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Instructions for Permit Application and Demonstration of NCWS 4-Log Treatment of Viruses for Groundwater Sources

PURPOSE

The attached form has been developed to provide completeness and uniformity in the submission of information by a noncommunity water system (NCWS) for the construction and/or documentation of facilities capable of providing 4-Log treatment of viruses for groundwater sources. The reports must be prepared by or under the supervision of a licensed professional engineer insofar as the Pennsylvania Engineer's Law regulates the practice of professional engineering. If additional space is required, attach an 8 ½ x 11 inch sheet of paper containing the information, being sure to reference which section the information pertains to.

Only a NCWS that is operating under a brief description form (Application for approval) as described in Section 109.505(a)(2) of the Pennsylvania Safe Drinking Water regulations set forth in Chapter 109 of Title 25 of the Pennsylvania Code should use the *Permit Application and Demonstration of 4-Log Treatment of Viruses for Groundwater Sources* form when demonstrating to the Department 4-Log treatment of viruses for groundwater sources.

A NCWS that has obtained a construction permit under Section 109.503 and an operation permit under Section 109.504 should use the *Demonstration of 4-Log Treatment of Viruses for Groundwater Sources* form (3900-FM-BSDW0470b) when demonstrating to the Department 4-Log treatment of viruses for groundwater sources.

A NCWS demonstrating 4-Log treatment of viruses must complete all five sections of this form and enclose all required documentation in order for the submittal to be considered complete. Incomplete submissions will delay processing and may be returned to the applicant.

Section I

Section I is general information to identify the NCWS that is submitting its application.

Section II

Section II is a checklist of the enclosures required for the submittal to be considered complete. Some of these enclosures may require significant time and resources to produce and may need to be prepared under the supervision of a professional engineer. Pay special attention to ensure that all enclosures are properly prepared and bear the appropriate signatures and/or seals.

Section III

Section III is a description of the systems disinfection and treatment practices used to provide 4-Log treatment of viruses.

Section IV

Section IV is a description of the system's storage facilities used in CT calculations.

Section V

Section V is a description of how the system will conduct compliance monitoring. Compliance monitoring consists of monitoring the free chlorine residual at the entry point and performing other monitoring as necessary when alternative technologies are in use to ensure that 4-Log treatment of viruses is maintained. Systems begin compliance monitoring following approval by the Department that they have successfully demonstrated 4-Log treatment of viruses for their groundwater source(s).

ITEM-BY-ITEM INSTRUCTIONS

Section I: General Information

PWS Name: Name of the public water system.

PWS ID: The seven-digit public water system identification number assigned by DEP.

Owner Name: Name of the person or entity that legally owns the water system.

Municipality: The municipality in which the water system is located.

County: The county in which the water system is located.

Mailing Address, City/State, ZIP and Telephone Number: The mailing address of the water system. This may or may not be the actual location of the facility. Include the telephone number of the water system contact person.

Population Served: The number of people served by the water system.

Entry Point ID: The DEP identification number of the entry point for which this submission is being made. If the system supplies more than one entry point served by groundwater, a separate submission is required for each entry point.

Minimum Water Temperature: The annual minimum temperature of the raw water or the water in the disinfection contact storage vessel the system encounters.

Peak Flow (GPM): The peak flow of all of the combined sources flowing through the entry point, including surface water and/or groundwater under the direct influence of surface water (GUDI) sources that may be supplementing groundwater sources.

Section II: Checklist of Enclosures

- A. Completed 4-Log Spreadsheet:** Water systems demonstrating 4-Log treatment of viruses to the Department must enclose, along with this form, one completed Demonstration of a 4-Log Treatment of Viruses for Groundwater Sources Spreadsheet (3900-FM-BSDW0470d) for each entry point served by groundwater sources. This spreadsheet calculates the log inactivation of viruses by chlorine disinfection by looking at the system in terms of segments. Each segment is assigned a baffling factor and, together with peak flow, a minimum effective contact time is determined. The minimum effective contact times for all of the segments are then summed for a total effective contact time. The spreadsheet uses the total effective contact time along with the minimum residual disinfectant level and minimum annual water temperature to calculate the minimum log inactivation under normal operating conditions. This minimum log inactivation must be greater than or equal to 4.0* for the system to be approved for 4-Log treatment of viruses.

The Department has also developed a paper worksheet version of the spreadsheet (3900-FM-BSDW0470c) that can be used and submitted in place of the Excel spreadsheet.

*The log inactivation generated by the spreadsheet and/or worksheet may be less than 4.0 only if the system is using supplemental treatment (e.g. UV, ozone, etc.) with approved log-treatment credit for viruses. The total log treatment must be greater than or equal to 4.0.

Tracer Study Report: Water systems may choose to hire a professional engineer to conduct a tracer study of the treatment system in lieu of submitting the 4-Log spreadsheet. The pilot study must, at a minimum, define the minimum effective contact time from the point of disinfectant application and the entry point. The pilot study must also include the calculations for total CT and minimum annual log-inactivation of viruses by free chlorine (taking into account the minimum annual water temperature). For specific tracer study requirements consult your DEP Regional Office.

Plant or System Schematic: Enclose a plant or treatment system schematic that shows all sources, treatment processes, and conveyances between the sources and the entry point. The treatment segments identified in the 4-Log Spreadsheet must be clearly labeled on the schematic. The location(s) where compliance monitoring grab sampling or continuous monitoring will be conducted must also be clearly labeled.

- B. Will you need to make any physical changes to your system?** Some systems, such as those with limited storage capacity, those without disinfection or those using residual-free disinfection technologies, will have to make system modifications to comply with the Groundwater Rule. Such systems may need to add storage capacity, modify existing storage by adding baffles, or install new or additional treatment. If physical changes need to be made in order to provide 4-Log treatment of viruses, a system should describe all modifications by submitting a *PWS Inventory and Brief Description Form* (3900-FM-BSDW0033) and obtain Department approval prior to construction per Section 109.505(a)(2)(ii)
- C. Do you plan to use any treatment technologies other than or in addition to chlorine disinfection to achieve 4-Log treatment of viruses for groundwater?:** Section V is focused on compliance monitoring for chlorine disinfection since most systems will use that technology to satisfy the requirement for 4-Log treatment of viruses. Systems using other technologies in lieu of, or in addition to chlorine disinfection must prepare and submit enclosures that describe how they plan to satisfy the compliance monitoring requirements. Systems using alternative technologies should contact their DEP Regional Office for information about acceptable compliance monitoring for specific technologies. Systems obtaining a permit to provide 4-Log treatment of viruses using an alternative treatment technology will be assigned special conditions relating to compliance monitoring in their operation permit.
- D. Have two (2) copies of the designer's plans and specifications been submitted?:** Any design plans and specifications supplied must be submitted with two copies.
- E. Does the front cover of flyleaf or first page of each set of drawings and specifications bear the signature and embossed seal of the licensed professional engineer by or under whom prepared?:** Documents need to be signed and bear the seal of a licensed professional engineer.
- F. Does each subsequent page or drawing bear and embossed seal or reasonable facsimile of such seal?:** The licensed professional engineer's seal needs to be present on each page of all documents submitted under the engineers preparation.
- G. Are complete detailed specifications supplied for the proposed project?:** The *Permit Application and Demonstration of NCWS 4-Log Treatment of Viruses for Groundwater Sources* form must have sufficient specifications supplied to verify the proposed project claims.
- H. Will all materials and chemicals that come in contact with, or affect the quality of, the water be certified for conformance with ANSI/NSF standards 60 and 61, as applicable?:** Chemicals used by a public water supplier which may come in contact with or affect the quality of the water should be certified for conformance with ANSI/NSF Standard 60. Materials used in the construction or modification of a public water system which may come into contact with or affect the quality of the water should be certified for conformance with ANSI/NSF Standard 61.

Section III: Disinfection

- A. Form of chemical disinfectant used:** Calcium hypochlorite or sodium hypochlorite should be used. If an alternative disinfectant is used, the regional engineer needs to be contacted for approval.
- B. Describe the chemical disinfection system, application method, and equipment and chemical storage locations:** Various chemical disinfectants may be used for disinfection, each having different or multiple application methods. Disinfectant specific equipment is used and backup equipment should be available to keep systems running efficiently. For safe handling, chemicals are often stored in separate locations.
- C. Did you include any length of pipe downstream of the entry-point (location of the chlorine analyzer or grab sampling tap) but upstream of the first customer in the CT calculations?:** Some water systems may benefit by including pipe volume between the compliance monitoring location at the traditional entry point and the first customer in their CT calculation for determining 4-Log inactivation by free chlorine.

However, the residual disinfectant level may degrade as the finished water travels over that distance. Systems wishing to use pipe volumes between the entry point and first customer may either conduct a pilot study to measure the free chlorine residual degradation and request that their minimum entry point residual be set accordingly, or install a new monitoring location downstream of the traditional entry point, but still upstream of the first customer. Installing a new sampling tap for monitoring purposes may require a minor permit amendment. Consult your regional DEP office for more information.

- D. Indicate the requested minimum residual for the EP. Does the dosage meet the appropriate EPA CT value to achieve 4-Log inactivation of viruses with at least 20 minutes of effective contact time? If you answered 'No', does your complete treatment process, including the technologies you described in attachments specified in II.C, achieve 4-Log treatment of viruses?:** Providing water that has a residual equal to or greater than the minimum residual ensures 4-Log inactivation of viruses. The requested entry point residual may be no less than 0.20 mg/L free chlorine or its equivalent. Upon approval, the minimum free chlorine residual will be added as a special condition to the system's permit. When chlorination is used to achieve 4-Log inactivation of viruses, 20-minutes of effective contact time prior to the first customer should be provided. If other technologies besides chemical disinfection are used to provide 4-Log treatment of viruses they should be listed here. Explain how the log inactivation credit was determined for these other treatment technologies
- E. Describe your justification for the minimum temperature used in your log-inactivation calculation:** Annual minimum temperature of your raw water or of the water in your disinfectant contact storage vessel, whichever is lower. A system without temperature data which does not have aboveground storage located outside may use a default minimum temperature of 5 degrees Celsius.

Section IV: Storage

- A. For existing storage, is the effective contact time at least 20 minutes?:** Systems may be able to achieve 4-Log inactivation of viruses with less than 20 minutes of effective contact time by increasing their disinfectant residual. While this is possible, the system still should provide 20 minutes of effective contact time. Additional storage may be needed to satisfy the 20 minutes of effective contact time.
- B. For new construction, describe the installation, control equipment, and the effective contact time:** Storage tanks can be above or below ground. The tanks can be designed in place or pre-fabricated; what locations are the storage tanks being monitored and what alarm levels are set? Effective contact time includes any segments after disinfection that are used in storage calculations. New storage must be designed to provide 20 minutes of effective contact time.
- C. What is the location of the storage system and procedure of operation for the system when storage is offline?:** When the storage tank is offline how does the water system operate? Make sure proper disinfection of the storage system is provided before the system is put back online.
- D. What type of interior coating is applied to the tank, and is it AWWA certified?:** Determine what the interior coating applied to the storage tank is and verify the coating follows AWWA standard D102 – *Coating Steel Water Storage Tanks* or D103 – *Factory Coated Bolted Steel Tanks for Water Storage*.
- E. If new storage is being added, will the storage facility be disinfected in accordance with the applicable AWWA standards?:** The storage facility will need to be disinfected before it is put online. AWWA standard, *Disinfection of Water Storage Facilities* (C652) should be followed.
- F. Where standpipes or hydropneumatic tanks are used for contact time, do separate inlets and outlets exist?:** If a standpipe or hydropneumatic tank is used for contact time, it should have separate inlets and outlets. If the standpipe or hydropneumatic tank does not have a separate inlet and outlet, a baffling factor of 0 will be assigned as no effective contact time will be provided.
- G. Describe each disinfection segment used in calculating contact time, the assigned baffling factor, and how the baffling factor was determined?:** Any segment after disinfection is applied to the water may be used to determine effective contact time. A description of each segment(s) being used to determine effective contact time is required along with the baffling factor assigned to the segment(s). The baffling factor may be assigned a value based on segment configuration or proven through a tracer study.

Section V: Compliance Monitoring of Entry Point Free Chlorine Residual

- A. List all of the sources supplying this entry point:** List ID#, name, type, and max yield of all of sources supplying the entry point, including surface water and groundwater under the direct influence of surface water (GUDI). Systems can visit the online Drinking Water Reporting System to find their source and entry point ID numbers.: (http://www.drinkingwater.state.pa.us/dwrs/HTM/DEP_frm.html)
- B. Indicate whether the system will use a continuous analyzer(s) or grab sampling to measure the free chlorine residual at the entry point(s).** Systems serving greater than 3,300 people are required to continuously monitor the residual disinfectant concentration at the entry point or other location approved by the Department and record the results at least every 15 minutes each day that water from the groundwater source is served to the public. Systems serving 3,300 people or fewer may also continuously monitor and record the residual disinfectant concentration, or at a minimum, are required to take a daily grab sample at the approved compliance monitoring location during the hour of peak flow or at any other time specified by the Department. If any daily grab sample measurement falls below the Department-required minimum residual disinfectant concentration, the groundwater system shall take follow up samples at least every 4 hours until the residual disinfectant concentration is restored to the Department-determined minimum level. Systems must indicate here which type of monitoring they intend to perform to satisfy the compliance monitoring requirement.
- C. If grab sampling will be conducted for regular compliance monitoring of free chlorine residuals, indicate the hour of peak flow when samples will be collected and analyzed:** All grab samples, whether for regular compliance monitoring of the entry point free chlorine residual or taken while continuous monitoring equipment is out of service, must be collected during the hour of peak flow or other time acceptable to the Department. Consult with your DEP Regional Office for acceptable sampling times and indicate on this form the hour when daily grab sampling will occur.
- D. Provide the manufacturers name and model number of each instrument used to monitor free chlorine residual. Indicate which instruments serve as back-up only, and whether each instrument is continuous chlorine analyzer or portable/benchtop chlorine analyzer.** List the equipment to be used to measure the chlorine residual at the compliance monitoring location for this entry point. If you are using a grab sampling method, list both the primary and back-up benchtop chlorine analyzers indicating which instrument serves as the back-up. Systems using continuous analyzers must also keep and maintain a back-up benchtop chlorine analyzer to measure grab samples whenever a continuous analyzer fails or is taken off-line. List all chlorine analyzing instruments here.
- E. Do all of the instruments listed above use an EPA-approved analytical method?** All free chlorine entry point residual results reported to the Department to meet the compliance monitoring requirements must be measured by instruments using EPA-approved analytical methods. Refer to the Code of Federal Regulations, 40 CFR 141.74(a)(2), for the current methods acceptable to EPA for measuring free chlorine residuals.
- F. On the enclosed schematic, identify the compliance monitoring location for this entry point. If you are planning to conduct compliance monitoring at a location other than the traditional entry point, explain:** The compliance monitoring location for continuous monitoring or grab sampling must be indicated on the treatment plant schematic included with this submission. If you are planning to conduct compliance monitoring at a location other than the traditional entry point (e.g., a location downstream of the entry point but still upstream of the first customer in order to gain additional CT volume), explain why this alternative monitoring location is necessary. Include in your explanation why other options for attaining 4-Log treatment of viruses were ruled out or deemed to be insufficient.

MAILING

Mail all submittals to your DEP Regional Office:

- The completed form is to be addressed to: PA DEP - Safe Drinking Water and sent to the address of the appropriate district office or county health department (CHD) having jurisdiction over the water system.
- District and CHD addresses by county can be found within DEP document number 3930-FM-BSDW0560. This document can be located by searching under "forms" for document number 3930-FM-BSDW0560 on eLibrary at the following link: <http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=3195>.