

grandfathered data. A system that created a *Giardia lamblia* disinfection profile under the IESWTR or LT1ESWTR may use the operational data collected for the *Giardia lamblia* profile to create a virus disinfection profile.

Grandfathered data are those operational data that a system has previously collected at a treatment plant during the course of normal operation. Those systems that have all the necessary information to determine profiles using existing operational data collected prior to the date when the system is required to begin profiling may use these data in developing profiles. However, grandfathered data must be substantially equivalent to operational data that would be collected under this rule. These data must be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

To develop disinfection profiles under this rule, systems are required to exercise one of the following three options:

Option 1—Systems conduct monitoring at least once per week following the process described later in this section.

Option 2—Systems that conduct monitoring under this rule, as described under Option 1, can also use one or two years of acceptable grandfathered data, in addition to one year of new operational data, in developing the disinfection profile.

Option 3—Systems that have at least one year of acceptable existing operational data are not required to conduct new monitoring to develop the disinfection profile under this rule. Instead, they can use a disinfection profile based on one to three years of grandfathered data.

Process to be followed by PWS for developing the disinfection profile:

- Measure disinfectant residual concentration (C, in mg/L) before or at the first customer and just prior to each additional point of disinfectant addition, whether with the same or a different disinfectant.
- Determine contact time (T, in minutes) for each residual disinfectant monitoring point during peak flow conditions. T could be based on either a tracer study or assumptions based on contactor basin geometry and baffling. However, systems must use the same method for both grandfathered data and new data.
- Measure water temperature (°C) (for disinfectants other than UV).
- Measure pH (for chlorine only).

To determine the weekly log inactivation, the system must convert

operational data from one day each week to the corresponding log inactivation values for *Giardia lamblia* and viruses. The procedure for *Giardia lamblia* is as follows:

- Determine CT_{calc} for each disinfection segment.
- Determine $CT_{99.9}$ (i.e., 3 log inactivation) from tables in the SWTR (40 CFR 141.74) using temperature (and pH for chlorine) for each disinfection segment. States can allow an alternate calculation procedure (e.g., use of a spreadsheet).
- For each segment, $\log \text{ inactivation} = (CT_{calc}/CT_{99.9}) \times 3.0$.
- Sum the log inactivation values for each segment to get the log inactivation for the day (or week).

For calculating the virus log inactivation, systems should use the procedures approved by States under the IESWTR or LT1ESWTR. Log inactivation benchmark is calculated as follows:

- Determine the calendar month with the lowest log inactivation.
- The lowest month becomes the critical period for that year.
- If acceptable data from multiple years are available, the average of critical periods for each year becomes the benchmark.
- If only one year of data is available, the critical period for that year is the benchmark.

c. *State review.* If a system that is required to produce a disinfection profile proposes to make a significant change in disinfection practice, it must calculate *Giardia lamblia* and virus inactivation benchmarks and must notify the State before implementing such a change. Significant changes in disinfection practice are defined as (1) moving the point of disinfection (this is not intended to include routine seasonal changes already approved by the State), (2) changing the type of disinfectant, (3) changing the disinfection process, or (4) making other modifications designated as significant by the State. When notifying the State, the system must provide a description of the proposed change, the disinfection profiles and inactivation benchmarks for *Giardia lamblia* and viruses, and an analysis of how the proposed change will affect the current inactivation benchmarks. In addition, the system should have disinfection profiles and, if applicable, inactivation benchmarking documentation, available for the State to review as part of its periodic sanitary survey.

EPA developed for the IESWTR, with stakeholder input, the Disinfection Profiling and Benchmarking Guidance

Manual (USEPA 1999d). This manual provides guidance to systems and States on the development of disinfection profiles, identification and evaluation of significant changes in disinfection practices, and considerations for setting an alternative benchmark. If necessary, EPA will produce an addendum to reflect changes in the profiling and benchmarking requirements necessary to comply with LT2ESWTR.

2. How Was This Proposal Developed?

A fundamental premise in the development of the M-DBP rules is the concept of balancing risks between DBPs and microbial pathogens. Disinfection profiling and benchmarking were established under the IESWTR and LT1ESWTR, based on a recommendation by the Stage 1 M-DBP Federal Advisory Committee, to ensure that systems maintained adequate control of pathogen risk as they reduced risk from DBPs. Today's proposal would extend disinfection benchmarking requirements to the LT2ESWTR.

EPA believes this extension is necessary because some systems will make significant changes in their current disinfection practice to meet more stringent limits on TTHM and HAA5 levels under the Stage 2 DBPR and additional *Cryptosporidium* treatment requirements under the LT2ESWTR. In order to ensure that these systems continue to provide adequate protection against the full spectrum of microbial pathogens, it is appropriate for systems and States to evaluate the effects of such treatment changes on microbial drinking water quality. The disinfection benchmark serves as a tool for making such evaluations.

EPA projects that to comply with the Stage 2 DBPR, systems will make changes to their disinfection practice, including switching from free chlorine to chloramines and, to a lesser extent, installing technologies like ozone, membranes, and UV. Similarly, to provide additional treatment for *Cryptosporidium*, some systems will install technologies like UV, ozone, and microfiltration. While these processes are all effective disinfectants, chloramines are a weaker disinfectant than free chlorine for *Giardia lamblia*. Ozone, UV, and membranes can provide highly effective treatment for *Giardia lamblia*, but they, as well as chloramines, are less efficient for treating viruses than free chlorine, relative to their efficacy for *Giardia lamblia*. Because of this, a system switching from free chlorine to one of these alternative disinfection