

finished water turbidity toolbox components.

This demonstration of performance credit does not apply to the use of chlorine dioxide, ozone, or UV light, because today's proposal includes specific provisions allowing the State to modify the standards for awarding disinfection credit to these technologies. As described in section IV.C.14, States can approve site-specific CT values for inactivation of *Cryptosporidium* by chlorine dioxide and ozone; as described in section IV.C.15, States can approve an alternative approach for validating the performance of UV reactors.

b. *How was this proposal developed?* The Stage 2 M-DBP Agreement in Principle recommends demonstration of performance as a process for systems to receive *Cryptosporidium* treatment credit higher than the presumptive credit for many microbial toolbox components, as well as credit for technologies not listed in the toolbox. EPA is aware that there may be plants where particular unit processes, or combinations of unit processes, achieve greater *Cryptosporidium* removal than the presumptive credit awarded under the LT2ESWTR. In addition, the Agency would like to allow for the use of *Cryptosporidium* treatment processes not addressed in the LT2ESWTR, where such processes can demonstrate a reliable specific log removal. Due to these factors, EPA is proposing a demonstration of performance component in the microbial toolbox, consistent with the Advisory Committee recommendation.

The Agreement in Principle makes no recommendations for how a demonstration of performance should be conducted. It is generally not practical for systems to directly quantify high log removal of *Cryptosporidium* in treatment plants because of the relatively low occurrence of *Cryptosporidium* in many raw water sources and limitations with analytical methods. Consequently, if systems are to demonstrate the performance of full scale plants in removing *Cryptosporidium*, this typically will require the use of indicators, where the removal of the indicator has been correlated with the removal of *Cryptosporidium*. As described previously, a number of studies have shown that aerobic spores are an indicator of *Cryptosporidium* removal by sedimentation and filtration (Dugan *et al.* 2001, Emelko *et al.* 1999 and 2000, Yates *et al.* 1998, Mazounie *et al.* 2000).

The nature of demonstration of performance testing that will be appropriate at a given facility will

depend on site specific factors, such as water quality, the particular process(es) being evaluated, resources and infrastructure, and the discretion of the State. Consequently, EPA is not proposing specific criteria for demonstration of performance testing. Instead, systems must develop a testing protocol that is approved by the State, including any requirements for ongoing reporting if demonstration of performance credit is approved. EPA has developed a draft document, Toolbox Guidance Manual (USEPA 2003f), that is available with today's proposal and provides guidance on demonstration of performance testing.

c. *Request for comment.* The Agency requests comment on today's proposal for systems to demonstrate higher *Cryptosporidium* removal levels. EPA specifically requests comment on the following issues:

- Approaches that should be considered or excluded for demonstration of performance testing;
- Whether EPA should propose minimum elements that demonstration of performance testing must include;
- Whether a factor of safety should be applied to the results of demonstration of performance testing to account for potential differences in removal of an indicator and removal of *Cryptosporidium*, or uncertainty in the application of pilot-scale results to full-scale plants;
- Whether or under what conditions a demonstration of performance credit should be allowed for a unit process within a plant—a potential concern is that certain unit processes, such as a sedimentation basin, can be operated in a manner that will increase removal in the unit process but decrease removal in subsequent treatment processes and, therefore, lead to no overall increase in removal through the plant. An approach to address this concern is to limit demonstration of performance credit to removal demonstrated across the entire treatment plant.

#### D. Disinfection Benchmarks for *Giardia lamblia* and Viruses

##### 1. What Is EPA Proposing Today?

EPA proposes to establish the disinfection benchmark under the LT2ESWTR as a procedure to ensure that systems maintain protection against microbial pathogens as they implement the Stage 2 M-DBP rules (*i.e.*, Stage 2 DBPR and LT2ESWTR). The disinfection benchmark serves as a tool for systems and States to evaluate the impact on microbial risk of proposed changes in disinfection practice. EPA established the disinfection benchmark

under the IESWTR and LT1ESWTR for the Stage 1 M-DBP rules, as recommended by the Stage 1 M-DBP Advisory Committee. Today's proposal extends disinfection benchmark requirements to apply to the Stage 2 M-DBP rules.

Under the proposed LT2ESWTR, the disinfection benchmark procedure involves a system charting levels of *Giardia lamblia* and virus inactivation at least once per week over a period of at least one year. This creates a profile of inactivation performance that the System must use to determine a baseline or benchmark of inactivation against which proposed changes in disinfection practice can be measured. Only certain systems are required to develop profiles and keep them on file for State review during sanitary surveys. When those systems that are required to develop a profile plan a significant change in disinfection practice (defined later in this section), they must submit the profile and an analysis of how the proposed change will affect the current disinfection benchmark to the State for review.

Systems that developed disinfection profiles under the IESWTR or LT1ESWTR and have not made significant changes in their disinfection practice or changed sources are not required to collect additional operational data to create disinfection profiles under the LT2ESWTR. Systems that produced a disinfection profile for *Giardia lamblia* but not viruses under the IESWTR or LT1ESWTR may be required to develop a profile for viruses under the LT2ESWTR. Where a previously developed *Giardia lamblia* profile is acceptable, systems may develop a virus profile using the same operational data (*i.e.*, CT values) on which the *Giardia lamblia* profile is based. Spreadsheets developed by EPA and States automatically calculate *Giardia lamblia* and virus profiles using the same operational data. EPA believes that virus profiling is necessary because many of the disinfection processes that systems will select to comply with the Stage 2 DBPR and LT2ESWTR (*e.g.*, chloramines, UV, MF/UF) are relatively less effective against viruses than *Giardia lamblia* in comparison to free chlorine.

The disinfection benchmark provisions contain three major components: (a) Applicability requirements and schedule, (b) characterization of disinfection practice, and (c) State review of proposed changes in disinfection practice. Each of these components is discussed in the following paragraphs.