



Disinfection Byproducts in a Water System: A Guide for Tennessee Municipal Elected Officials

Part 5 of a 6 Part Series

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What are Disinfection Byproducts in a water system?

Disinfection Byproducts (DBPRs) are formed within a water system when chlorine and other halogens react with naturally occurring material found dispersed within the water. These byproducts include:

- Trihalomethanes (THM)
- Haloacetic acids (HAA)
- Chlorite
- Bromate

Over a long period of time if consumed at dosages greater than EPA standards may increase health risks. As water ages within the distribution system the probability of DBPRs forming increases over time.

The Byproducts Rule was added to the Safe Drinking Water Act and the first stage was published in December 1998. The second stage was published in January 2006. Sampling for DBPRs is based upon the population served and the water source of the system.

Below is a table from the U.S. Environmental Protection Agency which lists the Maximum Contaminant Level (MCL) and the Maximum Contaminant Level Goal (MCLG).¹

Regulated Contaminants	Stage 1 DBPR		Stage 2 DBPR	
	MCL (mg/L)	MCLG (mg/L)	MCL (mg/L)	MCLG (mg/L)
THM	0.080		Unchanged ²	
Chloroform		-		0.07
Bromodichloromethane		Zero		Unchanged ²
Dibromochloromethane		0.06		Unchanged ²
Bromoform		Zero		Unchanged ²
HAA5	0.060		Unchanged ²	
Monochloroacetic acid		-		0.07
Dichloroacetic acid		Zero		Unchanged ²
Trichloroacetic acid		0.3		0.2
Bromoacetic acid		-		-
Dibromoacetic acid		-		-
Bromate (plants that use ozone) ¹	0.010	Zero	Unchanged ²	Unchanged ²
Chlorite (plants that use chlorine dioxide)	1.0	0.8	Unchanged ²	Unchanged ²
Regulated Disinfectants	MRDL³ (mg/L)	MRDLG³ (mg/L)	MRDL (mg/L)	MRDLG (mg/L)
Chlorine	4.0 as Cl ₂	4	Unchanged ²	Unchanged ²
Chloramines	4.0 as Cl ₂	4	Unchanged ²	Unchanged ²
Chlorine dioxide	0.8	0.8	Unchanged ²	Unchanged ²

¹A new analytical method for bromate was established with the Stage 2 DBPR.

²Stage 2 DBPR did not revise the MCL or MRDL for this contaminant/disinfectant.

³Stage 1 DBPR included MRDLs and MRDLGs for disinfectants, which are similar to MCLs and MCLGs.

¹ Comprehensive Disinfectants and Disinfectants Byproducts Rules (Stage 1 and Stage 2): Quick Reference Guide <https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockkey=P100C8XW.txt>

The Tennessee Department of Environment and Conservation, Division of Water Resources Rule 0400-45-01 Public Water Systems has the requirements for DBPRs. The main sections are:

- 0400-45-01-.36 Disinfection Residuals, Disinfection Byproducts and Disinfection Byproducts Precursors
- 0400-45-01-.37 Stage 2 Initial Distribution System Evaluation for Disinfection Byproducts
- 0400-45-01-.38 Stage 2 Disinfection Byproducts Requirements (LRAA)

A water system attempts to meet these requirements by utilizing various processes within the treatment plant and distribution system.

The first process is utilizing the water treatment plant to remove as much natural occurring matter from the water prior to chlorination. This is accomplished by chemical and physical means.

Flushing the system is a means to keep good water quality throughout the water distribution system. The flushing keeps fresh water flowing throughout the system and minimizes water age.

Water can age in distribution tanks and allow DBPR formation. Proper tank turn over and the addition of mixers within the tanks help reduce this potential problem.

Source

Rules of Tennessee Department of Environment and Conservation. Division of Water Resources. Chapter 0400-45-01.

<https://publications.tnsosfiles.com/rules/0400/0400-45/0400-45-01.20190217.pdf>



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