

K. Consultations With the Science Advisory Board, National Drinking Water Advisory Council, and the Secretary of Health and Human Services
L. Plain Language
VIII. References

I. Summary

A. Why Is EPA Proposing the LT2ESWTR?

EPA is proposing the Long Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR) to provide for increased protection against microbial pathogens in public water systems that use surface water sources. The proposed LT2ESWTR focuses on *Cryptosporidium*, which is a protozoan pathogen that is widespread in surface water. EPA is particularly concerned about *Cryptosporidium* because it is highly resistant to inactivation by standard disinfection practices like chlorination. Ingestion of *Cryptosporidium* oocysts can cause acute gastrointestinal illness, and health effects in sensitive subpopulations may be severe, including risk of mortality. *Cryptosporidium* has been identified as the pathogenic agent in a number of waterborne disease outbreaks across the U.S. and in Canada (details in section II).

The intent of the LT2ESWTR is to supplement existing microbial treatment requirements for systems where additional public health protection is needed. Currently, the Interim Enhanced Surface Water Treatment Rule (IESWTR) requires large systems that filter to remove at least 99% (2 log) of *Cryptosporidium* (63 FR 69478, December 16, 1998) (USEPA 1998a). The Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) extends this requirement to small systems (67 FR 1812, January 14, 2002) (USEPA 2002a). Subsequent to promulgating these regulations, EPA has evaluated significant new data on *Cryptosporidium* infectivity, occurrence, and treatment (details in section III). These data indicate that current treatment requirements achieve adequate protection for the majority of systems, but there is a subset of systems with higher vulnerability to *Cryptosporidium* where additional treatment is necessary.

Specifically, national survey data show that average *Cryptosporidium* occurrence in filtered systems is lower than previously estimated. However, these data also demonstrate that *Cryptosporidium* concentrations vary widely among systems, and that a fraction of filtered systems have relatively high levels of source water

Cryptosporidium contamination. Based on this finding, along with new data suggesting that the infectivity (*i.e.*, virulence) of *Cryptosporidium* may be substantially higher than previously understood, EPA has concluded that the current 2 log removal requirement does not provide an adequate degree of treatment in filtered systems with the highest source water *Cryptosporidium* levels. Consequently, EPA is proposing targeted additional treatment requirements under the LT2ESWTR for filtered systems with the highest *Cryptosporidium* risk.

Under current regulations, unfiltered systems are not required to provide any treatment for *Cryptosporidium*. New occurrence data suggest that typical *Cryptosporidium* levels in the treated water of unfiltered systems are substantially higher than in the treated water of filtered systems. Hence, *Cryptosporidium* treatment by unfiltered systems is needed to achieve equivalent public health protection. Recent treatment studies have allowed EPA to develop criteria for systems to inactivate *Cryptosporidium* with ozone, ultraviolet (UV) light, and chlorine dioxide. As a result, EPA has concluded that it is feasible and appropriate to propose under the LT2ESWTR that all unfiltered systems treat for *Cryptosporidium*.

In addition to concern with *Cryptosporidium*, the LT2ESWTR proposal is intended to ensure that systems maintain adequate protection against microbial pathogens as they take steps to reduce formation of disinfection byproducts (DBPs). Along with the LT2ESWTR, EPA is also developing a Stage 2 Disinfection Byproducts Rule (DBPR), which will further limit allowable levels of trihalomethanes and haloacetic acids. The proposed LT2ESWTR contains disinfection profiling and benchmarking requirements to ensure that microbial protection is maintained as systems comply with the Stage 2 DBPR. Also in the proposed LT2ESWTR are requirements to limit risk associated with existing uncovered finished water storage facilities. Uncovered storage facilities are subject to contamination if not properly managed or treated.

Today's proposed LT2ESWTR reflects consensus recommendations from the Stage 2 Microbial and Disinfection Byproducts (M-DBP) Federal Advisory Committee. These recommendations are set forth in the Stage 2 M-DBP Agreement in Principle (65 FR 83015, December 29, 2000) (USEPA 2000a).

B. What Does the LT2ESWTR Proposal Require?

1. Treatment Requirements for *Cryptosporidium*

EPA is proposing risk-targeted treatment technique requirements for *Cryptosporidium* control in filtered systems that are based on a microbial framework approach. Under this approach, systems that use a surface water or ground water under the direct influence of surface water (referred to collectively as surface water systems) will conduct source water monitoring to determine an average *Cryptosporidium* concentration. Based on monitoring results, filtered systems will be classified in one of four possible risk categories (bins). A filtered system's bin classification determines the extent of any additional *Cryptosporidium* treatment requirements beyond the requirements of current regulations.

EPA expects that the majority of filtered systems will be classified in the Bin 1, which carries no additional treatment requirements. Those systems classified Bins 2–4 will be required to provide from 1.0 to 2.5 log of treatment (*i.e.*, 90 to 99.7 percent reduction) for *Cryptosporidium* in addition to conventional treatment that complies with the IESWTR or LT1ESWTR (details in section IV.A). Filtered systems will meet additional *Cryptosporidium* treatment requirements by using one or more treatment or control steps from a "microbial toolbox" of options (details in section IV.C). Rather than monitoring, filtered systems may elect to comply with the treatment requirements of Bin 4 directly.

Under the proposed LT2ESWTR, all surface water systems that are not required to filter (*i.e.*, unfiltered systems) must provide at least 2 log (*i.e.*, 99 percent) inactivation of *Cryptosporidium*. In addition, unfiltered systems will monitor for *Cryptosporidium* in their source water and must achieve at least 3 log (*i.e.*, 99.9 percent) inactivation of *Cryptosporidium* if the mean level exceeds 0.01 oocysts/L. Alternatively, unfiltered systems may elect to provide 3 log *Cryptosporidium* inactivation directly, instead of monitoring. All requirements established under the Surface Water Treatment Rule (SWTR) (54 FR 27486, June 29, 1989) (USEPA 1989a) for unfiltered systems will remain in effect, including 3 log inactivation of *Giardia lamblia* and 4 log inactivation of viruses. However, the LT2ESWTR proposal requires that unfiltered systems achieve their overall inactivation requirements using a