TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 25 LONG TERM 2 (LT2) ENHANCED SURFACE WATER TREATMENT

25-001 SCOPE AND AUTHORITY: These regulations establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection found in Title 179 NAC 13, 17, and 19. These regulations apply to all public water systems supplied by a surface water source and all public water systems supplied by a ground water source under the direct influence of surface water. Systems that were subject to 40 CRF 141 Subpart W before the effective date of these regulations must continue to comply with the equivalent stage of these regulations upon their effective date. The authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

25-002 DEFINITIONS

Bag filters mean pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to the outside.

Bank filtration means a water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

Cartridge filters mean pressure-driven separation devices that remove particulate matter larger than one micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

Combined distribution system means the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

Consecutive system means a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Department means the Division of Public Health of the Department of Health and Human Services.

Director means the Director of Public Health of the Division of Public Health or his/her authorized representative.

EPA means the United States Environmental Protection Agency.

Finished water means water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

Flowing stream means a course of running water flowing in a definite channel.

Ground Water Under the Direct Influence of Surface Water (GWUDI) means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Director. The Director's determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation as described in 179 NAC 13 Attachment 2.

Lake/reservoir means a natural or man-made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.

Membrane filtration means a pressure or vacuum driven separation process in which particulate matter larger than one micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

Minor Deficiency means any deficiency found during a sanitary survey that is not a significant deficiency.

Plant intake means the works or structures at the head of a conduit through which water is diverted from a source (e.g., river or lake) into the treatment plant.

Presedimentation means a preliminary treatment process used to remove gravel, sand and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant.

Sanitary survey means an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities,

equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

Significant deficiency means a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system found during a sanitary survey that the Department determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

Two-stage lime softening means a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

Uncovered finished water storage facility means a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection and is directly open to the atmosphere.

Wholesale system means a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

25-003 GENERAL REQUIREMENTS

25-003.01 Applicability

1. Wholesale systems must comply with the requirements of this chapter based on the population of the largest system in the combined distribution system.

2. The requirements of this chapter for filtered systems apply to systems required by Title 179 to provide filtration treatment, whether or not the system is currently operating a filtration system.

3. The requirements of this chapter for unfiltered systems apply only to unfiltered systems that timely met and continue to meet the filtration avoidance criteria in 179 NAC 13, 17, and 19, as applicable.

25-003.02 Requirements: Systems that began any of the following activities under 40 CFR 141 Subpart W before [the effective date of these regulations] must continue to comply with these activities under 179 NAC 25. Systems subject to this chapter must comply with the following requirements:

1. Systems must conduct a round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for *Cryptosporidium*, *E. coli*, and turbidity as described in 179 NAC 25-004 through 25-009, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.

2. Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in 179 NAC 25-010 through 25-011.

3. Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in 179 NAC 25-012 and provide additional treatment for *Cryptosporidium* if required, as described in 179 NAC 25-013. All unfiltered systems must provide treatment for *Cryptosporidium* as described in 179 NAC 25-014. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in 179 NAC 25-015.

4. Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in 179 NAC 25-016.

5. Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in 179 NAC 25-017 through 25-022.

6. Systems must comply with the applicable recordkeeping and reporting requirements described in 179 NAC 25-023 through 25-024.

7. Systems must address deficiencies identified in sanitary surveys performed by the Department as described in 179 NAC 25-025.

25-004 SOURCE WATER MONITORING

25-004.01 Source Water Monitoring: Systems must conduct the following monitoring on the schedule in 179 NAC 25-004.02 unless they meet the monitoring exemption criteria in 179 NAC 25-004.03 or the Department has approved a different sampling schedule.

25-004.01A Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium*, *E. coli*, and turbidity at least monthly for 24 months.

25-004.01B Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.

25-004.01C Filtered Systems and *E. coli* monitoring

1. Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.

2. A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the Department that it will monitor for *Cryptosporidium* as described in 179 NAC 25-004.01D. The system

must notify the Department no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring.

25-004.01D Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under 179 NAC 25-004.01C or 40 CFR 141 Subpart W:

1. The annual mean *E. coli* concentration is greater than 100 *E. coli*/100 mL.

2. The system does not conduct *E. coli* monitoring as described in 179 NAC 25-004.01C.

25-004.01E For filtered systems serving fewer than 10,000 people, the Department may approve monitoring for an indicator other than *E. coli* under 179 NAC 25-004.01C. The Department also may approve an alternative to the *E. coli* concentration in 179 NAC 25-004.01D item 1 to trigger *Cryptosporidium* monitoring. This approval by the Department must be provided to the system in writing and must include the basis for the Department's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in 179 NAC 25-012.

25-004.01F Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.

25-004.01G Systems may sample more frequently than required under 179 NAC 25-004 if the sampling frequency is evenly spaced throughout the monitoring period.

25-004.02 Monitoring Schedule: Systems are required to begin source water monitoring no later than the month beginning with the date listed in this table or on a schedule approved by the Department:

SOURCE WATER MONITORING STARTING DATES TABLE

Systems that serve . . .	Must begin source water monitoring no later than the month beginning . . .
(1) At least 100,000 people	April 1, 2015
(2) From 50,000 to 99,999 people	October 1, 2015
(3) From 10,000 to 49,999 people	October 1, 2016
(4) Fewer than 10,000 and monitor for *E. coli* [a]	October 1, 2017
(5) Fewer than 10,000 and monitor for *Cryptosporidium*[b]	April 1, 2019

[a] Applies only to filtered systems.
[b] Applies to filtered systems that meet the conditions of 179 NAC 25-004.01D and unfiltered systems.

25-004.03 Monitoring Avoidance

25-004.03A Filtered systems are not required to conduct source water monitoring under this chapter if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in 179 NAC 25-013.

25-004.03B Unfiltered systems are not required to conduct source water monitoring under this chapter if the system will provide a total of a least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in 179 NAC 25-014.

25-004.03C If a system chooses to provide the level of treatment in 179 NAC 25-004.03A or 25-004.03B, as applicable, rather than start source water monitoring, the system must notify the Department in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under 179 NAC 25-005. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the Department in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in 179 NAC 25-015.

25-004.04 Plants Operating Only Part of the Year: Systems with surface water or ground water under the direct influence of surface water plants that operate for only part of the year must conduct source water monitoring in accordance with this chapter, but with the following modifications:

1. Systems must sample their source water only during the months that the plant operates unless the Department specifies another monitoring period based on plant operating practices.

2. Systems with plants that operate less than six months per year and that monitor for *Cryptosporidium* must collect at least six *Cryptosporidium* samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.

25-004.05 New Sources

25-004.05A A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring must monitor the new source on a schedule the Department approves. Source water monitoring must meet the requirements of this chapter. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of 179 NAC 25-012, 25-013, or 25-014, as applicable, for the new source on a schedule the Department approves.

25-004.05B The requirements of 179 NAC 25-004.05 apply to surface water and GWUDI systems that begin operation after the monitoring start date applicable to the system's size.

25-004.06 Failure to collect any required source water sample in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements is a monitoring violation.

25-005 SAMPLING SCHEDULES

25-005.01 Systems required to conduct source water monitoring must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

25-005.01A Systems must submit sampling schedules to the Department no later than three months prior to the applicable date listed in 179 NAC 25-004.03 02 or 40 CFR 141 Subpart W.

25-005.01B If the Department does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.

25-005.02 Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (i.e., within a five-day period around the schedule date) unless one of the conditions of 179 NAC 25-005.02 item 1 or 2 applies.

1. If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five-day period, the system must sample as close to the scheduled date as is feasible unless the Department approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the Department concurrent with the shipment of the sample to the laboratory.

2. Other Possible Conditions

    a. If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in 179 NAC 25-007, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

    b. The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the Department approves an alternative resampling date. The system must

submit an explanation for the delayed sampling date to the Department concurrent with the shipment of the sample to the laboratory.

25-005.03 Systems that fail to meet the criteria of 179 NAC 25-005.02 for any required source water sample must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the Department for approval prior to when the system begins collecting the missed samples.

25-006 SAMPLING LOCATIONS

25-006.01 Systems required to conduct source water monitoring must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the Department may approve one set of monitoring results to be used to satisfy the source water monitoring requirements for all plants.

25-006.02 Systems That Add Chemicals

25-006.02A Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of 179 NAC 25-006.02B.

25-006.02B The Department may approve a system to collect a source water sample after chemical treatment. To grant this approval, the Department must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

25-006.03 Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.

25-006.04 Bank Filtration

25-006.04A Systems that receive *Cryptosporidium* treatment credit for bank filtration under 179 NAC 17-005.02 or 179 NAC 19-009.03 as applicable, must collect source water samples in the surface water prior to bank filtration.

25-006.04B Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (i.e., after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under 179 NAC 25-019.03.

25-006.05 Multiple Sources: Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in 179 NAC 25-006.05A or 25-006.05B. The use of multiple sources during monitoring must be consistent with routine operational practice.

25-006.05A If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.

25-006.05B If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either 179 NAC 25-006.05B1 or 25-005.05B2 for sample analysis.

25-006.05B1 Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

25-006.05B2 Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

25-006.06 Additional Requirements: Systems must submit a description of their sampling location(s) to the Department at the same time as the required sampling schedule. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the Department does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

25-007 ANALYTICAL METHODS

25-007.01 *Cryptosporidium*: Systems must analyze for *Cryptosporidium* using *Method 1623: Cryptosporidium* and *Giardia in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA-815-R-05-002 or *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA-815-R-05-001, which are incorporated by reference or an equivalent method approved by EPA. A copy of these methods may be obtained online from http://www.epa.gov/safewater/disinfection/lt2 or from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave., NW, Washington, DC 20460 (Telephone: 800-426-4791). A copy may be inspected at the office of the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.

25-007.01A Systems must analyze at least a 10 liter (L) sample or a packed pellet volume of at least 2 milliliter (mL) as generated by the methods listed in 179 NAC 25-007.01. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in 179 NAC 25-007.01, up to a packed pellet volume of at least 2 mL.

25-007.01B Procedure for Matrix Spike Samples

25-007.01B1 Matrix Spike (MS) samples, as required by the methods in 179 NAC 25-007.01, must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under 179 NAC 25-008.

25-007.01B2 If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

25-007.01C Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

25-007.02 *E. coli*: Systems must use methods for enumeration of *E. coli* in source water approved in 40 CFR 136.3(a) or equivalent methods approved by EPA. Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.

25-007.02A The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of 179 NAC 25-007.02B.

25-007.02B The Department may approve on a case-by-case basis the holding of an *E. coli* sample for up to 48 hours between sample collection and initiation of analysis if the Department determines that analyzing an *E. coli* sample within 30 hours is not feasible. *E. coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in 40 CFR 136.3(a).

25-007.02C Systems must maintain samples between 0º C and 10º C during storage and transit to the laboratory.

25-007.03 Turbidity: Systems must use methods for turbidity measurement approved in 179 NAC 13-007.01A.

25-008 APPROVED LABORATORIES

25-008.01 *Cryptosporidium*: Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water or a laboratory that has been certified for *Cryptosporidium* analysis by an equivalent Department laboratory certification program.

25-008.02 *E. coli*: Any laboratory certified by EPA, the National Environmental Laboratory Accreditation Conference or the Department for total coliform or fecal coliform analysis under 179 NAC 13-007 is approved for *E. coli* analysis under this chapter when the laboratory uses the same technique for *E. coli* that the laboratory uses for 179 NAC 13-007.

25-008.03 Turbidity: Measurements of turbidity must be made by

1. A Grade I, II, III, or IV licensed water operator, or
2. A person who has been trained to measure turbidity and has completed Attachment 1 which is incorporated herein by reference and has sent it to the Department.

25-009 REPORTING SOURCE WATER MONITORING RESULTS

25-009.01 All systems must report results from the required source water monitoring to the Department no later than 10 days after the end of the first month following the month when the sample is collected.

25-009.02 Systems must report the applicable information in 179 NAC 25-009.02A and 25-009.02B for required source water monitoring.

25-009.02A Systems must report the following data elements for each *Cryptosporidium* analysis:

Data element

1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Sample type (field or matrix spike).
5. Sample volume filtered (L) to the nearest ¼ L.
6. Was 100% of filtered volume examined.
7. Number of oocysts counted.

25-009.02A1 For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.

25-009.02A2 For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.

25-009.02A3 For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.

25-009.02B Systems must report the following data elements for each *E. coli* analysis:

Data element

1. PWS ID
2. Facility ID
3. Sample collection date.
4. Analytical method number.
5. Method type.
6. Source type (flowing stream, lake/reservoir, GWUDI).
7. *E. coli*/100 mL.
8. Turbidity.[1]

[1] Systems serving fewer than 10,000 people that are not required to monitor for turbidity are not required to report turbidity with their *E. coli* results.

25-010 REQUIREMENTS WHEN MAKING A SIGNIFICANT CHANGE IN DISINFECTION PRACTICE

25-010.01 Following the completion of source water monitoring, a system that plans to make a significant change to its disinfection practice, as defined in 179 NAC 25-010.02, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in 179 NAC 25-011. Prior to changing the disinfection practice, the system must notify the Department and must include in this notice the following information:

25-010.01A A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in 179 NAC 25-011.

25-010.01B A description of the proposed change in disinfection practice.

25-010.01C An analysis of how the proposed change will affect the current level of disinfection.

25-010.02 Significant changes to disinfection practice are defined as follows:

1. Changes to the point of disinfection;
2. Changes to the disinfectant(s) used in the treatment plant;
3. Changes to the disinfection process; or
4. Any other modification identified by the Department as a significant change to disinfection practice.

25-011 DEVELOPING THE DISINFECTION PROFILE AND BENCHMARK

25-011.01 Systems required to develop disinfection profiles must follow the requirements of 179 NAC 25-011. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire

plant, based on contact time $(CT)_{99.9}$ values in Tables 13.1 through 13.8 of 179 NAC 13-007.02C5 as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the Department.

25-011.02 Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in 179 NAC 25-011.02A through 011.02D. Systems with more than one point of disinfectant application must conduct the monitoring in 179 NAC 25-011.02A through 25-011.02D for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in 179 NAC 13-007.01.

25-011.02A For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Department.

25-011.02B For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the Department.

25-011.02C The disinfectant contact time(s) (t) must be determined during peak hourly flow.

25-011.02D The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.

25-011.03 In lieu of conducting new monitoring under 179 NAC 25-011.02, systems may elect to meet the following requirements:

25-011.03A Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of 179 NAC 25-011.02 may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

25-011.03B Systems may use disinfection profile(s) developed under 179 NAC 17-004 or 179 NAC 19-007.01 through 19-007.07 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under 179 NAC 17-004 or 179 NAC 19-007.01 through 19-007.07 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.

25-011.04 Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in 179 NAC 25-011.04A through 25-011.04C.

25-011.04A Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the following methods:

1. Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

2. Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine [$\sum(CTcalc/CT_{99.9})$]

25-011.04B Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and [$\sum(CTcalc/CT_{99.9})$] must be calculated using the method in 179 NAC 25-011.04A item 2.

25-011.04C The system must determine the total logs of inactivation by multiplying the value calculated in 179 NAC 25-011.04A or 25-011.04B by 3.0.

25-011.04D Systems must calculate the log of inactivation for viruses using a protocol approved by the Department.

25-011.05 Systems must use the procedures specified in 179 NAC 25-011.05A and 25-011.05B to calculate a disinfection benchmark.

25-011.05A For each year of profiling data collected and calculated under 179 NAC 25-011.01 through 25-011.04, systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.

25-011.05B The disinfection benchmark is the lowest monthly mean value (for systems with one year of profiling data) or the mean of the lowest monthly mean values (for systems with more than one year of profiling data) of *Giardia lamblia* and virus log inactivation in each year of profiling data.

25-012 BIN CLASSIFICATION FOR FILTERED SYSTEMS

25-012.01 Following completion of required source water monitoring, filtered systems must calculate a *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results

reported under 179 NAC 25-004.01 or 40 CFR 141 Subpart W and must follow the following procedures:

25-012.02 Procedures for Bin Classification

25-012.02A For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

25-012.02B For systems that collect a total of at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.

25-012.02C For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (i.e., collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

25-012.02D For systems with plants operating only part of the year that monitor fewer than 12 months per year under 179 NAC 25-004.04, the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

25-012.02E If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in 179 NAC 25-012.02A through 25-012.02D.

25-012.03 Filtered systems must determine their bin classification from the following table and using the calculated *Cryptosporidium* bin concentration.

BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

For systems that are:	**With a *Cryptosporidium* bin concentration of . . .[1]**	**The bin classification is . .**
. . . required to monitor for *Cryptosporidium* under 179 NAC 25-004 or systems that monitored *Cryptosporidium* under 40 CFR 141 Subpart W	*Cryptosporidium* <0.075 oocysts/L 0.075 oocysts/L ≤*Cryptosporidium* <1.0 oocysts/L 1.0 oocysts/L ≤*Cryptosporidium* <3.0 oocysts/L *Cryptosporidium* ≥3.0 oocysts/L	Bin 1 Bin 2 Bin 3 Bin 4
. . . serving fewer than 10,000 people and NOT required to monitor for *Cryptosporidium* under 179 NAC 25-004.01D or 40 CFR 141 Subpart W	NA	Bin 1

25-012.04 Bin Classification Report

25-012.04A Filtered systems must report their bin classification to the Department for approval no later than six months after the system is required to complete source water monitoring.

25-012.04B The bin classification report to the Department must include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

25-012.05 Failure to comply with the conditions of 179 NAC 25-012.04 is a violation of the treatment technique requirement.

25-013 FILTERED SYSTEM ADDITIONAL *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS

25-013.01 Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in 179 NAC 25-013 based on their bin classification as determined under 179 NAC 25-012 or 40 CFR 141 Subpart W and according to the schedule in 179 NAC 25-015 or 40 CFR 141 Subpart W.

If the system bin classification is . . .	And the system uses the following filtration treatment in full compliance with 179 NAC 13, 17 and 19 (as applicable), then the additional *Cryptosporidium* treatment requirements are . . .			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	[1]
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	[2]
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	[3]

[1] As determined by the Department such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
[2] As determined by the Department such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
[3] As determined by the Department such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

25-013.02 Required *Cryptosporidium* Treatment

25-013.02A Filtered systems must use one or more of the treatment and management options listed in 179 NAC 25-017, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in 179 NAC 25-013.01.

25-013.02B Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under 179 NAC 25-013.01 using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in 179 NAC 25-018 through 179 NAC 25-022.

25-013.03 Failure by a system in any month to achieve treatment credit by meeting criteria in 179 NAC 25-018 through 25-022 for microbial toolbox options that is at least equal to the level of treatment required in 179 NAC 25-013.01 is a violation of the treatment technique requirement.

25-013.04 If the Department determines during a sanitary survey or an equivalent source water assessment that after a system completed source water monitoring, significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the Department to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in 179 NAC 25-017.

25-014 UNFILTERED SYSTEM *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS

25-014.01 Determination of Mean *Cryptosporidium* Level

25-014.01A Following completion of the source water monitoring, unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations. Systems must report this value to the Department for approval no later than six months after the month the system is required to complete source water monitoring.

25-014.01B If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level.

25-014.01C The report to the Department of the mean *Cryptosporidium* levels must include a summary of the source water monitoring data used for the calculation.

25-014.01D Failure to comply with the conditions of 179 NAC 25-014.01 is a violation of the treatment technique requirement.

25-014.02 *Cryptosporidium* Inactivation Requirements: Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels and according to the schedule for compliance.

25-014.02A Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.

25-014.02B Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.

25-014.03 Inactivation Treatment Technology Requirements: Unfiltered systems must use chlorine dioxide, ozone, or UV to meet the *Cryptosporidium* inactivation requirements.

25-014.03A Systems that use chlorine dioxide or ozone and fail to achieve the required *Cryptosporidium* inactivation on more than one day in the calendar month are in violation of the treatment technique requirement.

25-014.03B Systems that use UV light and fail to achieve the required *Cryptosporidium* inactivation by meeting the criteria in 179 NAC 25-022.04C2 are in violation of the treatment technique requirement.

25-014.04 Use of Two Disinfectants: Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of 179 NAC 13-005.01 using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium*, *Giardia lamblia*, or viruses.

25-015 SCHEDULE FOR COMPLIANCE WITH *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS

25-015.01 Following bin classification, filtered systems must provide the level of treatment for *Cryptosporidium* required under 179 NAC 25-013 according to the schedule in 179 NAC 25-015.03 or according to a schedule set by the Department.

25-015.02 Following determination of the mean *Cryptosporidium* level, unfiltered systems must provide the level of treatment for *Cryptosporidium* required under 179 NAC 25-014 according to the schedule in 179 NAC 25-015.03 or according to a schedule set by the Department.

25-015.03 *Cryptosporidium* Treatment Compliance Dates

Cryptosporidium Treatment Compliance Dates Table

Systems that serve . . .	Must comply with *Cryptosporidium* treatment requirements no later than . . . [a]
(1) At least 100,000 people	the effective date of these regulations
(2) From 50,000 to 99,999 people	the effective date of these regulations
(3) From 10,000 to 49,999 people	October 1, 2013
(4) Fewer than 10,000 people	October 1, 2014

[a] The Department may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

25-015.04 If the bin classification for a filtered system changes following source water monitoring, as determined under 179 NAC 25-012.04, the system must provide the level of treatment for *Cryptosporidium* required under 179 NAC 25-013 on a schedule the Department approves.

25-015.05 If the mean *Cryptosporidium* level for an unfiltered system changes following source water monitoring, and if the system must provide a different level of *Cryptosporidium* treatment under 179 NAC 25-014 due to this change, the system must meet this treatment requirement on a schedule the Department approves.

25-016 REQUIREMENTS FOR UNCOVERED FINISHED WATER STORAGE FACILITIES: Uncovered finished water storage facilities are not allowed.

25-016.01 Failure to comply with the requirements of 179 NAC 25-016 is a violation of the treatment technique requirement.

25-017 MICROBIAL TOOLBOX OPTIONS FOR MEETING *CRYPTOSPORIDIUM* TREATMENT REQUIREMENTS

25-017.01 Credits

25-017.01A Systems receive the treatment credits listed in the table in 179 NAC 25-017.02 by meeting the conditions for microbial toolbox options described in 179 NAC 25-018 through 179 NAC 25-022. Systems apply these treatment credits to meet the treatment requirements in 179 NAC 25-013 or 25-014, as applicable.

25-017.01B Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in 179 NAC 25-022 only.

25-017.02 The following table summarizes options in the microbial toolbox:

Microbial Toolbox Summary Table: Options, Treatment Credits and Criteria

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
1. Watershed control program	0.5-log credit for Department-approved program comprising required elements, annual program status report to the Department, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in 179 NAC 25-018.01.
2. Alternative source/intake management	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in 179 NAC 25-018.02.

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Pre-Filtration Toolbox Options	
3. Presedimentation basin with coagulation	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in

	turbidity or alternative Department-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in 179 NAC 25-019.01.
4. Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in 179 NAC 25-019.02.
5. Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in 179 NAC 25-019.03.

Treatment Performance Toolbox Options

6. Combined filter performance	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in 179 NAC 25-020.01.
7. Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in 179 NAC 25-020.02.
8. Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the Department with a Department-approved protocol. Specific criteria are in 179 NAC 25-020.03.

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria

Additional Filtration Toolbox Options

9. Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in 179 NAC 25-021.01.
10. Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in 179 NAC 25-021.01.
11. Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in 179 NAC 25-021.02.
12. Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in 179 NAC 25-021.03.

13. Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in 179 NAC 25-021.04.

Inactivation Toolbox Options

14. Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria are in 179 NAC 25-022.02.
15. Ozone	Log credit based on measured CT in relation to CT table. Specific criteria are in 179 NAC 25-022.02.
16. UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria are in 179 NAC 25-022.04

25-018 SOURCE TOOLBOX COMPONENTS

25-018.01 Watershed Control Program: Systems receive a 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of 179 NAC 25-018.

25-018.01A Systems that intend to apply for the watershed control program credit must notify the Department of this intent no later than two years prior to the treatment compliance date applicable to the system.

25-018.01B Systems must submit to the Department a proposed watershed control plan no later than one year before the applicable treatment compliance date. The Department must approve the watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the following elements:

1. Identification of an “area of influence” outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under 179 NAC 25-018.01E item 2.

2. Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system’s source water quality.

3. An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system’s source water.

4. A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and

commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

25-018.01C Systems with existing watershed control programs (i.e., programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in 179 NAC 25-018.01B and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

25-018.01D If the Department does not respond to a system regarding approval of a watershed control plan submitted under 179 NAC 25-018 and the system meets the other requirements of 179 NAC 25-018, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the Department subsequently withdraws such approval.

25-018.01E Systems must complete the following actions to maintain the 0.5-log credit:

1. Submit an annual watershed control program status report to the Department. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the Department or as the result of the watershed survey conducted under 179 NAC 25-018.01E item 2. It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the Department prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

2. Undergo a watershed sanitary survey every three years for community water systems and every five years for non-community water systems and submit the survey report to the Department. The survey must be conducted according to Department guidelines and by persons the Department approves.

    a. The watershed sanitary survey must meet the following criteria: encompass the region identified in the Department-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium*.

    b. If the Department determines that significant changes may have occurred in the watershed since the previous watershed sanitary

survey, systems must undergo another watershed sanitary survey by a date the Department requires, which may be earlier than the regular date in 179 NAC 25-018.01E item 2.

3. The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The Department may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

25-018.01F If the Department determines that a system is not carrying out the approved watershed control plan, the Department may withdraw the watershed control program treatment credit.

25-018.02 Alternative Source

25-018.02A A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the Department approves, a system may determine its bin classification under 179 NAC 25-012 based on the alternative source monitoring results.

25-018.02B If systems conduct alternative source monitoring under 179 NAC 25-018.02A, systems must also monitor their current plant intake concurrently as described in 179 NAC 25-004.

25-018.02C Alternative source monitoring under 179 NAC 25-018.02A must meet the requirements for source monitoring to determine bin classification, as described in 179 NAC 25-004 through 25-009. Systems must report the alternative source monitoring results to the Department, along with supporting information documenting the operating conditions under which the samples were collected.

25-018.02D If a system determines its bin classification using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in 179 NAC 25-015.

25-019 PRE-FILTRATION TREATMENT TOOLBOX COMPONENTS

25-019.01 Presedimentation: Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the following criteria:

1. The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.

2. The system must continuously add a coagulant to the presedimentation basin.

3. The presedimentation basin must achieve the following performance criteria:

   a. Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity) – $\log_{10}$(monthly mean of daily effluent turbidity).

   b. Complies with Department-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

25-019.02 Two-Stage Lime Softening: Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

25-019.03 Bank Filtration: Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in 179 NAC 25-019.03.

25-019.03A Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in 179 NAC 25-019.03D.

25-019.03B Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90% of the core length, grains less than 1.0 mm in diameter constitute at least 10% of the core material.

25-019.03C Only horizontal and vertical wells are eligible for treatment credit.

25-019.03D For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

25-019.03E Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the Department and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the Department determines that microbial removal has been compromised, the Department may revoke treatment credit until the system implements corrective actions approved by the Department to remediate the problem.

25-019.03F Springs and infiltration galleries are not eligible for treatment credit under 179 NAC 25-019.03, but are eligible for credit under 179 NAC 25-020.03.

25-019.03G Bank Filtration Demonstration of Performance: The Department may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in 179 NAC 25-019.03G. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in 179 NAC 25-019.03A to 25-019.03E.

25-019.03G1 The study must follow a Department-approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.

25-019.03G2 The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

25-020 TREATMENT PERFORMANCE TOOLBOX COMPONENTS

25-020.01 Combined Filter Performance: Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log *Cryptosporidium* treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95% of the measurements. Turbidity must be measured as described in 179 NAC 13-007.01 and 13-007.03.

25-020.02 Individual Filter Performance: Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in addition to the 0.5-log credit under 179 NAC 25-020.01, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in 179 NAC 17-006 or 19-010, as applicable.

25-020.02A The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95% of the measurements recorded each month.

25-020.02B No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

25-020.02C Any system that has received treatment credit for individual filter performance and fails to meet the requirements of 179 NAC 25-020.02A or 25-020.02B during any month does not receive a treatment technique violation under 179 NAC 25-013.03 if the Department determines the following:

1. The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.

2. The system has experienced no more than two such failures in any calendar year.

25-020.03 Demonstration of Performance: The Department may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in 179 NAC 25-013 or 25-019 through 25-022 and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

25-020.03A Systems cannot receive the prescribed treatment credit for any toolbox option in 179 NAC 25-019 through 25-022 if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

25-020.03B The demonstration of performance study must follow a Department-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

25-020.03C Approval by the Department must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The Department may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

25-021 ADDITIONAL FILTRATION TOOLBOX COMPONENTS

25-021.01 Bag and Cartridge Filters: Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the following criteria. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of 179 NAC 25-021.01 items 2 through 9 to the Department. The filters must treat the entire plant flow taken from a surface water or ground water under the direct influence of surface water source.

1. The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in 179 NAC 25-021.01 items 2 through 9. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in 179 NAC 25-021.01 items 2 through 9.

2. Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium*. Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

3. Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium*. The microorganism 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 microorganism 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 following equation:

   Maximum Feed Concentration = $1 \times 10^4 \times$ (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% 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 chapter.

7. Removal efficiency of a 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 measured during the challenge test; and C_p = the filtrate concentration measured 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.

8. Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45% and 55% of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100% of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

9. If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10^{th} percentile of the set of LRV_{filter} values for the various filters tested. The percentile is defined by [i/(n+1)] where i is the rank of n individiual data points ordered lowest to highest. If necessary, the 10^{th} percentile may be calculated using linear interpolation.

10. If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the Department.

25-021.02 Membrane Filtration

25-021.02A Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in 179 NAC 25-002 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under item 1 or 2 below:

1. The removal efficiency demonstrated during challenge testing conducted under the conditions in 179 NAC 25-021.02B.

2. The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in 179 NAC 25-021.02C.

25-021.02B Challenge Testing: The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the Department. Challenge testing must be conducted according to the following criteria. Systems may use data from challenge

testing conducted prior to January 5, 2006 if the prior testing was consistent with the following criteria.

1. Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

2. 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, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

3. The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:

   Maximum Feed Concentration = $3.16 \times 10^6 \times$ (Filtrate Detection Limit)

4. Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (i.e., backwashing).

5. Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:

   $LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$

   Where:

   LRV = log removal value demonstrated during the challenge test; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the

challenge particulate is not detected in the filtrate, the term C_p is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

6. The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than 20 modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then $LRV_{C\text{-}Test}$ is equal to the 10^{th} percentile of the representative LRVs among the modules 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 10^{th} percentile may be calculated using linear interpolation.

7. The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

8. If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the Department.

25-021.02C Direct Integrity Testing: Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the following requirements. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (i.e., one or more leaks that could result in contamination of the filtrate).

1. The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

2. The direct integrity method must have a resolution of three micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

3. The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the Department, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either a. or b. below as applicable to the type of direct integrity test the system uses.

   a. For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

      $LRV_{DIT} = LOG_{10} [Q_p/(VCF \times Q_{breach})]$

      Where:

      LRV_{DIT} = the sensitivity of the direct integrity test; Q_p = total design filtrate flow from the membrane unit; Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

   b. For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

      $LRV_{DIT} = LOG_{10}(C_f) – LOG_{10}(C_p)$

      Where

      LRV_{DIT} = the sensitivity of the direct integrity test; C_f = the typical feed concentration of the marker used in the test; and C_p = the filtrate concentration of the marker from an integral membrane unit.

4. Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the Department.

5. If the result of a direct integrity test exceeds the control limit established under 179 NAC 25-021.02C item 4, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

6. Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in

operation. The Department may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium* or reliable process safeguards.

25-021.02D Indirect Integrity Monitoring: Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the following criteria. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in 179 NAC 25-021.02C items 1 through 5 is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the Department summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

1. Unless the Department approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

2. Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

3. Continuous monitoring must be separately conducted on each membrane unit.

4. If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (i.e., two consecutive 15-minute readings above 0.15 NTU) direct integrity testing must immediately be performed on the associated membrane unit as specified in 179 NAC 25-021.02C items 1 through 5.

5. If indirect integrity monitoring includes a Department-approved alternative parameter and if the alternative parameter exceeds a Department-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in 179 NAC 25-021.02C items 1 through 5.

25-021.03 Second Stage Filtration: Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, granular activated carbon (GAC), or other fine grain media following granular media filtration if the Department approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

25-021.04 Slow Sand Filtration (as secondary filter): Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a

separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The Department must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

25-022 INACTIVATION TOOLBOX COMPONENTS

25-022.01 Calculation of CT Values

25-022.01A CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under 179 NAC 25-022.02 or 25-022.03 must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in 179 NAC 13-007.01 through 13-007.02.

25-022.01B Systems with several disinfection segments in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Under this approach, systems must add the *Cryptosporidium* CT values in each segment to determine the total CT for the treatment plant.

25-022.02 CT Values for Chlorine Dioxide and Ozone

25-022.02A Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in 179 NAC 25-022.01.

CT Values (Mg-Min/L) for *Cryptosporidium* Inactivation by Chlorine Dioxide[1]

Log credit	Water Temperature, °C										
	<=0.5	**1**	**2**	**3**	**5**	**7**	**10**	**15**	**20**	**25**	**30**
1. 0.25	159	153	140	128	107	90	69	45	29	19	12
2. 0.5	319	305	279	256	214	180	138	89	58	38	24
3. 1.0	637	610	558	511	429	360	277	179	116	75	49
4. 1.5	956	915	838	767	643	539	415	268	174	113	73
5. 2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
6. 2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
7. 3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = $[0.001506 \times (1.09116)^{Temp}] \times CT$

25-022.02B Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in 179 NAC 25-022.01.

CT Values (Mg-Min/L) for *Cryptosporidium* Inactivation by Ozone[1]

Log credit	Water Temperature ºC										
	<=0.5	**1**	**2**	**3**	**5**	**7**	**10**	**15**	**20**	**25**	**30**
1. 0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
2. 0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
3. 1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
4. 1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
5. 2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
6. 2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
7. 3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = [0.0397 x $(1.09757)^{Temp}$] X CT

25-022.03 Site-Specific Study: The Department may approve alternative chlorine dioxide or ozone CT values to those listed in 179 NAC 25-022.02 on a site-specific basis. The Department will base this approval on a site-specific study a system conducts that follows a Department-approved protocol.

25-022.04 Ultraviolet Light: Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in 179 NAC 25-022.04A. Systems must validate and monitor UV reactors as described in 179 NAC 25-022.04B and 25-022.04C to demonstrate that they are achieving a particular UV dose value for treatment credit.

25-022.04A UV Dose Table: The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in 179 NAC 25-022.04B. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV Dose Table for *Cryptosporidium, Giardia lamblia*, and Virus Inactivation Credit

Log Credit	*Cryptosporidium* UV dose ($mJ/cm^{2)}$	*Giardia lamblia* UV dose (mJ/cm^2)	Virus UV dose (mJ/cm^2)
1. 0.5	1.6	1.5	39
2. 1.0	2.5	2.1	58
3. 1.5	3.9	3.0	79
4. 2.0	5.8	5.2	100
5. 2.5	8.5	7.7	121
6. 3.0	12	11	143
7. 3.5	15	15	163
8. 4.0	22	22	186

25-022.04B Reactor Validation Testing: Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the

reactor delivers the UV dose required in 179 NAC 25-022.04A (*i.e.*, validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

25-022.04B1 When determining validated operating conditions, systems must account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

25-022.04B2 Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

25-022.04B3 The Department may approve an alternative approach to validation testing.

25-022.04C Reactor Monitoring:

25-022.04C1 Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under 179 NAC 25-022.04B. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the Department designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the Department approves.

25-022.04C2 To receive treatment credit for UV light, systems must treat at least 95% of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described in 179 NAC 25-022.04A and 022-04B. Systems must demonstrate compliance with this condition by the monitoring required under 179 NAC 25-022.04C1.

25-023 REPORTING REQUIREMENTS

25-023.01 Systems must report sampling schedules and source water monitoring results unless they notify the Department that they will not conduct source water monitoring due to meeting monitoring avoidance criteria.

25-023.02 Filtered systems must report their *Cryptosporidium* bin classification as described in 179 NAC 25-012.

25-023.03 Unfiltered systems must report their mean source water *Cryptosporidium* level as described in 179 NAC 25-014.

25-023.04 Systems must report disinfection profiles and benchmarks to the Department as described in 179 NAC 25-010 through 25-011 prior to making a significant change in disinfection practice.

25-023.05 Systems must report to the Department in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under 179 NAC 25-013 or 25-014. Alternatively, the Department may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

Microbial Toolbox Reporting Requirements

Toolbox Option	Systems must submit the following information	On the following schedule
1. Watershed control program (WCP)	(i) Notice of intention to develop a new or continue an existing watershed control program (ii) Watershed control plan (iii) Annual watershed control program status report (iv) Watershed sanitary survey report	(i) No later than two years before the applicable treatment compliance data in 179 NAC 25-015. (ii) No later than one year before the applicable treatment compliance date in 179 NAC 25-015. (iii) Every 12 months, beginning one year after the applicable treatment compliance date in179 NAC 25-015. (iv) For community water systems, every three years beginning three years after the applicable treatment compliance date in 179 NAC 25-015. For non-community water systems, every five years beginning five years after the applicable treatment compliance date in 179 NAC 25-015.
2. Alternative source/intake management	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results	No later than the applicable treatment compliance date in 179 NAC 25-015.
3. Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100% of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative Department-approved performance criteria.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
4. Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment

	to filtration (ii) Both stages treated 100% of the plant flow	compliance date in 179 NAC 25-015.
5. Bank filtration	(i) Initial demonstration of the following: (a) Unconsolidated, predominantly sandy aquifer (b) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit). (ii) If monthly average of daily maximum turbidity is greater than 1 NTU, then system must report result and submit an assessment of the cause.	No later than the applicable treatment compliance date in 179 NAC 25-015. Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
6. Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95% of the 4 hour CFE measurements taken each month	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in179 NAC 25-015.
7. Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95% of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in179 NAC 25-015.
8. Demonstration of performance	(i) Results from testing following a Department approved protocol (ii) As required by the Department, monthly verification of operation within conditions of Department approval for demonstration of performance credit	No later than the applicable treatment compliance date in 179 NAC 25-015. Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
9. Bag filters and cartridge filters.	(i) Demonstration that the following criteria are met: (a) Process meets the definition of bag or cartridge filtration; (b) Removal efficiency established through challenge testing that meets criteria in 179 NAC 25. (ii) Monthly verification that 100% of plant flow was filtered.	No later than the applicable treatment compliance date in 179 NAC 25-015. Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
10. Membrane filtration	(i) Results of verification testing demonstrating the following: (a) Removal efficiency established through challenge testing that meets criteria in 179 NAC 25; (b) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and	No later than the applicable treatment compliance date in 179 NAC 25-015.

	associated baseline. (ii) Monthly report summarizing the following: (a) All direct integrity tests above the control limit; (b) If applicable, any turbidity or alternative Department-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
11. Second stage filtration	Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
12. Slow sand filtration (as secondary filter)	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from surface water or GWUDI sources.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
13. Chlorine dioxide	Summary of CT values for each day as described in 179 NAC 25-023.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
14. Ozone	Summary of CT values for each day as described in 179 NAC 25-023.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.
15. UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose. (ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in 179 NAC 25-023.04.	No later than the applicable treatment compliance date in 179 NAC 25-015. Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in 179 NAC 25-015.

25-024 RECORDKEEPING REQUIREMENTS

25-024.01 Systems must keep results from source water monitoring until three years after bin classification for filtered systems or determination of the mean *Cryptosporidium* level for unfiltered systems for the particular round of monitoring.

25-024.02 Systems must keep any notification to the Department that they will not conduct source water monitoring due to meeting the criteria of 179 NAC 25-004.03 or 40 CFR 141 Subpart W for three years.

25-024.03 Systems must keep the results of treatment monitoring associated with microbial toolbox options under 179 NAC 25-018 through 179 NAC 25-022 and with uncovered finished water reservoirs under 179 NAC 25-016, as applicable, for three years.

25-025 REQUIREMENTS TO RESPOND TO DEFICIENCIES IDENTIFIED IN SANITARY SURVEYS PERFORMED BY THE DEPARTMENT

25-025.01 For sanitary surveys performed by the Department where deficiencies are identified, the Department will provide a "Deficiency Compliance Schedule" to the system. Systems must respond in writing to deficiencies identified in compliance schedules no later than 30 calendar days after receipt of the compliance schedule, indicating how and on what schedule the system will address deficiencies noted in the survey, if not on the same time frame as the deficiency compliance schedule. Any deviation from the Department-provided compliance schedule is subject to review and approval by the Department.

25-025.02 Systems must correct deficiencies identified in sanitary survey reports according to the schedule approved by the Department if such deficiencies are within the control of the system.

179 NAC 25 ATTACHMENT 1

Sampling Training For Individuals Other Than Licensed Operators

PWS System or Community Name: _____

Name of individuals taking samples:_____

Parameter(s) sampled routinely by the above individual:

_____

Trainer and Title: _____

Training material used: _____

Handouts given to the above individual:

_____

I certify that on _____ I personally provided the necessary sampling
(Date)

training to assure quality data and approve the above individual as qualified to perform the above sampling tasks.

X_____
(Signature of Trainer) (License Number)

I certify that I did receive said training and I understand how to properly sample the above parameters.

X_____
(Signature of Approved Sampling Individual)

When the above-named trained person no longer takes the samples the individual has been trained to take, I will inform the Nebraska Department of Health and Human Services, Drinking Water Program Field Services Program Manager at (402) 471-0521 within seven days. Acknowledged by System Owner or Operator in Charge:

X_____ Date: _____
(Signature)

(Keep a copy for your records and submit original within seven days to DHHS, Division of Public Health, Public Water Program at P. O. Box 95026, Lincoln, NE 68526-5026)