

may claim an additional 1.0 log *Cryptosporidium* removal credit for any month at each plant that meets both the individual filter effluent (IFE) turbidity requirements of paragraphs (b)(1) and (2) of this section, based on monitoring conducted under §§ 141.174(a) and 141.560.

(1) IFE turbidity must be less than 0.1 NTU in at least 95% of the maximum daily values recorded at each filter in each month, excluding the 15 minute period following return to service from a filter backwash.

(2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(c)(1) *Demonstration of performance.* Systems may demonstrate to the State, through the use of State-approved protocols, that a plant, or unit process of a plant, achieves a mean *Cryptosporidium* removal efficiency greater than any presumptive credit specified under § 141.720 or §§ 141.725 through 141.728. Systems are eligible for an increased *Cryptosporidium* removal credit if the State determines that the plant or process can reliably achieve such a removal efficiency on a continuing basis and the State provides written notification of its determination to the system. States may establish ongoing monitoring and/or performance requirements the State determines are necessary to demonstrate the greater credit and may require the system to report operational data on a monthly basis to verify that conditions under which the demonstration of performance was awarded are maintained during routine operations. If the State determines that a plant, or unit process of a plant, achieves an average *Cryptosporidium* removal efficiency less than any presumptive credit specified under § 141.720 or § 141.725 through 141.728, the State may assign the lower credit to the plant or unit process.

(2) Systems may not claim presumptive credit for any toolbox box component in §§ 141.726, 141.727(a) and (b), or 141.728 if that component is also included in the demonstration of performance credit.

§ 141.728 Additional filtration toolbox components.

(a) *Bag and cartridge filters.* Systems are eligible for a 1 log *Cryptosporidium* removal credit for bag filters and a 2 log *Cryptosporidium* removal credit for cartridge filters by meeting the criteria in paragraphs (a)(1) through (a)(10) of this section. The request to the State for this credit must include the results of challenge testing that meets the

requirements of paragraphs (a)(2) through (a)(9) of this section.

(1) To receive a 1 log *Cryptosporidium* removal credit for a bag filter, the filter must demonstrate a removal efficiency of 2 log or greater for *Cryptosporidium*. To receive a 2 log *Cryptosporidium* removal credit for a cartridge filter, the filter must demonstrate a removal efficiency of 3 log or greater for *Cryptosporidium*. Removal efficiency must be demonstrated through challenge testing conducted according to the criteria in paragraphs (a)(2) through (a)(9) of this section. The State may accept data from challenge testing conducted prior to [Date of Publication of Final Rule in the **Federal Register**] in lieu of additional testing if the prior testing was consistent with the criteria specified in paragraphs (a)(2) through (a)(9) of this section.

(2) Challenge testing must be performed on full-scale bag or cartridge filters that are identical in material and construction to the filters proposed for use in full-scale treatment facilities for removal of *Cryptosporidium*.

(3) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific organism or surrogate used in the test; gross measurements such as turbidity may not be used.

(4) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (*i.e.*, filtrate detection limit) and must be calculated using the equation in either paragraph (a)(4)(i) or (a)(4)(ii) of this section as applicable.

(i) For cartridge filters: Maximum Feed Concentration = $3.16 \times 10^4 \times$ (Filtrate Detection Limit).

(ii) For bag filters: Maximum Feed Concentration = $3.16 \times 10^3 \times$ (Filtrate Detection Limit).

(5) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(6) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subpart.

(7) Each filter evaluated must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up after a new bag or cartridge filter has been installed; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the run after the pressure drop has reached 100 percent of the terminal pressure drop.

(8) Removal efficiency of a bag or cartridge filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$LRV = \log_{10}(C_f) - \log_{10}(C_p)$$

where LRV = log removal value demonstrated during challenge testing; C_f = the feed concentration used during the challenge test; and C_p = the filtrate concentration observed during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit. An LRV must be calculated for each filter evaluated during the testing.

(9) If fewer than 20 filters are tested, the removal efficiency for the filtration device must be set equal to the lowest of the representative LRVs among the filters tested. If 20 or more filters are tested, then removal efficiency of the filtration device must be set equal to the 10th percentile of the representative LRVs among the various filters tested. The percentile is defined by $(i/(n+1))$ where i is the rank of n individual data points ordered lowest to highest. If necessary, the system may calculate the 10th percentile using linear interpolation.

(10) If a previously tested bag or cartridge filter is modified in a manner that could change the removal efficiency of the filter, additional challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the State.

(b) *Membrane filtration.* (1) Systems using a membrane filtration process, including a membrane cartridge filter that meets the definition of membrane filtration and the integrity testing requirements of this subpart, are eligible for a *Cryptosporidium* removal credit equal to the lower value of paragraph (b)(1)(i) or (b)(1)(ii) of this section:

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (b)(2) of this section.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the