Groundwater Rule:
Iowa DNR Application for 4-Log Virus Inactivation Using Chlorine

Background
The Groundwater Rule (GWR) encourages drinking water systems using groundwater to achieve 4-log or 99.99% removal and inactivation of viruses. Removal/inactivation occurs through filtration and/or disinfection. Achieving this level of treatment may or may not be possible depending on the unique conditions of the system, such as storage time, water temperature, peak flow rate, and chlorine concentration. Inactivation is a function of the disinfectant concentration and the amount of time the water spends in contact with the disinfectant before the first service connection, which is called "contact time" or CT. The credit to remove or inactivate 99.99% of virus is called "4-log virus credit."

Why would a system want to achieve 4-log virus credit for the Groundwater Rule?
Part of the GWR requires triggered source water monitoring of all wells that were in operation when the analytical result of any routine total coliform compliance sample, collected in the distribution system, tests positive for total coliform. A system that (1) has received credit for 4-log virus removal or inactivation through its treatment process, (2) conducts the daily required chlorine compliance monitoring, and (3) meets the disinfection requirements, does not have to conduct any triggered source water monitoring.

What's the process to see if my system can achieve 4-log virus credit?
For any system that wants the 4-log credit, its treatment processes must be reviewed and approved by the DNR in order to ensure that the system has sufficient contact time to receive the 4-log virus removal/inactivation credit. The system must submit this completed application. After review of the information, the DNR will notify the system whether or not it is approved for 4-log virus credit, including the conditions the system must meet in order to achieve the credit. A minimum free chlorine residual will be set by the DNR and must be maintained.

What are the ongoing requirements to maintain the 4-log virus credit?
Each system must meet the following requirements in order to maintain its 4-log virus credit:

1. **Systems serving more than 3,300 people:**
   - Must continuously monitor its disinfectant concentration at or before the first customer.
   - Must maintain the minimum disinfectant residual concentration determined by DNR as part of the 4-log virus credit approval, along with any other operational conditions.
   - If the continuous chlorine monitoring equipment fails, the system must take grab samples every 4 hours until the equipment is repaired. The equipment must be repaired within 14 days.

2. **Systems serving 3,300 people or fewer:**
   - Must either take a daily grab sample during the hour of peak flow or at another time determine by the state or continuously monitor its disinfectant concentration. Sampling point must be at or before the first customer.
   - If any daily grab sample measurement falls below the minimum DNR-required residual disinfectant concentration, the system must take follow-up samples every 4 hours until the residual is restored to the required level.
   - Must maintain the minimum disinfectant residual concentration determined by DNR as part of the 4-log virus credit approval, along with any other operational conditions.

All systems must notify the DNR any time the required minimum residual disinfectant concentration is not restored within 4 hours. The system must notify the DNR as soon as possible, but no later than the end of the next business day.

The public water system should consider how these requirements will affect its operation in determining if it wants to use the 4-log (99.99%) removal or inactivation of viruses under the Groundwater Rule.

What if a system does not want to continue to meet the 4-log virus credit requirements?
With a few exceptions, a system may decide to discontinue its 4-log virus credit monitoring requirements. It must notify the DNR immediately and conduct the triggered source water monitoring in the future.

What if a system cannot achieve 4-log virus credit or does not want to go through the process?
There are systems in Iowa that will not be able to achieve 4-log virus inactivation or removal because of inadequate contact time, due to minimal storage capacity or inability to maintain a free chlorine residual for the minimum length of time. Other systems do not want to go through the 4-log process or do not want to do compliance monitoring. For all of these systems, the triggered source water monitoring is required.

How does a system apply for 4-log virus credit?
Complete the application form and mail the form, along with the two most recent Monthly Operation Reports and the system schematics, to:

> 4-Log Virus Credit Application
> DNR Water Supply Engineering Section
> 502 E 9th St
> Des Moines IA 50319-0034

Note: An application must be submitted for each treatment plant and/or point of entry to the distribution system.

Questions?
Please contact Taroon Bidar at (515) 725-0278, taroon.bidar@dnr.iowa.gov, with the DNR Water Supply Engineering Section if you have any questions regarding completion of this form.

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A. General Information

PWS Name: _____ PWSID: _____

Mailing Address: _____ City, State, Zip Code: _____

Population served in your system: ☐ greater than 3,300 people ☐ less than or equal to 3,300 people

Contact Person:

Name: _____ Title: _____

Phone Number: _____ Fax Number: _____

E-mail Address: _____

B. System Information

1. Treatment Plant Name: _____ (Complete a separate application for each plant.)

2. Residual Disinfectant Type: ☐ Chlorine ☐ Chloramines ☐ Chlorine Dioxide

3. Is continuous chlorine monitoring provided? ☐ Yes ☐ No

4. Peak hourly flow in gallons per minute (GPM): _____

5. pH at the entry point to the distribution system: _____

6. Lowest water temperature at the entry point to the distribution system: _____ ☐ °C ☐ °F

7. Does your raw water contain ammonia? ☐ Yes ☐ No ☐ Don't know

   If yes, please attach documentation indicating the ammonia concentration in each well and describe any ammonia control measures you have in place.

8. Systems wanting 4-log credit for pipe storage must provide the following information:

   Diameter of pipe between disinfectant application and the first customer tap: _____ inches

   Length of pipe between disinfectant application and the first customer tap: _____ feet

   NOTE: To obtain credit for CT in pipes, the chlorine monitoring point (continuous or grab) must be located at or before the first customer (i.e., user). Please remember the plant service connection would count as the first customer or user.

9. Systems wanting 4-log credit for storage units must provide the following dimensional information for each unit for which contact time credit is requested:

   Rectangular Tanks:

Unit Identification	Lowest Water Depth (feet)	Length (feet)	Width (feet)	Distance between inlet and outlet (feet)

   Round Tanks:

Unit Identification	Lowest Water Depth (feet)	Diameter (feet)	Distance between inlet and outlet (feet)

NOTE: For baffled tanks, please include a detailed schematic of the tank including baffling details (number, location, dimensions, etc.).

10. Provide a flow diagram or scale drawing or plan sheet showing chlorine injection point(s), all tank sizes, inlet and outlet locations on each tank, pipe sizes and lengths, flow restrictor, sample taps, and chlorine monitoring point for 4-log credit compliance.

11. Provide the two most recent Monthly Operation Reports (MOR).

I certify that I am familiar with the information contained in this application and that the information is true, complete, and accurate.

_____ _____

Signature of Responsible Person   Date

_____ _____

Printed Name and Title of Responsible Person   Phone Number