



Drinking Water Priority Rulemaking: Microbial and Disinfection Byproduct Rules

Disinfection of drinking water is one of the major public health advances in the 20th century. One hundred years ago, typhoid and cholera epidemics were common throughout American cities and disinfection was a major factor in reducing these epidemics. However, the disinfectants themselves can react with naturally-occurring materials in the water to form unintended byproducts which may pose health risks.

Over the past ten years, we have also learned that there are specific microbial pathogens, such as *Cryptosporidium*, that are highly resistant to traditional disinfection practices. In 1993, *Cryptosporidium* caused 400,000 people in Milwaukee to experience intestinal illness. More than 4,000 were hospitalized, and at least 50 deaths have been attributed to the disease. There have also been cryptosporidiosis outbreaks in Nevada, Oregon, and Georgia over the past several years.

A major challenge for water suppliers is how to balance the risks from microbial pathogens and disinfection byproducts. It is important to provide protection from these microbial pathogens while simultaneously ensuring decreasing health risks to the population from disinfection byproducts (DBPs). The Safe Drinking Water Act (SDWA) Amendments, signed by President Clinton in August 1996, required EPA to develop rules to achieve these goals.

These new rules are a product of six years of collaboration between the water industry, environmental and public health groups, and local, state and federal government. This fact sheet contains general information about the two new rules and others that are a part of the Microbial-Disinfectants and Disinfection Byproducts (M-DBP) Rules. Separate fact sheets focus on the Interim Enhanced Surface Water Treatment Rule (EPA 816-F-01-013) and the Stage 1 Disinfectants and Disinfection Byproducts Rule (EPA 816-F-01-014).

Schedule of M-DBP Rules

December 16, 1998 – Final Rule	Interim Enhanced Surface Water Treatment Rule and Stage 1 Disinfectants and Disinfection Byproducts Rule
June 8, 2001 – Final Rule	Filter Backwash Recycling Rule
Summer 2001 – Final Rule	Long Term 1 Enhanced Surface Water Treatment Rule
Spring/Summer 2002 – Final Rule	Ground Water Rule
May 2002 – Final Rule	Long Term 2 Enhanced Surface Water Treatment Rule and Stage 2 Disinfectants and Disinfection Byproducts Rule

PUBLIC HEALTH CONCERNS

Most Americans drink tap water that meets all existing health standards all the time. These new rules will further strengthen existing drinking water standards and thus increase protection for many water systems.

In 1990, EPA's Science Advisory Board concluded that exposure to microbial contaminants such as bacteria, viruses, and protozoa (e.g., *Giardia lamblia* and *Cryptosporidium*) was likely the greatest remaining health risk management challenge for drinking water suppliers. Acute health effects from exposure to microbial pathogens is documented and associated illness can range from mild to moderate cases lasting only a few days to more severe infections that can last several weeks and may result in death for those with weakened immune systems.

While disinfectants are effective in controlling many microorganisms, they react with natural organic and inorganic matter in source water and the distribution system to form potentially harmful DBPs. Many of these DBPs have been shown to cause cancer and reproductive and developmental effects in laboratory animals. More than 200 million people consume water that has been disinfected. Because of the large population exposed, health risks associated with DBPs, even if small, need to be taken seriously.

EXISTING REGULATIONS

- C Surface Water Treatment Rule – The Surface Water Treatment Rule, promulgated in 1989, applies to all public water systems using surface water sources or ground water sources under the direct influence of surface water. It establishes maximum contaminant level goals (MCLGs) for viruses, bacteria and *Giardia lamblia*. It also includes treatment technique requirements for filtered and unfiltered systems that are specifically designed to protect against the adverse health effects of exposure to these microbial pathogens.
- Total Coliform Rule – The Total Coliform Rule, revised in 1989, applies to all PWSs and establishes a maximum contaminant level (MCL) for total coliforms.
- C Total Trihalomethane Rule – In 1979, EPA set an interim MCL for total trihalomethanes of 0.10 mg/l as an annual average. This applies to any community water system serving at least 10,000 people that adds a disinfectant to the drinking water during any part of the treatment process.
- Information Collection Rule – The Information Collection Rule, promulgated in 1996, established monitoring and data reporting requirements for large public water systems serving at least 100,000 people to support the M-DBP rulemaking process. This rule was intended to provide EPA with information on the occurrence in drinking water of microbial pathogens and DBPs. In addition, EPA collected engineering data on how PWSs currently control such contaminants.

INTERIM ENHANCED SURFACE WATER TREATMENT RULE AND STAGE 1 DISINFECTANTS AND DISINFECTION BYPRODUCTS RULE

EPA published the Interim Enhanced Surface Water Treatment Rule and Stage 1 Disinfectants and Disinfection Byproducts Rule in December 1998. The final rules resulted from formal regulatory negotiations with a wide range of stakeholders that took place in 1992-93 and 1997.

Interim Enhanced Surface Water Treatment Rule

The Interim Enhanced Surface Water Treatment Rule applies to systems using surface water, or ground water under the direct influence of surface water, that serve 10,000 or more persons. The rule also includes provisions for states to conduct sanitary surveys for surface water systems regardless of system size. The rule builds upon the treatment technique requirements of the Surface Water Treatment Rule with the following key additions and modifications:

- Maximum contaminant level goal (MCLG) of zero for Cryptosporidium.
- 2-log Cryptosporidium removal requirements for systems that filter.
- Strengthened combined filter effluent turbidity performance standards.
- Individual filter turbidity monitoring provisions.
- Disinfection profiling and benchmarking provisions.
- Systems using ground water under the direct influence of surface water now subject to the new rules dealing with Cryptosporidium.
- Inclusion of Cryptosporidium in the watershed control requirements for unfiltered public water systems.
- Requirements for covers on new finished water storage facilities.
- Sanitary surveys, conducted by states, for all surface water systems regardless of size.

The Interim Enhanced Surface Water Treatment Rule, with tightened turbidity performance criteria and required individual filter monitoring, is designed to optimize treatment reliability and to enhance physical removal efficiencies to minimize the Cryptosporidium levels in finished water. In addition, the rule includes disinfection benchmark provisions to assure continued levels of microbial protection while facilities take the necessary steps to comply with new DBP standards.

Stage 1 Disinfectants and Disinfection Byproducts Rule

The final Stage 1 Disinfectants and Disinfection Byproducts Rule applies to community water systems and non-transient non-community systems and transient non-community water systems using chlorine dioxide MCLs, including those serving fewer than 10,000 people, that add a disinfectant to the drinking water during any part of the treatment process.

The final Stage 1 Disinfectants and Disinfection Byproducts Rule includes the following key provisions:

- Maximum residual disinfectant level goals (MRDLGs) for chlorine (4 mg/L), chloramines (4 mg/L), and chlorine dioxide (0.8 mg/L).
- Maximum contaminant level goals (MCLGs) for three trihalomethanes (bromodichloromethane (zero), dibromochloromethane (0.06 mg/L), and bromoform (zero)), two haloacetic acids (dichloroacetic acid (zero) and trichloroacetic acid (0.3 mg/L)), bromate (zero), and chlorite (0.8 mg/L).
- MRDLs for three disinfectants (chlorine (4.0 mg/L), chloramines (4.0 mg/L), and chlorine dioxide (0.8 mg/L)).

- MCLs for total trihalomethanes (0.080 mg/L) - a sum of the three listed above plus chloroform, haloacetic acids (HAA5) (0.060 mg/L)- a sum of the two listed above plus monochloroacetic acid and mono- and dibromoacetic acids), and two inorganic disinfection byproducts (chlorite (1.0 mg/L)) and bromate (0.010 mg/L)).
- A treatment technique for removal of DBP precursor material.

The terms MRDLG and MRDL, which are not included in the SDWA, were created during the negotiations to distinguish disinfectants (because of their beneficial use) from contaminants. The final rule includes monitoring, reporting, and public notification requirements for these compounds. This final rule also describes the best available technology (BAT) upon which the MRDLs and MCLs are based.

FUTURE RULES

Long Term 1 Enhanced Surface Water Treatment Rule

While the Stage 1 Disinfectants and Disinfection Byproducts Rule will apply to systems of all sizes, the Interim Enhanced Surface Water Treatment Rule only applies to systems serving 10,000 or more people. The Long Term 1 Enhanced Surface Water Treatment Rule, expected in 2001, will strengthen microbial controls for small systems (i.e. those systems serving fewer than 10,000 people). The rule will also prevent significant increase in microbial risk where small systems take steps to implement the Stage 1 Disinfectants and Disinfection Byproducts Rule.

EPA believes that the rule will generally track the approaches in the Interim Enhanced Surface Water Treatment Rule for improved turbidity control, including individual filter monitoring and reporting. The rule will also address disinfection profiling and benchmarking.

Long Term 2 Enhanced Surface Water Treatment Rule and Stage 2 Disinfectants and Disinfection Byproduct Rule

The SDWA, as amended in 1996, requires EPA to finalize a Stage 2 Disinfectants and Disinfection Byproducts Rule by May 2002. Although the 1996 Amendments do not require EPA to finalize a Long Term 2 Enhanced Surface Water Treatment Rule along with the Stage 2 Disinfectants and Disinfection Byproducts Rule, EPA believes it is important to finalize these rules together to ensure a proper balance between microbial and DBP risks.

EPA began discussions with stakeholders in December 1998 on the direction for these rules. EPA anticipates proposed rules in 2001. The intent of the rules is to provide additional public health protection, if needed, from DBPs and microbial pathogens.

Ground Water Rule

EPA is finalizing the Ground Water Rule which specifies the appropriate use of disinfection and, just as importantly, addresses other components of ground water systems to ensure public health protection. There are more than 158,000 public ground water systems. Almost 89 million people are served by community ground water systems, and 20 million people are served by non-community ground water systems. Ninety-nine percent (157,000) of ground water systems serve fewer than 10,000 people. However, systems serving more than 10,000 people serve 55 percent (more than 60 million) of all people who get their drinking water from public ground water systems.

Filter Backwash Recycling Rule

The Filter Backwash Recycling Rule establishes a standard to return all recycle flows to a point that incorporates all treatment processes of the system's existing conventional or direct filtration systems or at an alternate location approved by the state. The regulation will apply to public water systems that use surface water or ground water under the direct influence of surface water, practice conventional or direct filtration, and recycle spent filter backwash, sludge thickener supernatant, or liquids from dewatering processes. The rule was promulgated on June 8, 2001.

ADDITIONAL INFORMATION

EPA encourages public input into regulation development. Public meetings and opportunities for public comment on M-DBP rules are announced in the *Federal Register*. EPA's Office of Ground Water and Drinking Water also provides this information for the M-DBP rules and other programs in its online Calendar of Events.

For more information, contact EPA's Safe Drinking Water Hotline, 1-800- 426-4791, or see the Office of Ground Water and Drinking Water web page at <http://www.epa.gov/safewater/standards.html>.