

Algal blooms are the most common problem in open reservoirs and can become a public health risk, as they increase the presence of bacteria in the water. Algae growth also leads to the formation of disinfection byproducts and causes taste and odor problems. Some algae produce toxins that can induce headache, fever, diarrhea, abdominal pain, nausea, and vomiting. Bird and animal wastes are also common and significant sources of contamination. These wastes may carry microbial contaminants such as coliform bacteria, viruses, and human pathogens, including *Vibrio cholera*, *Salmonella*, *Mycobacteria*, *Typhoid*, *Giardia lamblia*, and *Cryptosporidium* (USEPA 1999e). Microbial pathogens are found in surface water runoff, along with agricultural chemicals, automotive wastes, turbidity, metals, and organic matter (USEPA 1999e, LeChevallier *et al.* 1997).

In an effort to minimize contamination, systems have implemented various controls such as reservoir covers and liners, regular draining and washing, security and monitoring, bird and insect control programs, and drainage design to prevent surface runoff from entering the facility (USEPA 1999e).

A number of studies have evaluated the degradation of water quality in uncovered finished water storage facilities. LeChevallier *et al.* (1997) compared influent and effluent samples from six uncovered finished water storage reservoirs in New Jersey for a one year period. There were significant increases in the turbidity, particle count, total coliform, fecal coliform, and heterotrophic plate count bacteria in the effluent relative to the influent. Of particular concern were fecal coliforms, which were detected in 18 percent of effluent samples (no influent samples were positive for coliforms). Fecal coliforms are used as an indicator of the potential for contamination by pathogens. *Giardia* and/or *Cryptosporidium* were detected in 15% of inlet samples and 25% of effluent samples, demonstrating a significant increase in the effluent. There was a significant decrease in the chlorine residual concentration in some effluent samples.

Increases in algal cells, heterotrophic plate count (HPC) bacteria, turbidity, color, particle counts, and biomass, and decreases in residual chlorine levels, have been reported in other studies of uncovered finished water reservoirs as well (Pluntze 1974, AWWA Committee 1983, Silverman *et al.* 1983). Researchers have shown that small mammals, birds, fish, and algal growth

contribute to the microbial degradation of an open finished water reservoir (Graczyk *et al.* 1996, Geldreich 1990, Fayer and Ungar 1986, Current 1986).

As described in section II, the IESWTR and LT1ESWTR require water systems to cover all new reservoirs, holding tanks, or other storage facilities for finished water. However, these rules do not require systems to cover existing finished water storage facilities. EPA stated in the preamble to the final IESWTR (63 FR 69494, December 16, 1998) (USEPA 1998a) that with respect to requirements for existing uncovered finished water storage facilities, the Agency needed more time to collect and analyze additional information to evaluate regulatory impact. The IESWTR preamble affirmed that EPA would consider whether to require the covering of existing storage facilities during the development of subsequent microbial regulations when additional data to estimate national costs were available.

Since promulgation of the IESWTR, EPA has collected sufficient data to estimate national cost implications of regulatory control strategies for uncovered finished water storage facilities. Based on information provided by States, EPA estimates that there are approximately 138 uncovered finished water storage facilities in the United States and territories, not including reservoirs that systems currently plan to cover or take off-line. Costs for covering these storage facilities or treating the effluent, consistent with today's proposed requirements, are presented in section VI of this preamble and in the Economic Analysis for the LT2ESWTR (USEPA 2003a). Briefly, total capital costs were estimated as \$64.4 million, resulting in annualized present value costs of \$5.4 million at a three percent discount rate and \$6.4 million at a seven percent discount rate.

Based on the findings of studies cited in this section, EPA continues to be concerned about contamination occurring in uncovered finished water storage facilities. Therefore, as recommended by the Advisory Committee, EPA is proposing control measures for all systems with uncovered finished water storage facilities. This proposal is intended to represent a balanced approach, recognizing both the potentially significant but uncertain risks associated with uncovered finished water storage facilities and the substantial costs of either covering them or building alternative storage. Today's proposal allows systems to treat the storage facility effluent instead of providing a cover. Alternatively, States may determine that existing risk

mitigation is adequate, provided a system implements a risk mitigation plan as described in this section.

3. Request for Comments

EPA requests comment on the proposed requirements pertaining to uncovered finished water storage facilities. Specifically, the Agency would like comment on the following issues, and requests that comments include available supporting data or other technical information:

- Is it appropriate to allow systems with uncovered finished water storage facilities to implement a risk management plan or treat the effluent to inactivate viruses instead of covering the facility?

- If systems treat the effluent of an uncovered finished water storage facility instead of covering it, should systems be required to inactivate *Cryptosporidium* and *Giardia lamblia*, since these protozoa have been found to increase in uncovered storage facilities?

- Additional information on contamination or health risks that may be associated with uncovered finished water storage facilities.

- Additional data on how climatological conditions affect water quality, including daily fluctuations in the stability of the water related to corrosion control.

- The definition of an uncovered finished water storage facility in 40 CFR 141.2 is a tank, reservoir, or other facility used to store water that will undergo no further treatment except residual disinfection and is open to the atmosphere. There is a concern that this definition may not include certain systems using what would generally be considered an uncovered finished water storage facility. An example is a system that applies a corrosion inhibitor compound to the effluent of an uncovered storage facility where water is stored after filtration and primary disinfection. In this case, the system may claim that the corrosion inhibitor constitutes additional treatment and, consequently, the reservoir does not meet EPA's definition of an uncovered finished water storage facility. EPA requests comment on whether the definition of an uncovered finished water storage facility should be revised to specifically include systems that apply a treatment such as corrosion control to water stored in an uncovered reservoir after the water has undergone filtration, where required, and primary disinfection.

F. Compliance Schedules

Today's proposal includes deadlines for public water systems to comply with