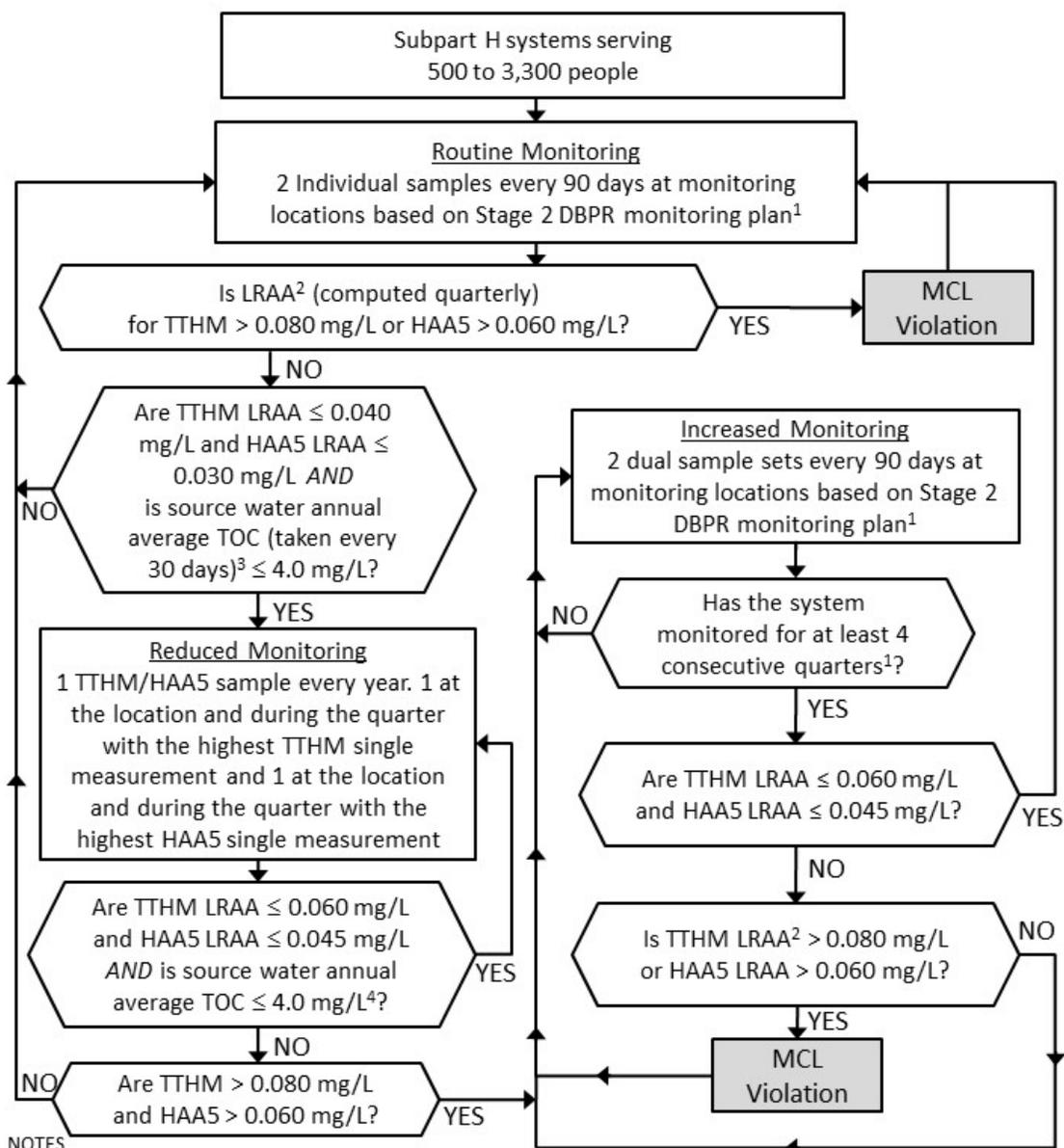
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 3,301 to 9,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

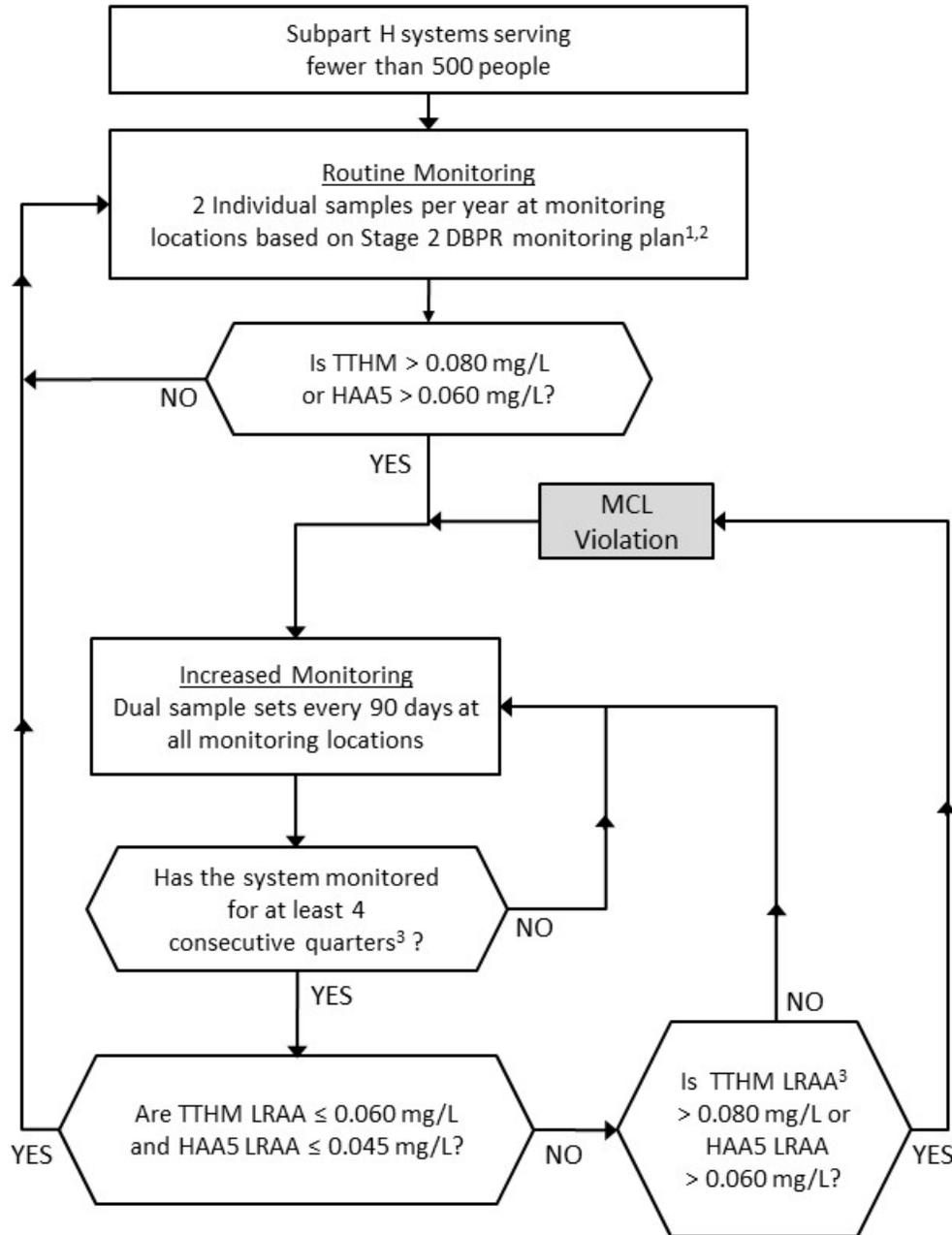
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 500 to 3,300 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
3. Subpart H systems which use conventional filtration must monitor for TOC monthly instead of every 30 days.
4. Subpart H systems that do not use conventional filtration qualify for reduced TTHM and HAA5 monitoring, a system may reduce source water TOC monitoring to TOC samples taken every 90 days. Subpart H systems using conventional filtration must remain on monthly TOC monitoring until the system's annual average treated water TOC < 2.0 mg/L for 2 consecutive years or < 1.0 mg/L for one year. After systems meet this requirement, they can reduce TOC monitoring from monthly to quarterly.

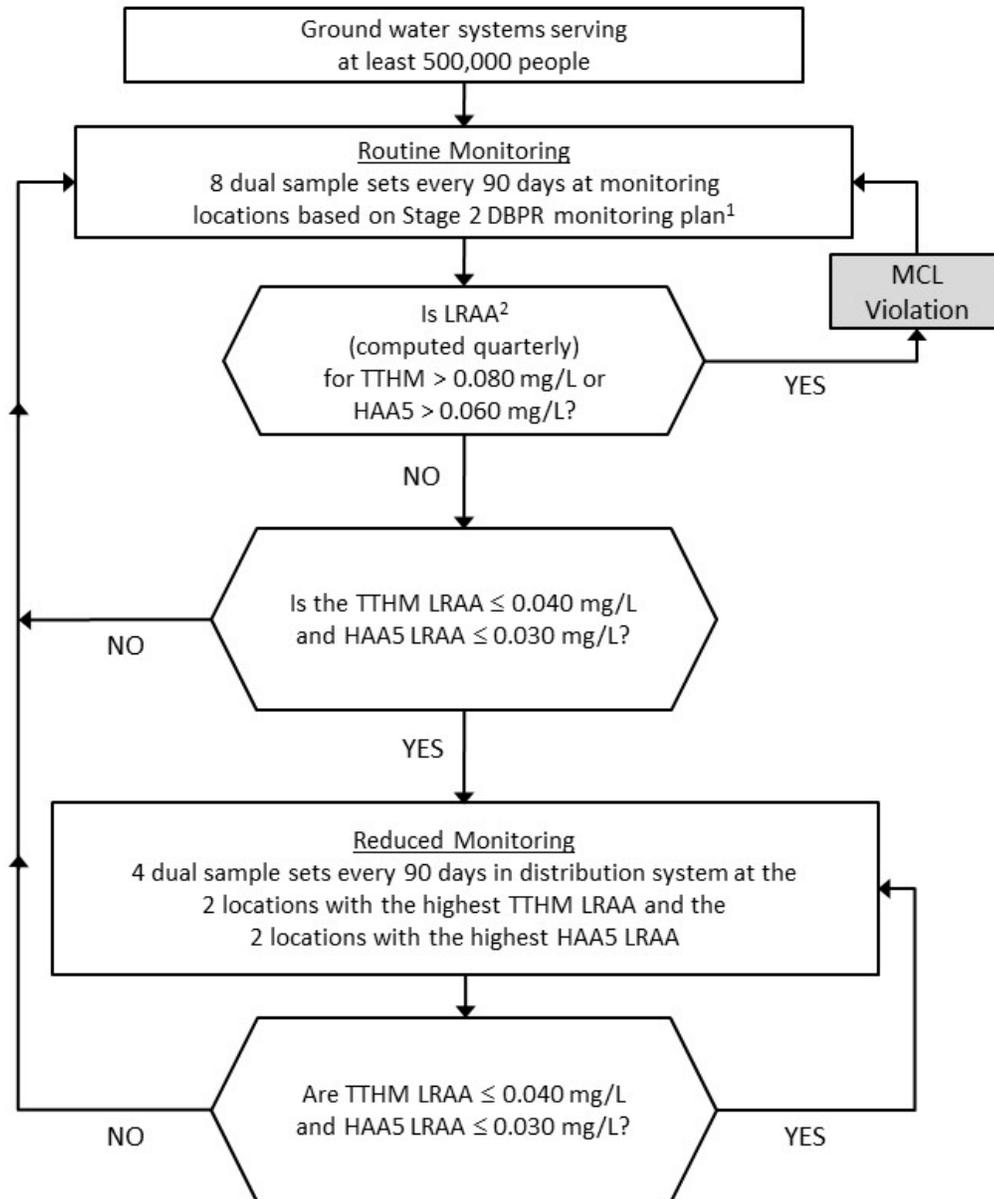
TTHM and HAA5 monitoring requirements for Subpart H systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves fewer than 500 people



NOTES

1. Only one dual sample set at one monitoring location per year is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.
2. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
3. Systems must calculate the arithmetic average of results for each monitoring location. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

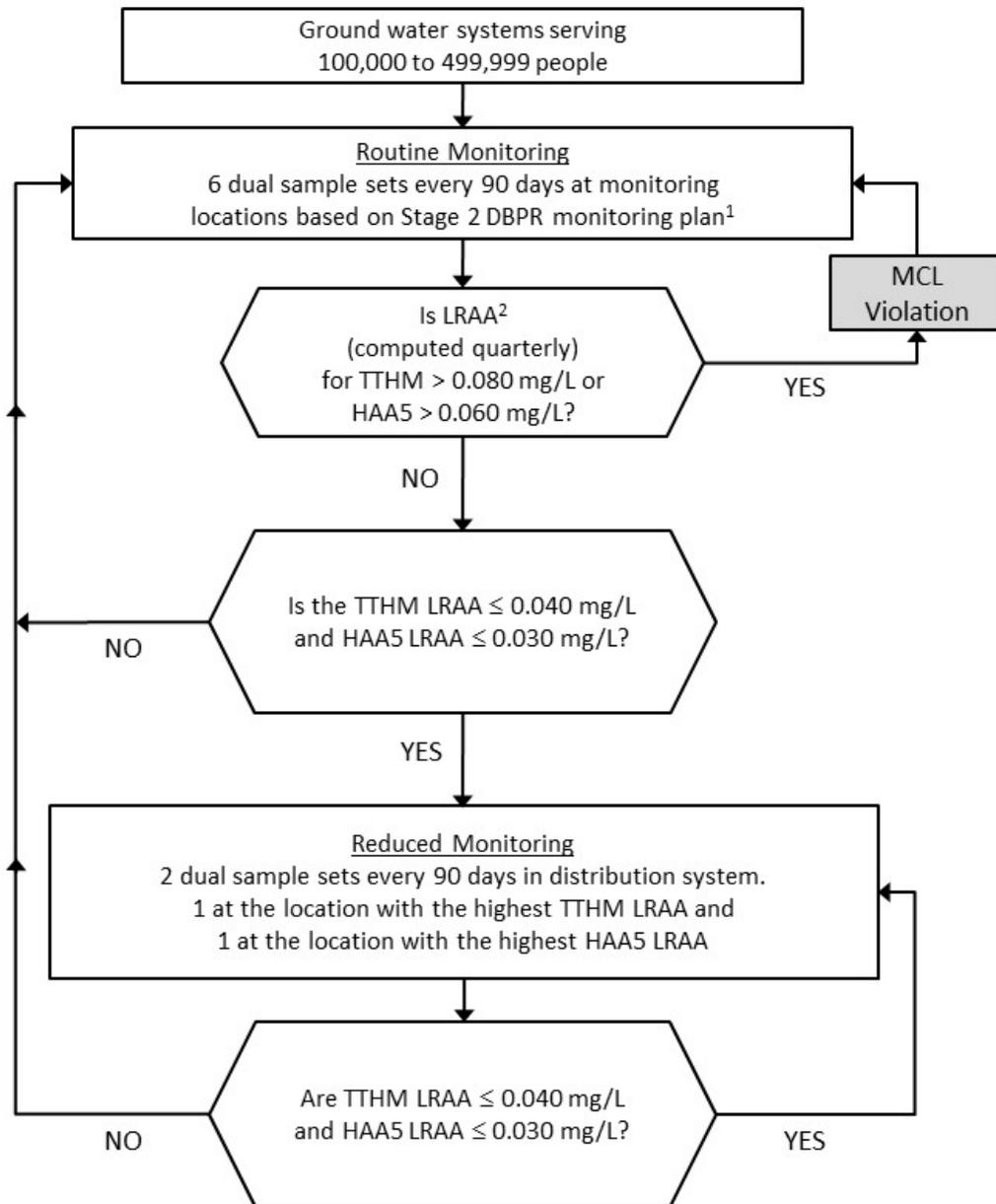
TTHM and HAA5 monitoring requirements for ground water systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves at least 500,000 people



NOTES

1. Monitoring locations must be based on Stage 2 DPBR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

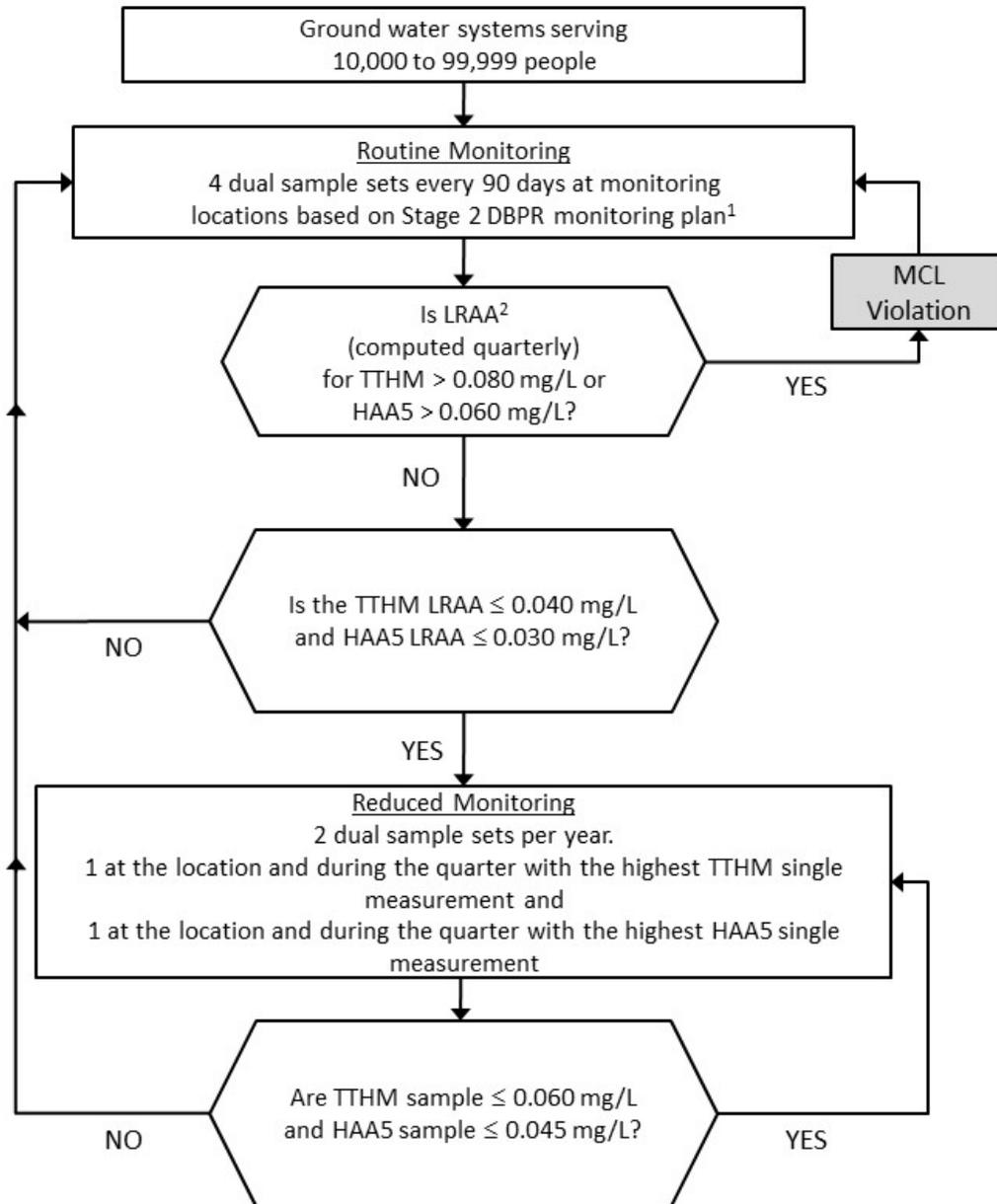
TTHM and HAA5 monitoring requirements for ground water systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 100,000 to 499,999 people



NOTES

- 1 Monitoring locations must be based on Stage 2 DBPR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

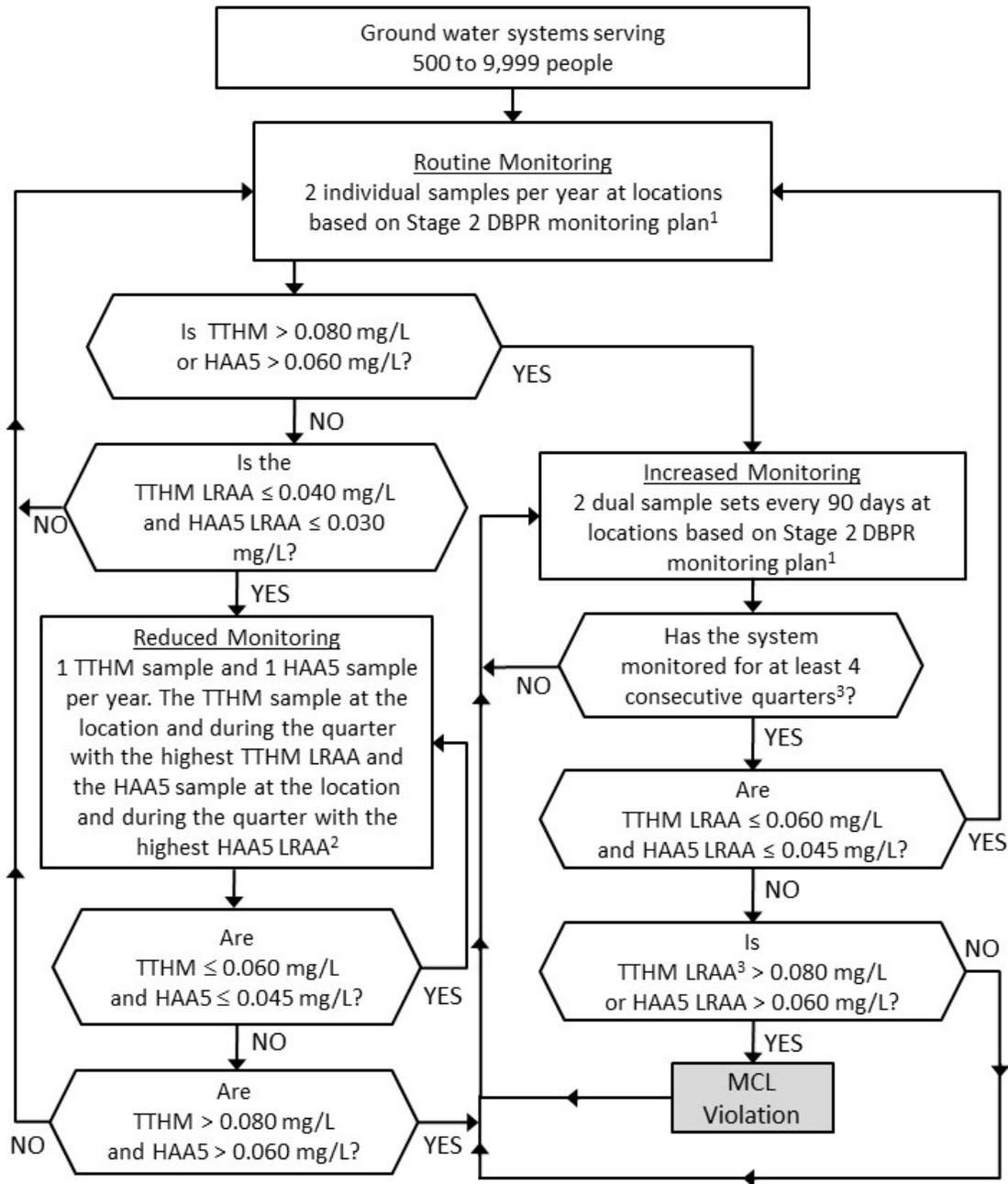
TTHM and HAA5 monitoring requirements for ground water systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 10,000 to 99,999 people



NOTES

1. Monitoring locations must be based on Stage 2 DBPR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. Systems must calculate the arithmetic average of results for each monitoring location, and an exceedance at any location is an MCL violation. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

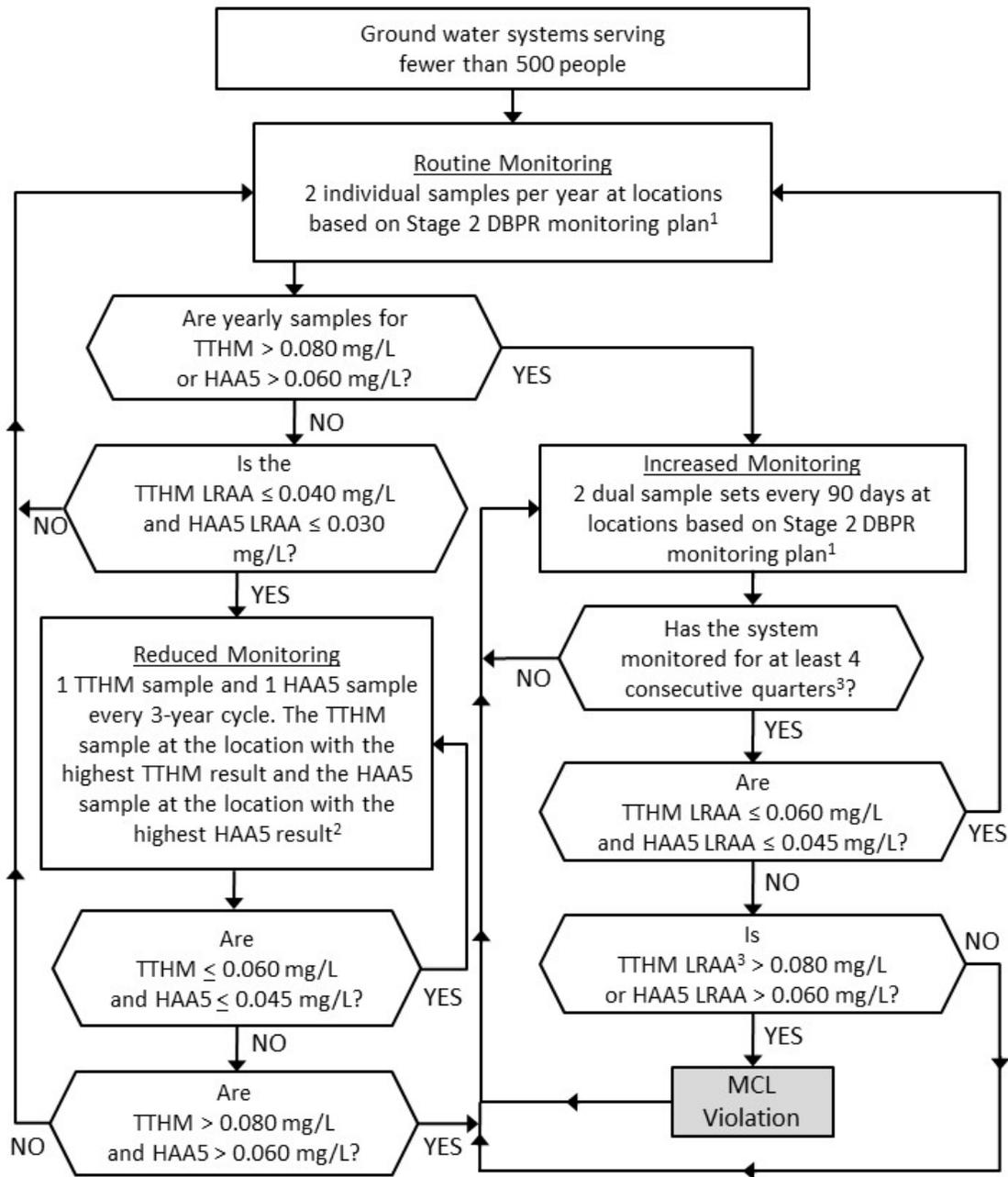
TTHM and HAA5 monitoring requirements for ground water systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves 500 to 9,999 people



NOTES

1. Monitoring locations must be based on the Stage 2 DBPR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. One dual sample set per year if the highest TTHM and HAA5 measurements occurred in the same location and quarter.
3. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

TTHM and HAA5 monitoring requirements for ground water systems that deliver water that has been treated with a disinfectant other than UV light and the largest system in the CDS serves fewer than 500 people



NOTES

1. Monitoring locations must be based on the Stage 2 DBPR monitoring plan. See Attachment 1 for an explanation of the site selection protocol.
2. One dual sample set per year if the highest TTHM and HAA5 measurements occurred in the same location and quarter.
3. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.

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Attachment 3: CWSs and NTNCWSs that deliver water that has been treated with chlorine or chloramines

ROUTINE MONITORING

If you deliver water that has been treated with chlorine or chloramines, you must sample for chlorine and chloramines at the same time and location as your Revised Total Coliform Rule (RTCR) samples.

REDUCED MONITORING

There is no reduced monitoring specifically allowed for chlorine and chloramines samples. Your chlorine and chloramines samples are tied to your RTCR routine and repeat samples.

COMPLIANCE

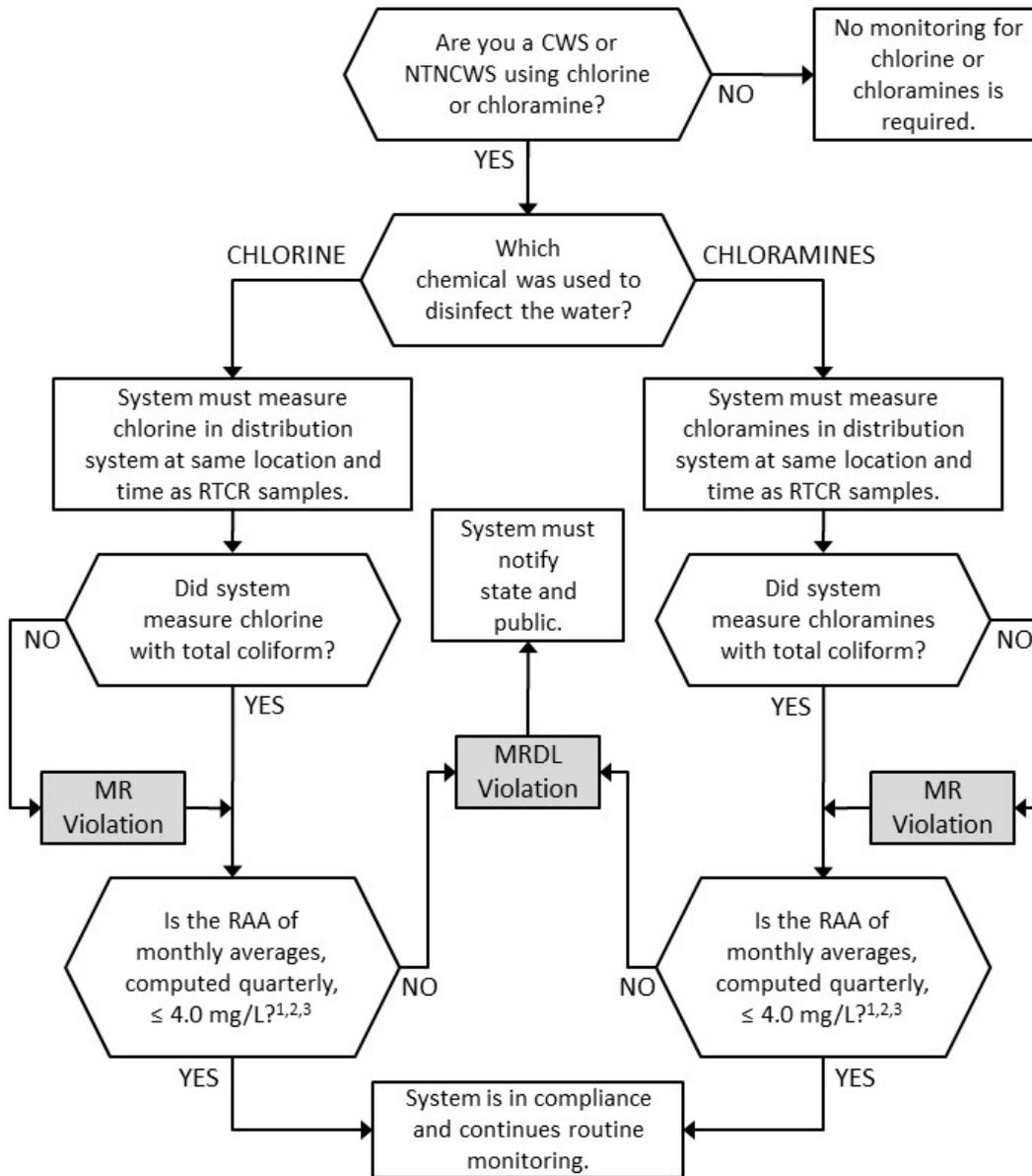
You must notify the public and report to the state if you are in violation. You must determine compliance with a RAA, computed quarterly, of monthly averages of all samples collected. If an annual arithmetic average of monthly averages covering any consecutive 4-quarter period exceeds the MRDL, then you are in violation of the MRDL. If you switch between chlorine and chloramines for residual disinfection during the year, you must determine compliance by including together all monitoring results for both chlorine and chloramines.

The MRDL for chlorine and chloramines is 4.0 mg/L. Notwithstanding the MRDL, 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.

REPORTING

You must report to the state within 10 days after the end of each quarter during which samples were collected. You must report the number of samples taken during each month of last quarter, the monthly arithmetic average of all samples taken in each month and the RAA of all monthly averages for the last 12 months. You also must report whether a MRDL was exceeded.

Monitoring Requirements for Chlorine and Chloramines



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. The RAA is first calculated after first 12 months of monitoring.

Attachment 4: Systems that deliver water that has been treated with chlorine dioxide

SYSTEMS ADDING CHLORINE DIOXIDE

If you treat water with chlorine dioxide you must sample for chlorine dioxide as a residual disinfectant. All CWSs, NTNCWSs and TNCWSs that add chlorine dioxide, regardless of the purpose (for example, disinfection, oxidation, or maintenance of a residual), must monitor for chlorine dioxide. You must comply with the MRDL for chlorine dioxide, which is 0.8 mg/L.

CHLORINE DIOXIDE ROUTINE MONITORING

You must sample every day you use chlorine dioxide at the entry point to the distribution system. If any daily sample exceeds the MRDL, you must conduct increased monitoring.

CHLORINE DIOXIDE INCREASED MONITORING

If any daily chlorine dioxide sample exceeds the MRDL, you must take three samples the following day. If you operate booster chlorination you must sample as close as possible to the first customer, at a location in the distribution system representing average residence time and as close as possible to the end of the distribution system. If you do not operate booster chlorination then all samples must be as close as possible to the first customer at intervals of at least 6 hours.

CHLORINE DIOXIDE REDUCED MONITORING

There is no reduced monitoring for the daily sampling of chlorine dioxide.

CHLORINE DIOXIDE COMPLIANCE

You must notify the public and report to the state if you are in violation. There are acute and non-acute violations for chlorine dioxide monitoring. You have incurred an acute violation if any daily sample taken at entrance to the distribution system exceeds 0.8 mg/L, and on the following day one or more of the three samples taken in the distribution system exceeds 0.8 mg/L. You 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. 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.

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, you have incurred a non-acute violation. The system must take immediate corrective action to lower the level of chlorine dioxide below 0.8 mg/L. Failure to take samples at the entrance to the distribution system following an exceedance of the MRDL is also a non-acute violation.

CHLORINE DIOXIDE REPORTING

You must report to the state within 10 days after the end of each quarter during which samples were collected.

You must report the dates, results and locations of chlorine dioxide samples taken during last quarter, whether a MRDL was exceeded and whether a MRDL was exceeded in any two consecutive daily samples. You must report any acute or non-acute violations.

CWSS AND NTNCWSS DELIVERING WATER TREATED WITH CHLORINE DIOXIDE

If you deliver water treated with chlorine dioxide, you must sample for chlorite as a contaminant. All CWSSs and NTNCWSSs that deliver water treated with chlorine dioxide must monitor for both chlorine dioxide and for the DBP, chlorite. You must comply with the MRDL for chlorine dioxide, which is 0.8 mg/L. In addition, you must comply with the MCL for chlorite, which is 1.0 mg/L. The requirements to sample for both chlorine dioxide and chlorite help to improve public health by reducing exposure to DBPs.

CHLORITE ROUTINE MONITORING

You must sample for chlorite every day you deliver water treated with chlorine dioxide at the entry point to the distribution system. If any daily sample exceeds 1.0 mg/L you must conduct increased monitoring.

Additionally, you must collect one 3-sample set per month. One sample must be taken from the location representative of average residence time in the distribution system, one sample from the location representing maximum residence time and one sample at the entry point to the distribution system.

CHLORITE INCREASED MONITORING

If any daily sample exceeds 1.0 mg/L, you must take three samples the following day. You must sample as close as possible to the first customer, at a location representative of maximum residence time and at a location representative of average residence time in the distribution system.

CHLORITE REDUCED MONITORING

There is no reduced monitoring for the daily samples for chlorite.

If you qualify and your state allows, you may reduce monthly chlorite monitoring to one 3-sample set per quarter if no daily or monthly sample has exceeded the MCL and no additional monitoring has been required. The quarterly 3-sample set must be taken from a location near the first customer, a location representative of average residence time and a location representative of maximum residence time in distribution system.

CHLORITE COMPLIANCE

You must notify the public and report to the state if you are in violation.

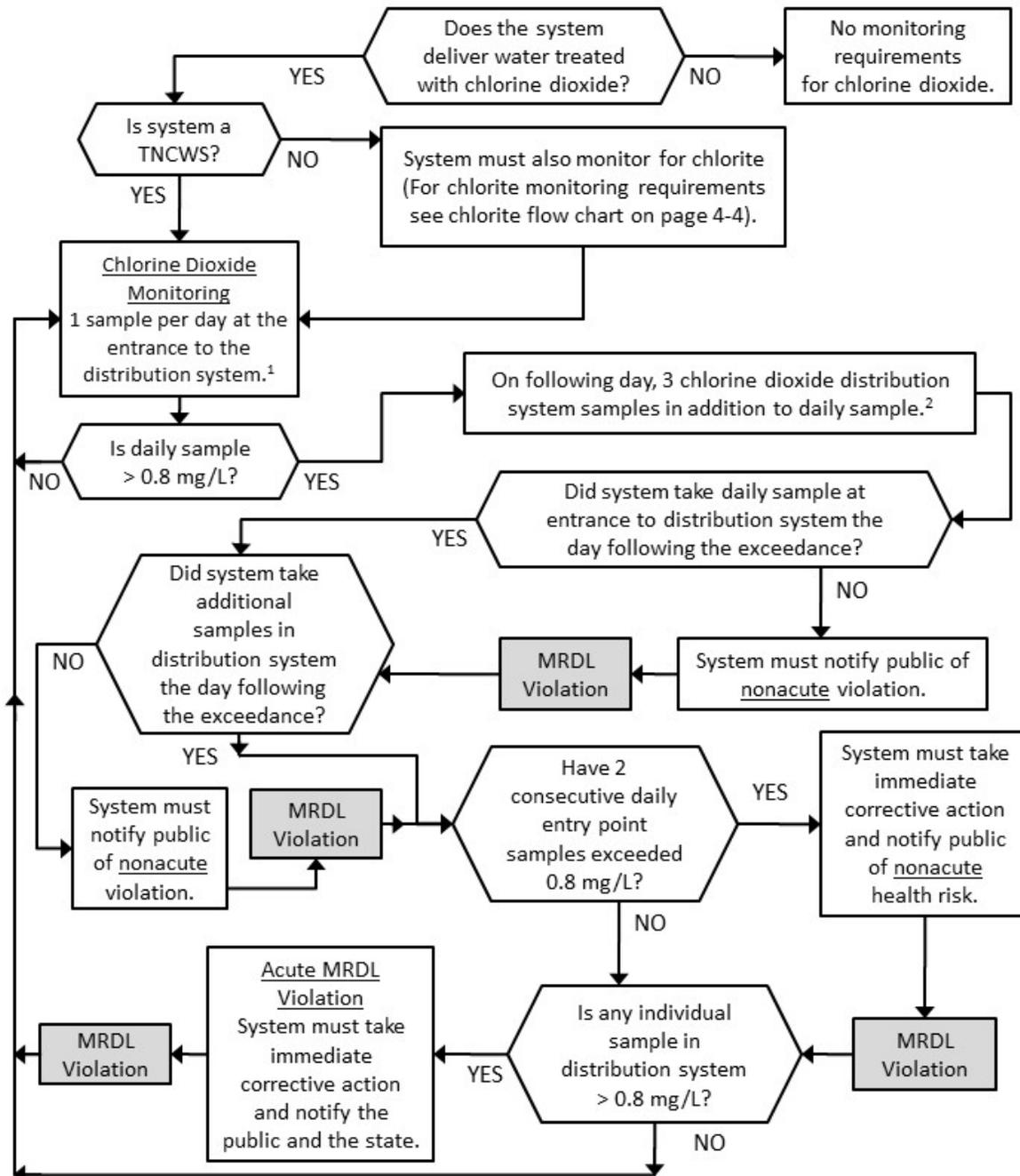
Compliance for the chlorite MCL is determined by an average of 3-sample sets. If the arithmetic average of any 3-sample set in the month exceeds the MCL, the system is in violation.

CHLORITE REPORTING

You must report to the state within 10 days after the end of each quarter during which samples were collected.

You must report the number of chlorite samples taken during the last 3 months, and the location, date and result of each sample taken during the last quarter. You must report the monthly arithmetic average of all samples taken in each 3-sample set taken, and you also must report whether the MCL was exceeded and how many times it was exceeded in the 3 months.

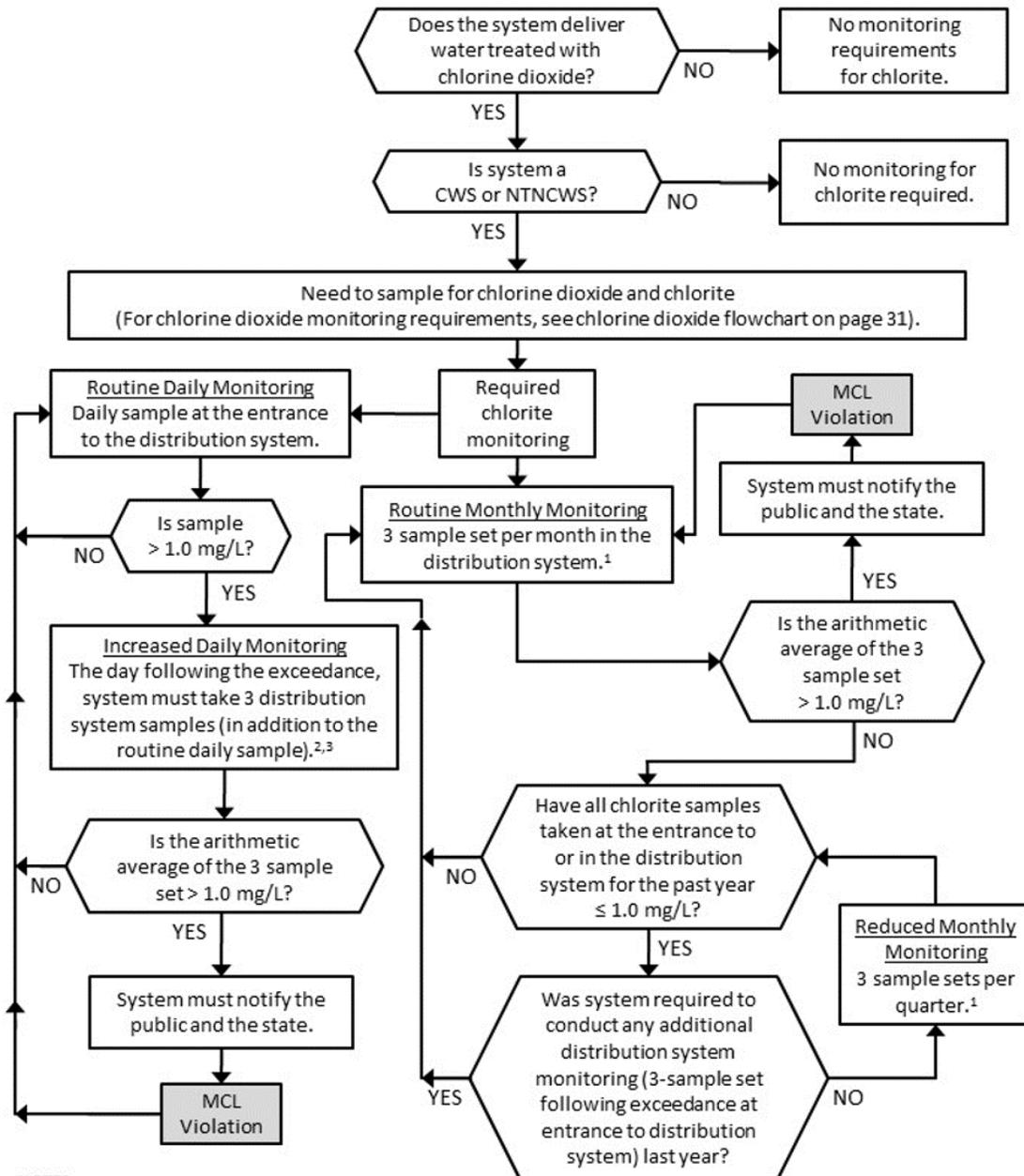
Chlorine Dioxide Monitoring Requirements for Systems Adding Chlorine Dioxide



NOTE

1. Sample taken every day that chlorine dioxide is used.
2. If chlorine dioxide, chloramines, or chlorine are used to maintain a disinfectant residual in the distribution system, and there are no disinfection addition points (i.e., no booster chlorination) after the entrance to the distribution system, 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 distribution system and there are one or more booster chlorination stations, the system must take one sample as close to the first 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 CWSs and NTCWSs Delivering Water Treated with Chlorine Dioxide



NOTES

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. The system must take one sample at each of the following locations: as close as possible to the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system.
3. If the system has not performed the routine monthly sampling for chlorite, they can use this 3 sample set for their monthly chlorite samples.

Attachment 5: Systems that deliver water that has been treated with ozone

If you are CWS or NTNCWS that operates a treatment plant that uses ozone, you must monitor for the DBP bromate.

ROUTINE MONITORING

You must collect one bromate sample per month per treatment plant at the entry point to the distribution system while the ozonation system is operating under normal conditions.

REDUCED MONITORING

You may collect one bromate sample per quarter per treatment plant at the entry point to the distribution system.

If you qualify and your state allows, you may conduct reduced monitoring only if the RAA of your routine monitoring bromate results is less than or equal to 0.0025 mg/L.

COMPLIANCE

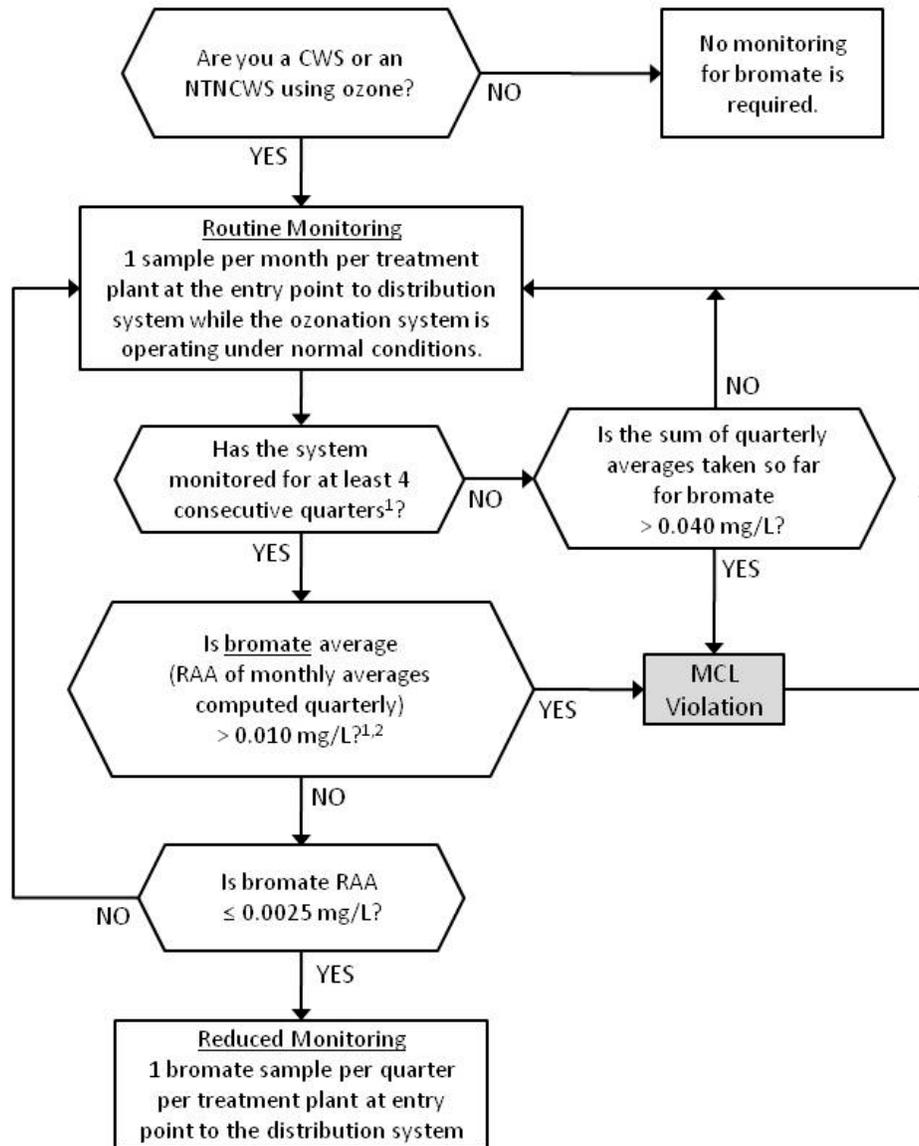
The MCL for bromate is 0.010 mg/L. You must notify the public and report to the state if you are in violation of the MCL. Bromate compliance is determined by a running annual arithmetic average, computed quarterly, of monthly samples (or average of all samples taken during the month if more than one sample was collected). If the average of monthly samples covering any consecutive 4-quarter period exceeds the MCL, the system is in violation.

If you fail to monitor, you are in violation of the monitoring requirements for each quarter that the monitoring result would have been used in the compliance calculation. All samples taken and analyzed under the provisions of your monitoring plan must be included in determining compliance, even if there are more than the minimum required. If during the first year of monitoring, any individual quarter's average will cause the RAA of that system to exceed the MCL, the system is out of compliance at the end of that quarter.

REPORTING

You must report to the state within 10 days after the end of each quarter during which samples were collected. You must report the number of samples taken during last quarter, the location, date and result of each sample and the arithmetic average of monthly arithmetic averages of all samples taken in the last year. You also must report whether the MCL was exceeded.

Monitoring Requirements for Bromate for Systems Using Ozone



NOTES

1. If a PWS fails to complete 4 consecutive quarters of monitoring, compliance with the MCL for the last 4-quarter period must be based on the average of available data.
2. The average is based upon representative monthly bromide measurements for 1 year (in months where more than one sample is taken, use the average of all samples taken during the month).

Attachment 6: Subpart H systems that operate a conventional filtration treatment plant

If you operate a Subpart H system and operate a conventional treatment plant, then you must comply with TOC removal requirements.

ROUTINE MONITORING

You must take one monthly paired TOC sample and one monthly alkalinity sample at the same time. The TOC paired sample includes one measurement from the source water prior to any treatment, and one measurement no later than the point of combined filter effluent turbidity monitoring and representative of filtered water. The alkalinity sample must be taken at the same location as the source water TOC sample.

REDUCED MONITORING

If you qualify and your state allows, you may reduce monitoring to one paired TOC sample and one alkalinity sample at the same time per quarter, if you have an average treated water TOC less than 2.0 mg/L for 2 consecutive years, or less than 1.0 mg/L for 1 year. Reduced monitoring locations are the same as routine monitoring locations.

COMPLIANCE

There are different ways of determining compliance with the TOC removal requirement. Using the monitoring results you can determine TOC removal using enhanced coagulation or enhanced softening. The required TOC removal is listed in the table below.

Table 6.1 - Step 1 TOC – TOC Removal (3 by 3 Matrix)

Source Water TOC (mg/L)	Source Water Alkalinity, mg/L as CaCO ₃		
	0-60	> 60-120	>120
> 2.0 to 4.0	35.0%	25.0%	15.0%
> 4.0 to 8.0	45.0%	35.0%	25.0%
> 8.0	50.0%	40.0%	30.0%

You may also show you are in compliance with the TOC removal requirement by using one of the following alternative compliance criteria:

1. RAA of monthly source water TOC samples less than 2.0 mg/L.
2. RAA of monthly treated water TOC samples less than 2.0 mg/L.
3. RAA of source water TOC less than 4.0 mg/L, RAA of source water alkalinity greater than 60 mg/L, and either:
 - a. TTHM RAA less than or equal to 0.040 mg/L and HAA5 RAA less than or equal to 0.030 mg/L; or
 - b. The CWS or NTNCWS has made a “clear and irrevocable commitment” to installing technology to limit TTHM and HAA5 to those levels.
4. TTHM RAA less than or equal to 0.040 mg/L and HAA5 RAA less than or equal to 0.030 mg/L, and the CWS or NTNCWS uses only chlorine for primary disinfection and maintenance of a residual.
5. RAA of SUVA prior to any treatment less than or equal to 2.0 L/mg-m.

6. RAA of treated water SUVA less than or equal to 2.0 L/mg-m.
7. Softening systems only: Softening that results in a RAA of treated water alkalinity less than 60 mg/L (as calcium carbonate).
8. Softening systems only: Softening that results in a RAA for the removal of magnesium hardness (as calcium carbonate) of at least 10 mg/L.

Finally, if you cannot achieve compliance with TOC removal requirement using one of these two methods you should contact your state and discuss Step 2 TOC removal or a waiver.

Where 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. All samples taken under the provisions of the monitoring plan must be included in determining compliance, even if that number is greater than the minimum required.

REPORTING

You must report to the state within 10 days after the end of each quarter during which samples were collected. You must report the number of paired samples taken during last quarter, the location, date and result of each paired sample and associated alkalinity taken during last quarter. You also must report whether system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements for the last 4 quarters.

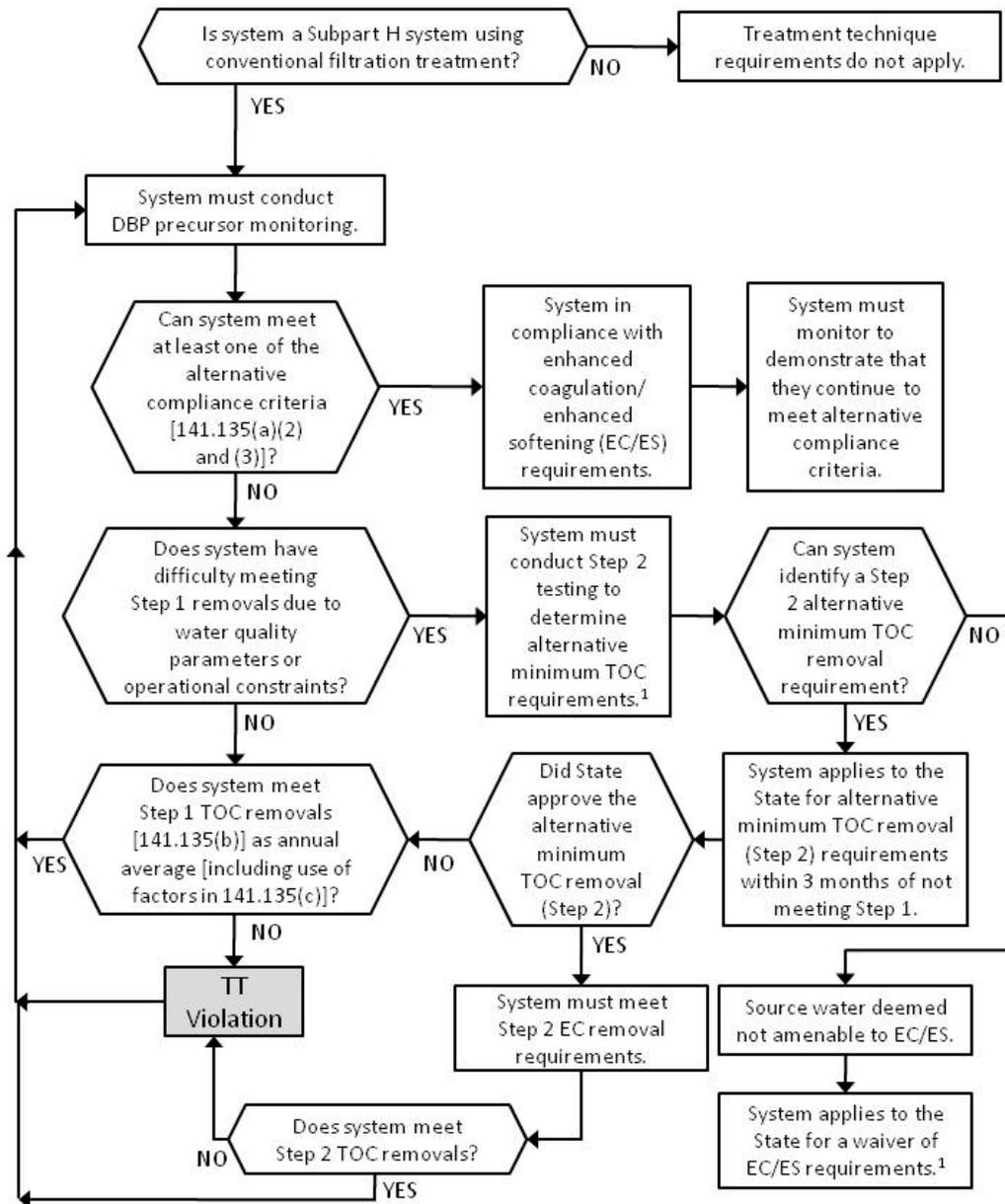
Systems using Step 1 or Step 2 enhanced coagulation or enhanced softening must report:

- 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.
- Calculations for determining compliance with TOC percent removal requirements.

Systems using an alternative compliance criterion must report:

- RAA of source water SUVA or treated water SUVA if using this criterion for alternative compliance.
- RAA based on monthly average of source or treated water TOC if using this criterion for alternative compliance.
- RAA of source water alkalinity or treated water alkalinity if using this criterion for alternative compliance.
- RAA for both TTHM and HAA5 if using this criterion for alternative compliance.
- RAA of amount of magnesium hardness removal if using this criterion for alternative compliance.
- Whether system is in compliance with particular alternative compliance criterion.

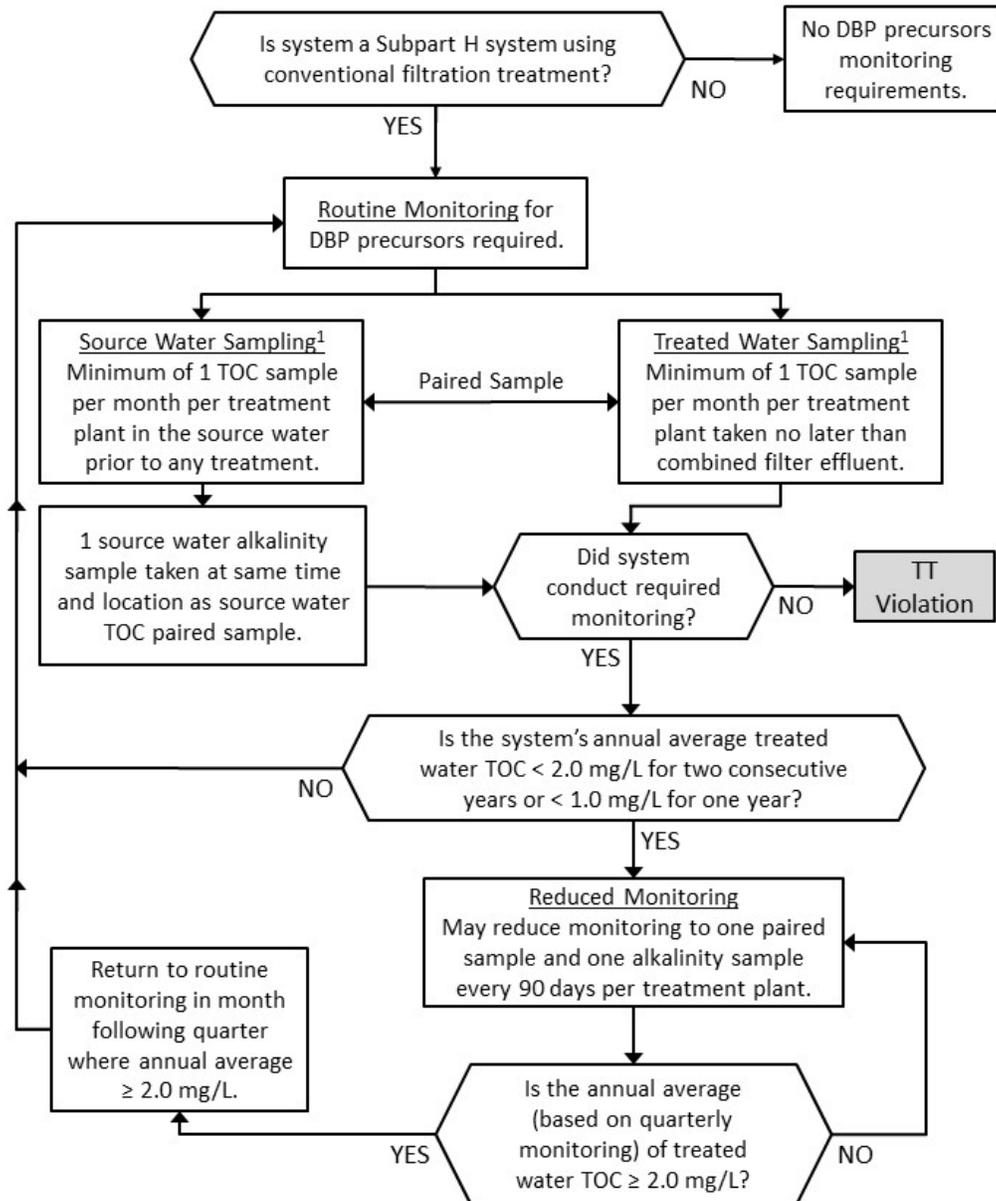
Disinfection Byproducts Precursor Removal Treatment Technique



NOTE

1. Until the system receives a waiver from the state, they must meet Step 1 removals.

Monitoring Requirements for Disinfection Byproduct Precursors



NOTE

1. The source water and the treated water samples are referred to as paired samples and are to be taken simultaneously.