	Massachusetts Department of Environmental Protection - Drinking Water Program	
	Ground Water Rule **Request for 4-log Certification – Chlorination**	**Form: GWR D: 4-Log Certification - Chlorination**

Important Note: *All public water systems (PWSs) that wish to obtain MassDEP certification for 4-log virus treatment per the requirements of the Ground Water Rule (GWR) must answer all questions and submit this form to their Regional MassDEP office. If MassDEP approval is not received prior to December 1, 2009, the PWS must conduct GWR triggered source water monitoring per 310 CMR 22.26(3)(a) until approval is received.*

For more information, please call your regional GWR contact or Denise Springborg, Boston, at 617-574-6879.

Central: Kelly Momberger – 508-849-4023
Western: Jim Bumgardner – 413-755-2270
Northeast: Jim Dillon – 978-694-3231
Southeast: Mike Quink – 508-946-2766 or Terry Dayian – 508-946-2765

Instructions

This form is only for those PWSs who believe their existing chlorination systems and contact time can achieve 4-log treatment for viruses. PWSs with treatment and disinfection that are requesting 4-log certification for a combination of processes can use this form to obtain log certification for the disinfection process. Please call your regional contact for instructions. If this application is approved by the MassDEP Drinking Water Program, the PWS is NOT required to conduct GWR triggered source water monitoring per 310 CMR 22.26(3)(a) at 4-log certified ground water sources. However, the PWS IS required to conduct GWR compliance monitoring per 310 CMR 22.26(4)(b) to prove that the disinfection process is providing 4-log treatment at all times. PWSs conducting compliance monitoring must complete and submit monthly GWR compliance monitoring forms.

PWSs can use this certification form if they are changing the point of chlorine application, installing a continuous chlorine analyzer or are moving the point of chlorine residual measurement. However, if changes are not complete by December 1, 2009, the PWS will only receive "pending" approval. The PWS must conduct triggered source water monitoring per 310 CMR 22.26(3)(a) until final approval is received.

This form is NOT applicable to PWSs that currently do not have chlorination or must make significant system modifications (e.g. installing a tank) to their existing process to achieve 4-log treatment of viruses. These PWSs must complete permit application(s): BRP WS 23 (Approval to Construct a Treatment Facility), or BRP 29 (Chemical Addition) or BRP WS 25 (Treatment Facility Modification). Please call your regional contact for guidance on which permit(s) is required. Permits and instructions can be obtained at: http://www.mass.gov/dep/service/online/gettings.htm After the permit(s) is approved and construction is completed, the PWS must submit this form to request 4-log certification of the modified system.

Section A: PWS Information & Certification

PWS Name:	City/Town:	PWS ID:
PWS Address:		COM, NTNC, or TNC (circle one)
Contact Person:		Date Submitted:___/___/_____
Phone Number:	Email:	

All PWSs with chlorination were required to estimate their current log treatment by completing GWR Form A. All PWSs requesting MassDEP certification of 4-log treatment for the GWR must complete GWR Form D and submit all supporting documentation and calculations in addition to completing Form A.

Was GWR Form A previously submitted to Mass DEP? Yes/No _____
Number of wells (sources) serving your PWS: _____

Section B: Supporting Documentation & Calculations

List each well (source) for which you are requesting 4-log certification; include source name and source ID. If the PWS has multiple points of chlorination, a separate form should be completed for each point of application and the wells being chlorinated should be listed below.

_____
_____
_____
_____
_____
_____

System Configuration - Please describe on a separate page the current configuration of the piping and or tank providing contact time (include size of tank, diameter and length of pipe), point of chlorine application, and how (if) wells are manifolded together prior to chlorination. Include both a narrative and diagram. Hand drawn diagrams are acceptable.

Is the description attached? Yes/No _____

Chlorine Application and Residual Measurement

The Ground Water Rule requires chlorine residual measurements to be taken at or before the first customer. The residual must also be measured at a location beyond that used to calculate the contact time needed to achieve CT for 4-log treatment of viruses. For example, if a PWS measures chlorine residual at the 100 foot tap, but the first customer is located 500 ft away, and all 500 ft of pipe is needed to achieve contact time, the PWS cannot receive state certification of 4-log treatment for viruses until a means of measuring chlorine residual is established at or before the first customer AND after the required contact time. To achieve this, the PWS may consider several options: installing a stand alone sampling station (approved by MassDEP), changing the point at which chlorine residual is measured, or increasing the chlorine residual to meet CT. If any of these options are chosen, the PWS will only be granted pending approval until the modifications are made. If the PWS chooses to install additional pipe or a tank for increased contact time, then a permit is required. Call your MassDEP regional GWR contact for more information.

By December 1, 2009:
- The chlorine residual must be measured at or before the first customer; **AND**
- The chlorine residual must be measured after the required contact time.

1. Is the chlorine residual measured at or before the first customer? Yes/No _____
2. Is the chlorine residual measured after the required contact time? Yes/No _____

If you answered no to either of the above questions and wish to obtain state certification for 4-log virus treatment, call your regional contact and discuss your options. Until you receive state certification, you are required to conduct GWR triggered source water monitoring and issue Tier 1 public notification if a fecal indicator is detected in the source.

The GWR requires all PWSs serving greater than 3,300 to install a continuous chlorine residual analyzer. The GWR also allows PWSs serving ≤ 3,300 to collect a daily grab sample and test for chlorine residual. However, MassDEP emergency response guidelines for critical chemical controls requires "each pump or group of pumps discharging treated water into a distribution system must be monitored with a chemical analyzer for each critical chemical (e.g. chlorine) injected in the water system by a chemical metering pump, unless it can be demonstrated that such an analyzer is not needed. Requests for a waiver from the requirement for a chemical analyzer shall be made in writing to MassDEP and shall include documentation to support that the analyzer is not needed." Therefore, all PWSs requesting 4-log certification must install a chlorine analyzer unless they serve ≤ 3,300 and

obtain a waiver from the MassDEP regional office.

3. Does your PWS serve more than 3,300 people? Yes/No _____

4. If the answer to question #3 is "yes", do you have a continuous chlorine residual analyzer? Yes/No _____
   - If "yes", does the analyzer meet the requirements of 310 CMR 22.26? Yes/No _____
     Indicate type and model: _____
     EPA is in the process of approving amperometric methods (on-line electrochemical sensor); they anticipate approval by December 1, 2009. In the interim, MassDEP will accept these analyzers pending EPA approval. Does your analyzer use these methods? Yes/No/NA _____
   - If "no" when will the continuous analyzer be installed? _____
     _____

5. If the answer to question #3 above is "no" (systems serving ≤ 3,300), you must either install a chlorine analyzer by December 1, 2009 or obtain a waiver from this requirement from MassDEP by June 30, 2010 and collect a grab sample every day during peak flow.
   - Do you have a continuous chlorine residual analyzer currently installed? Yes/No _____
   - If "yes", does the analyzer meet the requirements of 310 CMR 22.26? Yes/No _____
     Indicate type and model: _____
     EPA is in the process of approving amperometric methods (on-line electrochemical sensor); they anticipate approval by December 1, 2009. In the interim, MassDEP will accept these analyzers pending EPA approval. Does your analyzer use these methods? Yes/No/NA _____
   - If "no", does your PWS plan to collect a daily grab sample every day during peak flow and submit a waiver form to MassDEP? Yes/No _____

6. Describe where the chlorine residual is measured. Indicate if the residual is measured by a continuous analyzer or from a grab sample and time of grab sample collection. _____
   _____
7. Chlorine must be applied prior to any pipes or tanks used to achieve contact time for the required CT. Is the point of chlorine application prior to the pipe and or tanks used to achieve CT? Yes/No _____
   If no, the PWS is NOT eligible for 4-log treatment.

8. Describe the location of chlorine application: _____
   _____
9. What is the minimum chlorine dose applied at your PWS? _____mg/L
10. What is the range of chlorine doses applied at your PWS? _____mg/L
11. Do you apply chlorine gas, sodium hypochlorite, or chlorine dioxide? _____
    Note: Contact your regional MassDEP office if you use chlorine dioxide.

Contact Time & Calculating CT

Inactivation of viruses using chlorine is based on the "CT" concept where "C" is the measured concentration of the disinfectant residual and "T" is the contact time between the point of application of the disinfectant and the point where the disinfection residual is measured. The point where the disinfection residual is measured must be before or at the first customer AND after the contact time needed to achieve 4-log treatment. "T", the contact time of the disinfectant in minutes is determined by dividing the total volume of system components (pipe, storage tank), in gallons, by peak hourly flow, in gallons per minute (gpm), of the system. Once "C" is measured and "T" is determined, the product "C x T" (CT) is calculated and compared to the required CT.

If contact time from a tank and/or pipeline is used to achieve CT and meet 4-log treatment requirements, a drawing must be submitted by the PWS. Note the following: 1) tanks and/or pipeline must be located prior to the first customer. Per EPA guidance, hydropneumatic tanks may not be used for contact time calculations. PWSs must calculate CT at the peak hourly flow.

1. Does the PWS have a tank that will be used to achieve contact time? Yes/No _____
2. Is the tank a hydropneumatic tank? If yes, do not use in contact time calculations: Yes/No _____
3. Is a drawing of the tank attached? Yes/No/NA _____
   If a drawing is not available, indicate the dimensions and capacity of the tank: _____
   _____
4. Does the contact tank have baffles? Yes/No/NA _____
5. If yes, indicate the baffling factor used in the CT calculations and the rational for choosing the baffling factor. Attach supporting documentation such as examples of baffling configurations and associated baffling factors as indicated in EPA Surface Water Treatment Rule guidance documents. Baffling Factor: _____
   A baffling factor of 0.1 must be applied to all tanks unless the tank has baffles to reduce short circuiting.
6. Was a tracer study conducted in the tank? Yes/No/NA _____
7. If yes, attach the results of the tracer study. Are the results attached? Yes/No/NA _____
8. If pipe is used to achieve contact time, attach a drawing or indicate length and diameter of pipe: _____
   _____
9. What is the peak hourly flow (gpm)? If a flow meter is not installed, the maximum pumping rate may be used.
   _____
10. Describe the method used to determine peak hourly flow and indicate the time of peak hourly flow. _____
    _____
    _____
    _____
11. Is a flow meter installed? Yes/No _____
    If "yes", is flow recorded manually or on a continuous recorder?
    _____
12. System's free chlorine residual, C = ____ mg/L (must be measured at or before the first customer and after contact time)

Attach CT calculations or use GWR Form A to complete CT calculations and attach the form.

13. What is your calculated CT? _____ min-mg/L

Log Inactivation

Use the table below to identify the required CT to achieve 4-log inactivation of viruses.

1. What is your coldest source water temperature? If unknown, use 52°F _____
2. Is your pH always within the range of 6.0 to 9.0? Yes/No If "no" contact your MassDEP regional office.
3. From the table below, what is your required CT? _____
4. From the section above, #13, what is your calculated CT? _____ min-mg/L

If the calculated (#4 above) is equal to or greater than the CT required for 4-log inactivation (#3 above), the PWS provides 4-log treatment. If MassDEP approves of the information provided in this form and the PWS meets all requirements, written certification will be sent to the PWS.

Is 4-log treatment of viruses achieved? Yes/No _____

Table: CT Values for 4-Log Inactivation of Viruses by Free Chlorine at pH 6.0 to 9.0

CT Values for Inactivation of Viruses by Free Chlorine, pH 6.0 – 9.0																									
Temperature																									
C°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
F°	34	36	37	39	41	43	45	46	48	50	52	54	55	57	59	61	63	64	66	68	70	72	73	75	77
Log Inactivation																									
	5.8	5.3	4.9	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0	1.0	1.0	1.0	1.0	1.0
	8.7	8.0	7.3	6.7	6.0	5.6	5.2	4.8	4.4	4.0	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.4	2.2	2.0	1.8	1.6	1.4	1.2	1.0
	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	2.8	2.6	2.4	2.2	2.0

Section C: Certification

Certification Statement: I certify under penalty of law that I am the person authorized to fill out this certification form, and the information contained herein is true, accurate and complete to the best of my knowledge and belief. I certify that based on the chlorine residual and drinking water contact time provided by the PWS under peak flow conditions, 4-log treatment for viruses is achieved at or before the first customer.

Certification Requirements: A licensed professional engineer must sign and seal the certification statement.

Print Name: _____ Title: _____
Signature: _____ Date: _____
Phone #: ( ) _____- _____ Email: _____

Additional Certification Statement: I certify under penalty of law that I am the person to complete this statement. I certify that no changes will be made to the chlorination application and monitoring processes as identified in this form and used to achieve compliance with the GWR without prior written approval from the MassDEP.

Certification Requirements: PWS Operator or Official

Print Name: _____ Title: _____
Signature: _____ Date: _____
Phone #: ( ) _____- _____ Email: _____

PWSs that do not achieve 4-log treatment or do not wish to be certified for 4-log treatment.
Certification Statement: I certify under penalty of law that I am the person to complete this statement. I certify that at this time, the PWS does not achieve 4-log treatment and will conduct GWR triggered monitoring beginning December 1,2 009.

Certification Requirements: PWS Operator or Official

Print Name: _____ Title: _____
Signature: _____ Date: _____
Phone #: ( ) _____- _____ Email: _____

DWP Use Only: Date Received __/__/__ Action Taken:

_____
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