

MCLGs of zero for *Giardia lamblia*, viruses, and Legionella, and includes treatment technique requirements to reduce exposure to pathogenic microorganisms, including: (1) Filtration, unless specified avoidance criteria are met; (2) maintenance of a disinfectant residual in the distribution system; (3) removal and/or inactivation of 3 log (99.9%) of *Giardia lamblia* and 4 log (99.99%) of viruses; (4) combined filter effluent turbidity of 5 nephelometric turbidity units (NTU) as a maximum and 0.5 NTU at 95th percentile monthly for treatment plants using conventional treatment or direct filtration (with separate standards for other filtration technologies); and (5) watershed protection and source water quality requirements for unfiltered systems.

#### 2. Total Coliform Rule

The Total Coliform Rule (TCR) (54 FR 27544, June 29, 1989) (USEPA 1989b) applies to all PWSs. It established an MCLG of zero for total and fecal coliform bacteria, and an MCL based on the percentage of positive samples collected during a compliance period. Coliforms are used as a screen for fecal contamination and to determine the integrity of the water treatment process and distribution system. Under the TCR, no more than 5 percent of distribution system samples collected in any month may contain coliform bacteria (no more than 1 sample per month may be coliform positive in those systems that collect fewer than 40 samples per month). The number of samples to be collected in a month is based on the number of people served by the system.

#### 3. Interim Enhanced Surface Water Treatment Rule

The IESWTR (63 FR 69477, December 16, 1998) (USEPA 1998a) applies to PWSs serving at least 10,000 people and using surface water or GWUDI sources. Key provisions established by the IESWTR include the following: (1) An MCLG of zero for *Cryptosporidium*; (2) *Cryptosporidium* removal requirements of 2 log (99 percent) for systems that filter; (3) strengthened combined filter effluent turbidity performance standards of 1.0 NTU as a maximum and 0.3 NTU at the 95th percentile monthly for treatment plants using conventional treatment or direct filtration; (4) requirements for individual filter turbidity monitoring; (5) disinfection benchmark provisions to assess the level of microbial protection provided as facilities take steps to comply with new DBP standards; (6) inclusion of *Cryptosporidium* in the definition of GWUDI and in the watershed control

requirements for unfiltered public water systems; (7) requirements for covers on new finished water storage facilities; and (8) sanitary surveys for all surface water systems regardless of size.

The IESWTR was developed in conjunction with the Stage 1 Disinfectants and Disinfection Byproducts Rule (Stage 1 DBPR) (63 FR 69389; December 16, 1998) (USEPA 1998b), which reduced allowable levels of certain DBPs, including trihalomethanes, haloacetic acids, chlorite, and bromate.

#### 4. Long Term 1 Enhanced Surface Water Treatment Rule

The LT1ESWTR (67 FR 1812, January 14, 2002) (USEPA 2002a) builds upon the microbial control provisions established by the IESWTR for large systems, through extending similar requirements to small systems. The LT1ESWTR applies to PWSs using surface water or GWUDI as sources that serve fewer than 10,000 people. Like the IESWTR, the LT1ESWTR established the following: 2 log (99 percent) *Cryptosporidium* removal requirements for systems that filter; individual filter turbidity monitoring and more stringent combined filter effluent turbidity standards for conventional and direct filtration plants; disinfection profiling and benchmarking; inclusion of *Cryptosporidium* in the definition of GWUDI and in the watershed control requirements for unfiltered systems; and the requirement that new finished water storage facilities be covered.

#### 5. Filter Backwash Recycle Rule

EPA promulgated the Filter Backwash Recycling Rule (FBRR) (66 FR 31085, June 8, 2001) (USEPA 2001a) to increase protection of finished drinking water supplies from contamination by *Cryptosporidium* and other microbial pathogens. The FBRR requirements will reduce the potential risks associated with recycling contaminants removed during the filtration process. The FBRR provisions apply to all systems that recycle, regardless of population served. In general, the provisions include the following: (1) Recycling systems must return certain recycle streams prior to the point of primary coagulant addition unless the State specifies an alternative location; (2) direct filtration systems recycling to the treatment process must provide detailed recycle treatment information to the State; and (3) certain conventional systems that practice direct recycling must perform a one-month, one-time recycling self assessment.

#### C. What Public Health Concerns Does This Proposal Address?

This section presents the basis for the public health concern associated with *Cryptosporidium* in drinking water by summarizing information on *Cryptosporidium* health effects and outbreaks. This is followed by a description of the specific areas of public health concern that remain after implementation of the IESWTR and LT1ESWTR and that are addressed in the LT2ESWTR proposal. More detailed information about *Cryptosporidium* health effects may be found in the following criteria documents: *Cryptosporidium*: Human Health Criteria Document (USEPA 2001b), *Cryptosporidium*: Drinking Water Advisory (USEPA 2001c), and *Cryptosporidium*: Risks for Infants and Children (USEPA 2001d).

##### 1. Introduction

While modern water treatment systems have substantially reduced waterborne disease incidence, drinking water contamination remains a significant health risk management challenge. EPA's Science Advisory Board in 1990 cited drinking water contamination, particularly contamination by pathogenic microorganisms, as one of the most important environmental risks (USEPA 1990). This risk is underscored by information from the Centers for Disease Control and Prevention (CDC) which indicates that between 1980 and 1998 a total of 419 outbreaks associated with drinking water were reported, with greater than 511,000 estimated cases of disease. A number of agents were implicated in these outbreaks, including viruses, bacteria, and protozoa, as well as several chemicals (Craun and Calderon 1996, Levy *et al.* 1998, Barwick *et al.* 2000). The majority of cases were associated with surface water, and specifically with the 1993 *Cryptosporidium* outbreak in Milwaukee, WI with an estimated 403,000 cases (Mac Kenzie *et al.* 1994). A recent study by McDonald *et al.* (2001), which used blood samples from Milwaukee children collected during and after the 1993 outbreak, suggests that *Cryptosporidium* infection, including asymptomatic infection, was more widespread than might be inferred from the illness estimates by Mac Kenzie *et al.* (1994).

It is important to note that the number of identified and reported outbreaks in the CDC database is believed to substantially understate the actual incidence of waterborne disease outbreaks and cases (Craun and