

Stage 1 and Stage 2 Disinfectants and Disinfection Byproduct Rules: Laboratory Quick Reference Guide

Overview of the Rules

Title*	<p>Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) 63 FR 69390, December 16, 1998, Vol. 63, No. 241</p> <p>Revisions to the Interim Enhanced Surface Water Treatment Rule (IESWTR), the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR), and Revisions to State Primacy Requirements to Implement the Safe Drinking Water Act (SDWA) Amendments 66 FR 3770, January 16, 2001, Vol. 66, No. 29</p> <p>Stage 2 Disinfectants and Disinfection Byproducts Rule (Stage 2 DBPR) 71 FR 388, January 4, 2006, Vol. 71, No. 2</p>
Purpose	<p>Improve public health protection by reducing exposure to disinfection byproducts. Some disinfectants and disinfection byproducts (DBPs) have been shown to cause cancer and reproductive effects in lab animals and are suspected to cause bladder cancer and reproductive effects in humans.</p>
General Description	<p>The Stage 1 DBPR is the first of a staged set of rules that will reduce the allowable levels of DBPs in drinking water. The new rule establishes seven new standards and a treatment technique of enhanced coagulation or enhanced softening to further reduce DBP exposure. The rule is designed to limit capital investments and avoid major shifts in disinfection technologies until additional information is available on the occurrence and health effects of DBPs. The Stage 2 DBPR bases total trihalomethanes (TTHM) and haloacetic acids (HAA5) compliance on a locational running annual average (LRAA) calculated at each monitoring location.</p>
<p>*This document provides a summary of federal drinking water requirements; to ensure full compliance, please consult the federal regulations at 40 CFR 141 and any approved state requirements.</p>	

Critical Deadlines and Requirements

January 1, 2002**	<p>Surface water systems and ground water systems under the direct influence of surface water (GWUDI) serving $\geq 10,000$ people must comply with the Stage 1 DBPR requirements.</p>
January 1, 2004**	<p>Surface water systems and GWUDI serving $< 10,000$, and all ground water systems must comply with the Stage 1 DBPR requirements.</p>
April 1, 2009	<p>Systems that use ozone must qualify for reduced monitoring using a Bromate running annual average (RAA) of less than or equal to 0.0025 mg/L. Systems can no longer qualify for reduced monitoring using source water Bromide monitoring.</p>

**This is the compliance date for TTHM/HAA5 running annual average (RAA) under Stage 1 DBPR. For compliance dates under Stage 2 DBPR see the Quick Reference Guides for the rule.

Routine Monitoring Requirements

Regulated Contaminants/ Disinfectants	Requirement
TTHM/HAA5	<p>Under the Stage 1 DBPR the monitoring frequency is based on the system's source water type, number of persons served, and number of plants. Under Stage 2 DBPR, the monitoring frequency is based on the system's source water type and number of persons served. Systems may be required to monitor quarterly or yearly depending on system size.</p>
Bromate	<p>Systems that disinfect their water using ozone must monitor for bromate monthly at the entrance to the distribution system.</p>
Chlorite	<p>Systems that disinfect their water using chlorine dioxide must monitor for chlorite daily at the entrance to the distribution system and monthly in the distribution system.</p>
Chlorine/Chloramines	<p>All systems must monitor for chlorine/chloramines at the same location and with the same frequency as Total Coliform Rule sampling.</p>
Chlorine dioxide	<p>Systems that disinfect their water using chlorine dioxide must monitor for chlorine dioxide daily at the entrance to the distribution system.</p>
DBP precursors (TOC/ Alkalinity/SUVA)	<p>Systems that use conventional filtration systems must monitor monthly for total organic carbon and alkalinity or the specific ultraviolet absorbance (SUVA) alternative.</p>

Laboratory Considerations

Obtain certification (or state approval) to perform new analyses.
 Become familiar with new monitoring requirements.
 Prepare for increased number of samples (e.g., storage, supplies, staff).
 Schedule to accommodate large number of samples, holding times, and demands on instrumentation.

The table on the reverse is a brief summary of available methods. The entire list of methods may be found in 40 CFR 141, Subpart C.



For additional information on the Stage 1 or Stage 2 DBPR

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA Web site at <http://water.epa.gov/drink>; or contact your state or local primacy agency's drinking water representative.

Routine Monitoring Requirements

Regulated Contaminants/ Disinfectants	MCL (mg/L)	MRDL (mg/L)	Analytical Method(s)	Preservation/Quenching Agent	Holding Time Sample/ Extract	Sample Container Size & Type ¹
TTHM* (Sum of: Chloroform Bromochloromethane Dibromochloromethane Bromoform)	0.080		EPA 502.2	Ascorbic acid or sodium thiosulfate. Adjust to pH <2 with HCL (dechlorinate before adding acid).	14 days at 4°C	40 - 120 mL glass w/Teflon-lined septum
			EPA 524.2	Ascorbic acid (if gases are included); otherwise, sodium thiosulfate. Adjust to pH <2 with HCl (dechlorinate before adding acid).		
			EPA 524.3	If only TTHM analysis: sodium thiosulfate. If all VOCs included: use maleic acid/ascorbic acid.	48 hours at ≤ 10°C, then 14 days at ≤ 6°C	40 - 60 mL glass w/Teflon-lined septum
			EPA 551.1	If only TTHM analysis: ammonium chloride. If full target list: sodium sulfite.	Samples: 14 days at 4°C. Extracts: 14 days at < -10°C	60 mL glass w/Teflon-lined septum
HAA5* (Sum of: Monochloroacetic acid Dichloroacetic acid Trichloroacetic acid Monobromoacetic acid Dibromoacetic acid)	0.060		EPA 552.1	Ammonium chloride	Samples: 28 days at 4°C away from light. Extracts: 48 hours at ≤ 4°C	> 100 mL amber glass w/Teflon-lined septum
			EPA 552.2	Ammonium chloride	Samples: 14 days at 4°C away from light. Extracts: 7 days at 4°C, or 14 days at ≤ -10°C	> 50 mL amber glass w/Teflon-lined septum
			EPA 552.3	Ammonium chloride	Samples: 14 days at ≤ 6°C away from light. Extracts: 21 days (MTBE extracts) or 28 days (TAME extracts) at ≤ -10°C	> 50 mL amber glass w/Teflon-lined septum
			EPA 557	Ammonium chloride	48 hours at ≤ 10°C, then 14 days at ≤ 6°C	40 mL amber glass w/Teflon-lined septum
			SM 6251B	Ammonium chloride	Samples: 14 days at 4°C. Extracts: 21 days at -11°C	40 - 60 mL glass vial w/Teflon-lined septum
						28 days
Bromate*	0.010		EPA 317.0, Rev. 2.0; EPA 326.0 ²	Ethylenediamine	28 days at < 6°C	> 30 mL opaque plastic or glass
			EPA 321.8 ²	Ethylenediamine	28 days	> 30 mL plastic or glass
			EPA 302.0	Ethylenediamine	28 days ≤ 6°C	> 20 mL plastic or glass
			EPA 557	Ammonium chloride	48 hours at ≤ 10°C, then 14 days at ≤ 6°C	> 40 mL amber glass w/Teflon-lined septum
			SM 4500-ClO ₂ E	None	Immediately	> 500 mL plastic or glass
						Remove 1 mL sample from vial and replace with 1 mL citric acid/glycine buffer.
Chlorite* (Daily at entrance to distribution system)	1.0		EPA 327.0, Rev. 1.1	Ethylenediamine	14 days < 4°C	> 30 mL opaque glass or plastic
			EPA 300.0, Rev. 2.1; EPA 300.1; ASTM D 6581-00, 08 A, B	Ethylenediamine	14 days < 6°C	> 30 mL opaque glass or plastic
			EPA 317.0, Rev. 2.0; EPA 326.0	Ethylenediamine	14 days < 4°C	> 30 mL opaque glass or plastic
			EPA 300.0, Rev. 2.1; EPA 300.1; ASTM D 6581-00, 08 A, B	Ethylenediamine	14 days < 6°C	> 30 mL opaque glass or plastic
			EPA 317.0, Rev. 2.0; EPA 326.0	Ethylenediamine	14 days < 6°C	> 30 mL opaque glass or plastic
			Free - SM 4500-Cl D, F, G, H; EPA 334.0; ASTM D 1253-08	None	Immediately	
Chlorine* (Monthly in distribution system)	1.0	4.0 as Cl ₂	Total - SM 4500-Cl D, E, F, G, I; EPA 334.0; ASTM D 1253-08	None		
			ChloroSense (Free & Total)	None		
			D99-003 (Free)	None		
			Total - SM 4500-Cl D, E, F, G, I; ASTM D 1253-08; EPA 334.0; ChloroSense (Total)	None		
Chloramines*		4.0 as Cl ₂	Combined - SM 4500-Cl D, F, G; ASTM D 1253-08	None		
			SM 4500-ClO ₂ D, E	None		
Chlorine Dioxide*		0.8 as ClO ₂	EPA 327.0, Rev. 1.1	Remove 1 mL sample from vial and replace with 1 mL citric acid/glycine buffer.	Immediately; samples can be held up to 4 hours at ≤ 10°C	16 mL amber glass vial
			EPA 150.1; 150.2; SM 4500-H+ B; or ASTM D 1293-95, 99	None	Immediately	> 500 mL plastic or glass
pH*			SM 5310 B, C, D; EPA 415.3 for TOC or DOC portion of SUVA	Acidify TOC samples to pH < 2. Filter. DOC sample through 0.45 µm pore diameter filter as soon as possible after collection (≤ 48 hours) and then acidify same as TOC.	28 days stored at 4°C and protected from light	> 100 mL amber glass w/Teflon-lined septum
			SM 5910 B; EPA 415.3 for UV ₂₅₄ portion of SUVA	Filter; through 0.45 µm pore diameter filter as soon as possible after collection (≤ 48 hours).	≤ 48 hours stored at 4°C and protected from light	> 100 mL amber glass w/Teflon-lined septum
			ASTM D 1067-92, 02 B; SM 2320 B; I-1030-85 for alkalinity	None	14 days stored at 4°C and protected from light	> 200 mL plastic or glass

1 - Note the sample volumes specified in this table are estimates. The actual sample container volumes should be specified by the laboratory(s) performing the analyses.
 2 - Starting April 1, 2009, systems must use one of these methods to qualify for reduced bromate monitoring.
 + - Indicates the analysis must be performed by a party approved by the state.
 * - Indicates the laboratory must be certified to analyze the sample.