ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 141, and 142
[WH-FRL–7124–2]

RIN 2040–AD18

National Primary Drinking Water Regulations: Long Term 1 Enhanced Surface Water Treatment Rule

AGENCY: Environmental Protection Agency (EPA).

ACTION: Final rule.

SUMMARY: In this document, EPA is finalizing the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). The purposes of the LT1ESWTR are to improve control of microbial pathogens, specifically the protozoan Cryptosporidium, in drinking water and address risk trade-offs with disinfection byproducts. The rule will require systems to meet strengthened filtration requirements as well as to calculate levels of microbial inactivation to ensure that microbial protection is not jeopardized if systems make changes to comply with disinfection requirements of the Stage 1 Disinfection and Disinfection Byproducts Rule (DBPR). The LT1ESWTR applies to public water systems that use surface water or ground water under the direct influence of surface water and serve fewer than 10,000 persons. The LT1ESWTR builds upon the framework established for systems serving a population of 10,000 or more in the Interim Enhanced Surface Water Treatment Rule (IESWTR). This rule was proposed in combination with the Filter Backwash Recycling Rule (FBRR) in April 2000.

DATES: This regulation is effective February 13, 2002. As discussed in the supplementary information section and consistent with sections 1412(b)(10) and 1445 of SDWA, regulated entities must comply with this rule starting March 15, 2002. For judicial review purposes, this final rule is promulgated as of 1 p.m. eastern time on January 14, 2002.

ADDRESSES: Public comments, the comment/response document, applicable Federal Register notices, other major supporting documents, and a copy of the index to the public docket for this rulemaking (W–99–10, Final Long Term 1 Enhanced Surface Water Treatment Rule) are available for review at EPA’s Drinking Water Docket: 401 M Street, SW., Rm. EB57, Washington, DC 20460 from 9 a.m. to 4 p.m., Eastern Time, Monday through Friday, excluding legal holidays. For access to docket materials or to schedule an appointment please call (202) 260–3027.

FOR FURTHER INFORMATION CONTACT: For technical inquiries contact Tom Grubbs at 1200 Pennsylvania Avenue, NW., MC4607, Washington, DC 20460, (202) 564–5262. For general information contact the Safe Drinking Water Hotline, telephone (800) 426–4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 9 a.m. to 5:30 p.m. Eastern Time.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially regulated by the LT1ESWTR are public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI) and serve fewer than 10,000 persons. Regulated categories and entities include:

<table>
<thead>
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<th>Category</th>
<th>Examples of regulated entities</th>
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<tr>
<td>Industry</td>
<td>PWSS that use surface water or GWUDI.</td>
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<tr>
<td>State, Local, Tribal or Federal Governments.</td>
<td>PWSS that use surface water or GWUDI.</td>
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This table is not intended to be exhaustive, but rather provides a guide for readers regarding entities likely to be regulated by the LT1ESWTR. This table lists the types of entities that EPA is now aware could potentially be regulated by this rule. Other types of entities not listed in this table could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the definition of PWS in § 141.2 of the Code of Federal Regulations and applicability criteria in § 141.501 of today’s final rule. If you have questions regarding the applicability of the LT1ESWTR to a particular entity, consult the person listed in the preceding FOR FURTHER INFORMATION CONTACT section.

List of Abbreviations Used in This Document:

AWWA American Water Works Association
AWWSc American Water Works Service Company
°C Degrees Celsius
CCP Composite Correction Program
CCR Consumer Confidence Report
CDC Centers for Disease Control
CFR Code of Federal Regulations
CFSS Continuing Survey of Food Intakes by Individuals
COI Cost of Illness
CPE Comprehensive Performance Evaluation
CTA Comprehensive Technical Assistance
DAF Dissolved Air Flotation
DBP Disinfection Byproducts
DBPR Disinfectants and Disinfection Byproduct Rule
EPA Environmental Protection Agency
ESWTR Enhanced Surface Water Treatment Rule
FAC A Federal Advisory Committee Act
FBRR Filter Backwash Recycle Rule
FR Federal Register
gpm Gallons per Minute
GWUDI Ground Water Under Direct Influence of Surface Water
HAA5 Haloacetic Acids (Monochloroacetic, Dichloroacetic, Trichloroacetic, Monobromochloroacetic and Dibromochloroacetic Acids)
HRCA Health Risk Reduction and Cost Analysis
ICR Information Collection Request
IESWTR Interim Enhanced Surface Water Treatment Rule
LT1ESWTR Long Term 1 Enhanced Surface Water Treatment Rule
MCL Maximum Contaminant Level Goal
M-DBP Microbial and Disinfectants/Disinfection Byproducts
NDWAC National Drinking Water Advisory Council
NPWR National Primary Drinking Water Regulation
NODA Notice of Data Availability
NTTAA National Technology Transfer and Advancement Act
NTU Nephelometric Turbidity Units
O&M Operation and Maintenance
OMB Office of Management and Budget
PBMS Performance-based Measurement System
PRA Paperwork Reduction Act
PWS Public Water System
PWSS Public Water Supply Supervision
RFA Regulatory Flexibility Act
RIA Regulatory Impact Analysis
SAB Science Advisory Board
SBA Small Business Administration
SBAR Small Business Advocacy Review
SBREFA Small Business Regulatory Enforcement Fairness Act of 1996
SDWA Safe Drinking Water Act
SDWIS Safe Drinking Water Information System
SWTR Surface Water Treatment Rule
TTHM Total Trihalomethanes
UMRA Unfunded Mandates Reform Act
WTP Willingness to Pay

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1. Summary
C. What Are the Health Concerns Associated With Cryptosporidium?

When someone is infected with Cryptosporidium, they may contract cryptosporidiosis, a disease which can cause diarrhea, stomach cramps, nausea, loss of appetite, and a mild fever. Cryptosporidium has become recognized as one of the most common causes of waterborne disease (drinking and recreational) in humans in the United States. The parasite is found in every region of the United States and throughout the world (www.cdc.gov/ncidod/dpd/parasites/cryptosporidiosis/factsht_cryptosporidiosis.htm). The symptoms of cryptosporidiosis begin an average of seven days after infection. Persons with a normal, healthy immune system can expect their illness to last for two weeks or less, with constant or intermittent diarrhea. However, even after symptoms cease, an individual can still pass Cryptosporidium in the stool for up to two months, and may be a source of infection for others.

Cryptosporidiosis is not treatable with antibiotics, so prevention of infection is critical. People with weakened immune systems (those with HIV/AIDS, on cancer chemotherapy, or who have received organ transplants) will have cryptosporidiosis for a longer period of time, and it could become life-threatening. Young children, pregnant women, or the elderly infected with cryptosporidiosis can quickly become severely dehydrated.

Twelve waterborne cryptosporidiosis outbreaks have occurred at drinking water systems since 1984 (Craun, 1998; USEPA, 2000a). The largest of the outbreaks was in Milwaukee and was responsible for over 400,000 illnesses and at least 50 deaths (Hoxie, et al., 1997; MacKenzie et al., 1994); other known outbreaks have occurred in smaller communities and have involved many fewer people. An incident such as a rainstorm that flushes many oocysts into the source water or causes a sanitary sewer overflow combined with a water treatment plant upset could allow a large pulse of oocysts to move past the multiple barriers of a water treatment plant.

D. Does This Regulation Apply to My Water System?

Today’s final regulation applies to all small (serving less than 10,000 people) public water systems (PWSs) that use surface water or ground water under the direct influence of surface water (GWUDI).

E. How Is the EPA Regulating Cryptosporidium in the LT1ESWTR?

In the IESWTR (63 FR 69478), EPA established a maximum contaminant level goal (MCLG) of zero for Cryptosporidium. When establishing an MCLG, EPA must also establish either a corresponding Maximum Contaminant Level (MCL) or a treatment technique. In the IESWTR and in today’s LT1ESWTR, the Agency chose to establish a treatment technique that relies on strengthening water treatment processes already in place. For filtered systems, this means achieving at least 2-log (99 percent) removal of Cryptosporidium by meeting strengthened combined filter effluent turbidity limits as established by today’s rule. For unfiltered systems, it means maintaining and improving Cryptosporidium control under existing watershed control plans.

F. What Other Requirements Are Included in This Rule?

Today’s final regulation includes several requirements.

—All surface water and GWUDI systems serving fewer than 10,000 people must meet the requirements for achieving a 2-log removal or control of Cryptosporidium.
—Conventional and direct filtration systems must comply with specific combined filter effluent turbidity requirements while alternative filtration systems (systems using filtration other than conventional filtration, direct filtration, slow sand filtration, or diatomaceous earth filtration), must demonstrate the ability to achieve 2-log removal of Cryptosporidium and comply with specific State-established combined filter effluent turbidity requirements.
—Conventional and direct filtration systems must continuously monitor the turbidity of individual filters and perform follow-up activities if this monitoring indicates a potential problem.
—Systems must develop a disinfection profile unless they can demonstrate that their TTHM and HAAs disinfection byproduct (DBP) levels are less than 0.064 mg/L and 0.048 mg/L respectively.
—Systems considering a significant change to their disinfection practice must develop a disinfection inactivation benchmark of their existing level of microbial protection and consult with the State for approval prior to implementing the disinfection change.
—Finished water reservoirs for which construction begins after the effective date of today’s rule must be covered; and
—Unfiltered systems must comply with updated watershed control requirements that add Cryptosporidium as a pathogen of concern.

G. How Will This Regulation Protect Public Health?

Today’s rule for the first time establishes Cryptosporidium control requirements for small systems by requiring a minimum 2-log removal for Cryptosporidium. The rule also strengthens filter performance requirements to ensure 2-log Cryptosporidium removal, establishes individual filter monitoring to minimize contaminant pass-through and support improved performance, includes Cryptosporidium in the definition of GWUDI, and explicitly considers unfiltered system watershed control provisions. Today’s rule also reflects a commitment to the importance of maintaining existing levels of microbial protection in public water systems as plants take steps to comply with newly applicable DBP standards. Systems considering significant changes to their disinfection practices must first evaluate current levels of Giardia inactivation (and virus inactivation if applicable) and consult with their State Primacy Agency for approval before implementing those changes to assure that current microbial protection is not significantly reduced. Thus, compliance with the provisions of today’s rule will improve public health protection by reducing the risk of exposure to Cryptosporidium in small systems serving fewer than 10,000 people even as those systems begin to take steps to comply with related DBP standards.

II. Background

A. What Is the Statutory Authority for the LT1ESWTR?

The Safe Drinking Water Act (SDWA or the Act), as amended in 1986, requires EPA to publish a maximum contaminant level goal (MCLG) for each contaminant which in the judgement of the EPA Administrator, may have an adverse effect on the health of persons, occurs in public water systems with a frequency and at a level of public health concern, and whose regulation would represent a meaningful public health risk reduction (Section 1412(b)(1)(A)). MCLGs are non-enforceable health goals to be set at a level at which no known or anticipated adverse effect on the health of persons occur and which allows an adequate margin of safety (Section 1412(b)(4)). The Act was again
trade associations, environmental groups, and representatives of State and local elected officials. Of particular importance for this rule, given its focus on small systems, EPA received valuable input from small entity representatives as part of the Small Business Regulatory Enforcement Fairness Act (SBREFA) panel. The panel was initiated in April of 1998 and officially convened in August of 1998. Many of the panel’s recommendations are reflected in today’s rule.

EPA provided numerous opportunities for stakeholder and public involvement. In early June 1999, EPA mailed an informal draft of the LT1ESWTR preamble to the approximately 100 stakeholders who attended either of the public stakeholder meetings. Members of trade associations and the SBREFA panel also received the draft preamble. EPA received valuable suggestions and stakeholder input from 15 State representatives, trade associations, environmental interest groups, and individual stakeholders. EPA proposed the LT1ESWTR on April 10, 2000. During the comment period, the Agency held a public meeting in Washington D.C. on April 14, 2000. Additionally, the proposed rule was presented to industry, State representatives, and the public in nearly 50 meetings across the US, including a May 30, 2000 meeting in Washington, D.C. with ten representatives of elected State and local officials (USEPA 2000g,h). Finally, EPA mailed approximately 200 copies of the proposed rule to stakeholders.

D. What Did the April 10, 2000 Proposal Contain?

The proposed rulemaking package, which is the basis for today’s final rule, was entitled The Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Proposed Rule (USEPA 2000b).

The proposed rule included two distinct sets of provisions: LT1ESWTR provisions and Filter Backwash Recycling Rule (FBRR) provisions. The Agency promulgated the final FBRR in a Federal Register announcement on June 8, 2001 (66 FR 31086), separate from today’s final rule. The LT1ESWTR proposed rule provisions applied to surface and GWUDI systems serving fewer than 10,000 persons and included the following provisions:

—2-log removal of Cryptosporidium;
—Compliance with specific combined filter effluent turbidity requirements;
—Continuous turbidity monitoring for individual filters with follow-up activities if monitoring results indicated a potential problem;
—Development of a disinfection profile unless optional monitoring at a particular plant demonstrated THM and HAAs levels less than 0.064 mg/L and 0.048 mg/L respectively;
—Development of a Giardia inactivation disinfection benchmark and consultation with the State for approval before making a significant change in disinfection practices;
—Mandatory covers for all newly constructed finished water reservoirs; and
—Unfiltered system compliance with updated watershed control requirements that add Cryptosporidium as a pathogen of concern.

III. Discussion of the Final Rule

A. What Level of Cryptosporidium Removal Does the LT1ESWTR Require?

1. What Does Today’s Rule Require?

Today’s final rule establishes a treatment technique requirement for 2-log removal of Cryptosporidium for surface water and GWUDI systems serving fewer than 10,000 persons. This requirement applies between a point where the raw water is not subject to contamination by surface water runoff and a point downstream before or at the first customer.

2. How Was This Requirement Developed?

As discussed previously in today’s rule, Cryptosporidium is a microbiological contaminant that has caused several outbreaks of cryptosporidiosis and poses serious health risks. For these reasons, the Agency set forth to develop requirements to minimize risks associated with Cryptosporidium in drinking water. In the IESTWR, EPA established a MCLG of zero for Cryptosporidium. EPA decided to establish 2-log removal of Cryptosporidium as the accompanying treatment technique for this MCLG. This requirement is based on a number of treatment effectiveness studies that demonstrate the ability of well-operated conventional and direct filtration plants to achieve at least a 2-log removal of Cryptosporidium (Patania et al., 1995; Nieminski and Ongerth, 1995; Ongerth and Pecoraro, 1995; LeChevallier and Norton, 1992; LeChevallier et al., 1991; Foundation for Water Research, 1994; Kelly et al., 1995; and West et al., 1994). The information and data in these eight studies provide convincing evidence that conventional and direct filtration plants that employ coagulation, flocculation, sedimentation (in conventional filtration only), and filtration steps, have the ability to achieve a minimum of 2-log removal of Cryptosporidium when meeting specific turbidity limits. EPA has also provided data in the proposal for today’s final rule that indicate the ability of slow sand filtration, diatomaceous earth filtration, and alternative filtration (membrane filtration, cartridge filtration, etc.) to achieve at least 2-log removal of Cryptosporidium (Jacangelo et al., 1995; Drozd & Scharzbrot, 1997; Hirata & Hashimoto, 1998; Goodrich et al., 1995; Collins et al., 1996; Lykins et al., 1994; Adham et al., 1998; Shuler & Ghosh, 1991; Timms et al., 1995; Shuler et al., 1990; and Ongerth & Hutton, 1997). The Agency believes that the technological feasibility for 2-log removal is demonstrated for both large and small systems and therefore today’s rule extends the 2-log Cryptosporidium removal requirement established for large and medium systems in the 1998 IESTWR to small systems serving fewer than 10,000 persons.

3. What Major Comments Were Received?

The majority of the commenters on the proposed rule agreed with the appropriateness of establishing a 2-log removal requirement for Cryptosporidium. A few commenters noted that small systems should not be required to meet the same Cryptosporidium log removal requirements as large systems. EPA disagrees. The technological feasibility of 2-log removal is well demonstrated (as shown in the studies discussed in the proposal for today’s final rule) and the Agency believes that persons served by all sized systems should be afforded comparable levels of public health protection (i.e., the small systems subject to the LT1ESWR should have the same MCLG, and the 2-log Cryptosporidium removal treatment technique as large systems subject to the IESWR).

B. What Combined Filter Effluent Requirements Does the LT1ESWTR Contain?

1. What Does Today’s Rule Require?

Today’s final rule requires strengthened combined filter effluent performance for conventional filtration, direct filtration, and alternative filtration systems (systems using filtration technologies other than conventional filtration, direct filtration, diatomaceous earth filtration, or slow sand filtration) as the treatment technique for achieving a 2-log removal of Cryptosporidium. For conventional and direct filtration systems, the
turbidity level of representative samples of a system’s combined filter effluent water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month. The turbidity level of representative samples of a system’s filtered water must at no time exceed 1 NTU. Under today’s rule, conventional and direct filtration plants meeting these filter performance requirements are presumed to achieve at least a 2-log removal of Cryptosporidium. Slow sand and diatomaceous earth filtration plants are presumed to achieve at least 2-log removal of Cryptosporidium if they continue to meet the existing filter performance requirements established in the SWTR. Systems using alternative filtration (i.e., membrane filtration, cartridge filtration, etc.) must demonstrate to the State that their system achieves 2-log removal of Cryptosporidium. The State will then establish appropriate turbidity limits to reflect this performance. At the end of each month, systems must report the total number of combined filter effluent turbidity measurements taken each month, as well as the number and percentage of turbidity measurements that exceeded their 95th percentile turbidity limit and the number of measurements that exceeded their maximum turbidity limit. Combined filter effluent turbidity measurements must be kept for at least three years.

2. How Was This Requirement Developed?

In establishing the 2-log removal as a treatment technique for Cryptosporidium, the Agency relied on the aforementioned studies to demonstrate the technological feasibility of establishing the 2-log removal. These studies demonstrated that specific treatment would achieve 2-log removal of Cryptosporidium when operated to achieve specific turbidity performance limits. For conventional and direct filtration systems, studies demonstrated that achieving a turbidity of 0.3 NTU 95 percent of the time and never exceeding 1 NTU would ensure at least 2-log removal of Cryptosporidium. For slow sand and diatomaceous earth filtration systems, the studies demonstrated that meeting existing SWTR turbidity limits would ensure at least 2-log removal of Cryptosporidium. Alternative filtration systems were shown to achieve at least 2-log removal of Cryptosporidium at a variety of turbidities based on the type of filtration and other site-specific characteristics. The requirements of today’s final rule reflect the recommendations of the 1997 M-DBP Committee.

As part of the LT1ESWTR development process, EPA analyzed performance data from 211 small systems in 15 different States. That data indicated that a substantial number of small systems are presently meeting the tighter performance standards of today’s rule. For example, 50 percent of the 211 systems are currently meeting 0.3 NTU 12 months out of the year. In addition, 93 percent of the 211 systems never exceeded the 1 NTU maximum 12 months out of the year. Therefore, EPA believes that the strengthened filter performance standards established for small systems in today’s final rule are feasible and achievable.

3. What Major Comments Were Received?

The majority of the commenters on the proposal agreed with the appropriateness of the combined filter effluent requirements. Many commenters raised concerns with the proposal’s reliance on turbidity as an indicator for demonstrating that membrane filtration meets the same Cryptosporidium removal requirements as conventional and direct filtration systems. Commenters indicated that although turbidity is the most prevalent form of water quality monitoring, establishing a 0.3 NTU 95th percentile limit and 1 NTU maximum limit would not be as appropriate an indicator of the performance of membranes than other parameters such as flux or membrane integrity. They noted that using turbidity was appropriate if site specific turbidity limits were utilized. At most facilities these limits would typically be much lower than 0.3 NTU. Additionally, commenters asserted that since the typical operational turbidities of membranes (< 0.05 NTU) were so much lower than those of conventional filtration, it would be inappropriate to require membranes to meet turbidity limits that were significantly higher than standard operating practices. In response, EPA notes that in the proposed rule, EPA allowed membrane systems to meet either conventional filtration or alternative filtration combined filter effluent requirements. After further evaluating existing studies and information provided by commenters, EPA agrees that other appropriate indicators may be used to determine the treatment efficiency of membrane filtration, and that given the different operational turbidities of conventional filtration and membrane filtration, different turbidity limits are appropriate. Therefore, today’s final rule treats nonconventional available alternative filtration technology, instead of requiring membranes to meet the same turbidity limits as conventional and direct filtration.

C. What Individual Filter Monitoring Requirements Does the LT1ESWTR Contain?

1. What Does Today’s Rule Require?

Today’s final rule establishes a requirement that all systems using surface water or CWUDI, serving fewer than 10,000 persons, and utilizing conventional or direct filtration must continuously monitor the individual filter turbidity for each filter used at the system. For purposes of this rule, continuous monitoring means at least every 15 minutes. Systems must keep the results of this monitoring for at least three years. Each month systems must report to the State that they have conducted individual filter turbidity monitoring, and are required to indicate the dates, filter number, and turbidities of any measurements that exceeded 1.0 NTU. Today’s rule provides that systems with two or fewer filters may monitor combined filter effluent turbidity continuously, in lieu of individual filter turbidity monitoring.

Based on this monitoring, if a system exceeds 1.0 NTU in two consecutive measurements the system must include the filter number, date, time and reason for the exceedance at the end of the month in its monthly filter performance report to the State. If this occurs three months in a row for the same filter, a system is required to conduct a self-assessment of the filter. If a self-assessment is required, it must take place within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month. The system must report to the State that the self-assessment was completed. A self-assessment must include at least the following components:

—Assessment of filter performance;
—Development of a filter profile;
—Identification and prioritization of factors limiting filter performance;
—Assessment of the applicability of corrections; and
—Preparation of a self-assessment report.

If a system exceeds 2.0 NTU (in two consecutive measurements 15 minutes apart) for two months in a row, the system must contact the State to arrange for the State or an approved third party to conduct a Comprehensive Performance Evaluation (CPE) not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. The CPE must be completed and