New Jersey Department of Environmental Protection
Division of Water Supply
Technical Review Form

GROUND WATER RULE/4-LOG VIRUS INACTIVATION CERTIFICATION

The Groundwater Rule allows a water system to demonstrate 4 log virus inactivation treatment to avoid triggered source monitoring (40 CFR 141.402(a)). Public Water Systems must provide one completed form for each treatment plant. The form must be prepared and sealed by a New Jersey Licensed Professional Engineer and signed by the Licensed Operator of the water system. Contact the Division of Water Supply at (609) 292-2957 for assistance or if your system claims 4-log virus inactivation by another chemical (i.e. chlorine dioxide, ozone, etc.) or with the combination of UV. Detailed instructions on how to complete the form is attached.

A process schematic and a site map (signed and sealed) must be provided showing the location of the treatment plant (including filters, clarifiers, etc., if applicable), the chlorine contact pipe/tank and the chlorine analyzer and finished water sample line. Be advised that all treatment objectives must be achieved prior to leaving treatment plant site (including finished water sample point). No credit will be given for chlorine contact time beyond the sampling point.

Note: Monthly sampling of raw water for E. coli will be required from each well for a minimum of 12 months, as a condition of 4-log certification.

_____	_____	_____
Treatment Plant Name and Facility ID	PWSID#	Total Population Served By PWSID

General Information

1. 4-log virus inactivation provided through (select one):
   - _____ pre-chlorination and post-disinfection
   - _____ only post-disinfection

2. List the following information for all wells at this Treatment Plant on a separate attachment to this form: Well Name, SDWIS Facility ID, Well Permit Number, Pump Capacity in gallons per minute (gpm), Water Allocation Permit Diversion Capacity (gpm), and Well Status (i.e. permanent, backup, etc.). A copy of the Well Permit and Well Record must be provided for each well.

3. What is the total treatment plant capacity? (gpm)
   _____

Pre-Chlorination (If not applicable and go to #13)

4. A) If the population served is greater than 3,300, provide the make and model of an approved continuous chlorine analyzer/recorder that is being utilized to record the free chlorine residual prior to post disinfection:

   _____

   B) If the population served is less than or equal to 3,300, the water system may use an approved continuous chlorine analyzer/recorder or collect a grab sample at peak daily flow to record the free chlorine residual prior to post disinfection.
   - If a continuous chlorine analyzer/recorder is to be used, provide the make and model of the approved continuous chlorine analyzer/recorder:

   _____

   - If grab samples are taken what is the peak daily flow and how is it determined?

   _____

5. What analytical method for pre-chlorination is used by the continuous analyzer/recorder or licensed operator to determine the chlorine residual concentration?

   _____

6. What type of chemical is used for pre-chlorination (i.e. sodium hypochlorite, gaseous, tablet, etc.)?

   _____

7. What is the minimum pre-chlorination free chlorine residual (in mg/L) that will be maintained at the pre-chlorination analyzer or daily grab sample location? Provide a drawing that shows the location of the pre-chlorination sampling point.

   _____

8. Provide a description of the treatment process(es) utilized after the pre-chlorination injection point (i.e. clarifiers, filters, chemical addition, etc.).

   _____

9. Provide dimensions and volume of any treatment process unit that is being utilized for chlorine contact time as part of pre-chlorination (i.e. pipes, clarifiers, filters, etc.). If filters with media are being utilized, provide the dimensions (D x H or L x W x H), volume (in cubic feet), and the void factor of the media within each filter. Empty bed contact time can not be used.

   _____

   _____

   _____

10. What is the time (in minutes) that the water is in contact with the chlorine for each pre-chlorination treatment process? (Attach signed and sealed calculations)
    [(Unit Volume$_{gallons}$ ÷ Capacity$_{gallons/minute}$) x Baffling Factor]

    _____

    _____

    _____

11. What is the total pre-chlorination contact time (total from #10 above)?

    _____

12. What is the calculated CT for pre-chlorination treatment (#7 (in mg/L) x #11 (in minutes))?

    _____

Post-Disinfection

13. A) If population served is greater than 3,300, provide the make and model of the approved continuous chlorine analyzer/recorder that is being utilized to record the free chlorine residual prior to leaving the treatment plant site:

    _____

    B) If population served is less than or equal to 3,300, the water system may use an approved continuous chlorine analyzer/recorder or collect a grab sample at peak daily flow to record the free chlorine residual prior to leaving the treatment plant site.

    - If a continuous chlorine analyzer/recorder is to be used, provide the make and model of the approved continuous chlorine analyzer/recorder:

    _____

    - If grab samples are taken, what is the peak daily flow and how is it determined?

    _____

14. What analytical method for post-disinfection is used by the continuous analyzer/recorder or licensed operator to determine chlorine concentration?

    _____

15. What type of chemical is used for disinfection (i.e.sodium hypochlorite, gaseous, tablet, etc)?

    _____

16. Does the treatment plant utilize UV in addition to chemical disinfection?

    _____

17. Is disinfection (by chlorine) the last form of treatment?

    _____

18. What is the minimum post-disinfection free chlorine residual (in mg/L) that will be maintained at the post-disinfection analyzer? Provide a drawing that shows the location of the post-disinfection sampling point. (Note that no credit will be given for chlorine contact beyond the sampling point)

    _____

19. How is chlorine contact time provided after the final injection point (i.e. pipe, tank, etc.)?

    _____

20. What are the dimensions of the pipe/tank?

    Length (in feet) = _____

    Diameter (in inches) = _____

    Volume (in gallons) = _____

21. What is the baffling factor of the pipe/tank?

    _____

Baffling Factors		
Conditions	**Factor**	**Description**
Unbaffled (mixed flow)	0.1	None, agitated basin, very low length to width ratio, high inlet/outlet velocities
Poor	0.3	Single or multiple unbaffled inlets or outlets, no intra-basin baffling
Average	0.5	Baffled inlet/outlet with some intra-basin baffling
Superior	0.7	Perforated inlet baffle, serpentine or perforated intra-basin baffles, outlet weir or perforated launders
Perfect (plug flow)	1.0	Very high length to width ratio (minimum 10:1 for pipeline flow) perforated inlet, outlet and intra-basin baffles

    Note: Provide manufacturer specifications showing the baffling factor for a tank. If a tracer study was performed please provide data from that study.

22. What is the time (in minutes) that the water is in contact with the chlorine for each unit that contributes to post-disinfection (attach sealed calculations)?

    [(Pipe/Tank Volume$_{gallons}$ ÷ Capacity$_{gallons/minute}$) x Baffling Factor]

    _____

23. What is the total post-disinfection contact time (total from #22 above)?

    _____

24. What is the calculated CT provided for post-disinfection (#18 (in mg/L) x #23 (in minutes))?

_____

25. What is the calculated CT provided for this treatment plant (sum of #12 and #24)?

_____

26. What is the ground water source pH and coldest recorded water temperature over the last 12 months (in ^{o}C)?

_____

Use the values from #25 and #26 above to determine the required CT value as provided in the table below. Round down the minimum recorded temperature (i.e. 12.7 ^{o}C, use 12 ^{o}C). If the pH is not within the range shown below, please contact the Department.

Required CT Values for Inactivation of Viruses by Free Chlorine, pH 6.0 - 9.0

Degrees C^{o}	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
4-log inactivation	11.6	10.7	9.8	8.9	8.0	7.6	7.2	6.8	6.4	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0

CT values provided in the tables are modified by linear interpolation between 5°C increments

27. Based on your calculations compared to the table above, does this treatment plant provide 4-log virus inactivation?

_____

28. Does this plant provide post-disinfection with a minimum of five (5) minutes chlorine contact time as per N.J.A.C. 7:10-11.16(e)2 (see #23)?

_____

Please note that post-disinfection treatment with a minimum of five (5) minutes chlorine contact time must still be provided for all Public Community Water Systems. Please be sure to obtain the proper permits before any additions or modifications are made to a water treatment plant.

***Submit appropriate engineering plans, specifications, reports with calculations, etc. to substantiate the responses ***

GROUND WATER RULE/4-LOG VIRUS INACTIVATION CERTIFICATION

I hereby certify that all the information provided herein accurately describes Treatment Plant _____ and that the current conditions at this treatment plant achieve 4 log virus treatment.

_____

Signature of Engineer Date N.J.P.E. #
Professional Engineer's Embossed Seal

_____ _____

Type or Print Name of Engineer Type or Print Name of Engineering Firm

I hereby certify that the raw water data, treatment process, and dimensions of each unit shown above are correct for Treatment Plant _____.

_____

Signature of Water System's Licensed Operator Date License Number

_____ _____

Type or Print Name of Licensed Operator Type or Print Name of Water System

GWR/4-log Virus Inactivation Certification Form Instructions

The Groundwater Rule allows a water system to demonstrate 4 log virus inactivation treatment to avoid triggered source monitoring (40CFR 141.402(a)). Public Water Systems must provide one completed form for each treatment plant. The form must be prepared and sealed by a New Jersey Licensed Professional Engineer and signed by the Licensed Operator of the water system. Contact the Division of Water Supply at (609) 292-2957 for assistance or if your system claims 4-log virus inactivation by another chemical (i.e. chlorine dioxide, ozone, etc.) or with the combination of UV.

A process schematic and a site map (signed and sealed) must be provided showing the location of the treatment plant (including filters, clarifiers, etc., if applicable), the chlorine contact pipe/tank and the chlorine analyzer and finished water sample line. Be advised that all treatment objectives must be achieved prior to leaving treatment plant site (including finished water sample point). No credit will be given for chlorine contact time beyond the sampling point.

Note: Monthly sampling of raw water for E. coli will be required from each well for a minimum of 12 months, as a condition of 4-log certification.

The following numbers correspond to the numbering system on the Ground Water Rule/4-log Virus Inactivation Certification Form

1. Self-explanatory

2. Provide the Well Name, SDWIS Facility ID, Well Permit Number, Pump Capacity, and Water Allocation Diversion Capacity (if applicable) for all the wells that are treated by the treatment plant requesting certification. Provide the capacities in gallons per minute (gpm). Also, list the status of the well (i.e. permanent, backup, etc.). Indicate which, if any, of the wells that can not be pumped simultaneously (due to the Water Allocation Permit or an interlocking mechanism) or if a well is a backup for the system or a backup for just one well. Calculate the total well capacity excluding those wells identified above as 'for back up purposes only' and/or the well with the lesser value of the wells that can not be pumped simultaneously.

   Example1

Well(s)	SDWIS	Well Permit #	Pump Capacity	Water Allocation	Status
Well 1	WL001001	25-00000	1,000 gpm	1,000 gpm	Permanent
Well 2	WL001002	25-00001	1,000 gpm	1,500 gpm	Permanent
Well 3	*WL001003*	*25-00002*	*500 gpm*	*1,000 gpm*	*System Backup*
		TOTAL	**2,000 gpm**	2,500 gpm	

   Well 3 would not be included since it is a backup well. When calculating the Total Well Capacity, the lesser value between pump capacity and water allocation capacity should be used. In Example 1 above, the total capacity equals 2,000 gpm.

Example 2

Well(s)	SDWIS	Well Permit #	Pump Capacity	Water Allocation	Status
Well 4	WL001001	24-00000	1,000 gpm	1,000 gpm	Permanent
Well 5	*WL001002*	*24-00001*	*1,000 gpm*	*1,500 gpm*	*Well 5 and Well 6 can not pump simultaneously*
Well 6	WL001003	24-00002	1,500 gpm	1,500 gpm	
		TOTAL	**2,500 gpm**	2,500 gpm	

Well 5 and Well 6 cannot be pumped simultaneously. Well 6 is included in the Total Capacity since it's capacity is greater than Well 5. In Example 2 above, the total capacity equals 2,500 gpm.

3. Provide the total treatment plant capacity under normal operation (include only primary units).

Example 3

Treatment Unit	Capacity
Filter 1	500 gpm
Filter 2	500 gpm
Filter 3	500 gpm
Filter 4	*500 gpm*
TOTAL	**1,500 gpm**

Filter 4 is a backup filter, therefore, not included in the Total Capacity.

4. Public Community Water Systems (PCWS) that serve more than 3,300 people are required to provide an APPROVED continuous chlorine analyzer/recorder (see 5 below). If the PCWS serves less than or equal to 3,300 people, a continuous chlorine analyzer/recorder is not required, <u>but is highly recommended</u>. If this treatment plant is utilizing pre-chlorination in addition to post-disinfection, two sampling points must be provided; 1) to measure the pre-chlorination residual (located after all pre-chlorination treatment processes and before post-disinfection injection point); and 2) to measure the post-disinfection residual (located after the post-disinfection units and prior to leaving treatment plant site).

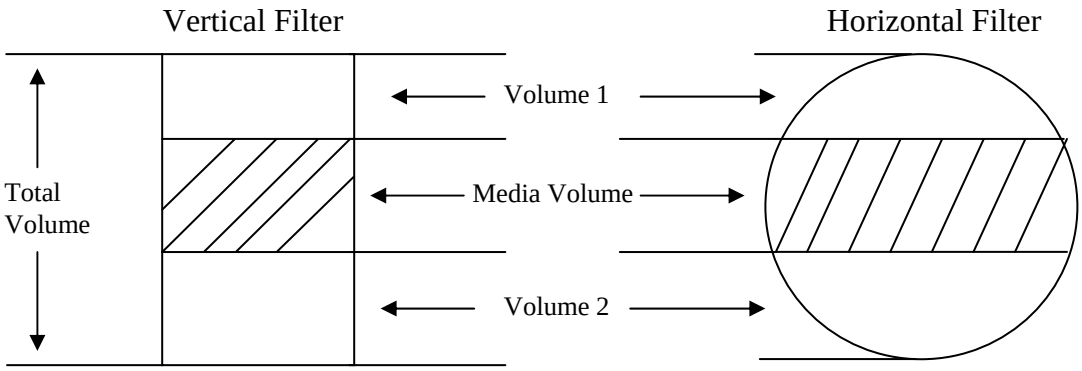
5. An approved continuous chlorine analyzer/recorder adapted from methods listed in 40 CFR 141.74(a)2 or 40 CFR 141 Appendix A to Subpart C for online monitoring of free and total chlorine. The continuous monitor/analyzer must be equivalent in chemistry, accuracy and precision to those methods.

6. Self-explanatory.

7. If you are requesting log virus inactivation credit for pre-chlorination, a sampling point must be located after the final unit that will be utilized for credit (but before post-disinfection) to measure the chlorine residual. The minimum free chlorine residual is separate from the concentration of chlorine injected.

8. Self-explanatory.

9. Provide the dimensions and volume of all filters, clarifiers, pipes, etc. that are being utilized for chlorine contact time in pre-chlorination. If there are any units that contain media, the dimension, volume, and Void Factor (obtained from the manufacturer) of the media within each unit must be submitted. Please see the example diagrams below (side views) when listing dimensions and volume of a unit with media.



A baffling factor of 0.7 and 0.1 should be utilized for volume 1 and volume 2, respectively.

10. When calculating the time that the water is in contact with chlorine for pre-chlorination assume only all non-back up units will be in operation. (see the example #3 above) If a system has a total of 4 filters (3 primary and 1 backup), only 3 filters should be used in the calculations. Another example is a system with 3 filters (all primary), only 2 filters should be used in the calculations, based on the assumption that only 2 filters can compensate for the period of time the third filter is being backwashed. For both examples, the total gallons should be divided by the Pump Capacity, Water Allocation Pump Capacity, or Treatment Plant Capacity, whichever is **less** (in gpm). The system can not pump more than they can treat and can not treat more than they can pump. The Baffling Factors can be found under #21 of the form. For media, the volume is multiplied by both the Void Factor and by a Baffling Factor of 1.

The calculation for the diagram in #9 will show:

$$\frac{\overbrace{[(Volume1 * 0.7 + Volume2 * 0.1 + (MediaVolume * VoidFactor * 1)]}^{\text{Unit 1 Volume}} + [Unit2Volume] + [etc.]}{Capacity} = Time(\text{min})$$

Do not round the contact time to the whole number. A minimum of one decimal place is required (i.e. 5.2 minutes, not 5 minutes).

11. The total pre-chlorination contact time is the sum of the contact time per process (in series) in number 10.

12. CT is defined as the chlorine residual multiplied by the contact time.

13. See #4 above.

14. See #5 above.

15. Self-explanatory.

16. If your system utilizes UV disinfection in combination with chlorination for post-disinfection, a separate form must be submitted for the UV information. Please contact the Division before submitting this information.

17. Self-explanatory.

18. A sampling point must be provided after the unit(s) that is (are) providing the post-disinfection chlorine contact time. Please note that the chlorine contact time is required to be provided prior to leaving the treatment plant site, unless otherwise approved by the Department. Also, no credit will be given for chlorine contact beyond the sampling point.

19. Self-explanatory.

20. If the system utilizes something other than a pipe/tank, please provide the dimensions, volume, and baffling factor of the infrastructure.

21. Self-explanatory.

22. When calculating the time that the water is in contact with chlorine for post-disinfection, use the same capacity from #10 (pre-chlorination). If you are not applying for pre-chlorination log virus inactivation credit, calculate the contact time using the Pump or Allocation Diversion Capacity, or Treatment Plant Capacity, whichever is **less** (in gpm).

    Do not round the contact time to the whole number. A minimum of one decimal place is required (i.e. 5.2 minutes, not 5 minutes).

23. The total post-chlorination contact time is the sum of the contact time per process (in series) in #22.

24. CT is defined as the chlorine residual multiplied by the contact time.

25-28. Self-explanatory

Contact the Division of Water Supply at (609) 292-2957 with any questions regarding the completion of the Ground Water Rule/4-log Virus Inactivation Certification Form, or if the system plans to demonstrate 4-log virus inactivation through the use of another chemical (i.e. chlorine dioxide, ozone, etc.) or in combination with ultra-violet (UV) treatment.