CR 90-59

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
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STATE OF WISCONSIN)
) ss
DEPARTMENT OF NATURAL RESOURCES)

TO ALL TO WHOM THESE PRESENTS SHALL COME, GREETINGS:

I, Bruce B. Braun, Deputy Secretary of the Department of Natural Resources and custodian of the official records of said Department, do hereby certify that the annexed copy of Natural Resources Board Order No. WS-20-90 was duly approved and adopted by this Department on September 27, 1990. I further certify that said copy has been compared by me with the original on file in this Department and that the same is a true copy thereof, and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed the official seal of the Department at the Natural Resources Building in the City of Madison, this 12th day of November, 1990.

Bruce B. Braun, Deputy Secretary

(SEAL)

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ORDER OF THE STATE OF WISCONSIN NATURAL RESOURCES BOARD
RENUMBERING, RENUMBERING & AMENDING, AMENDING, REPEALING & RECREATING AND CREATING RULES

IN THE MATTER of renumbering ss. NR 109.04(2) to (23), 109.70, 109 Part IV & V, 109.80(5); amending ss. NR 109.05(1), 109.09(1), 109.12(6), 109.14(3), 109.21(4), 109.23(6) (intro.), 109.25(7)(a)3., (b)3., (c), (8), 109.40, 109 Part III(title), 109.705(2), 109.71, 109.72, 109.80(2), 109.81(1)(a)3. (intro.) and (2) (intro.); repealing s. NR 109.21(5) and (6); repealing and recreating ss. NR 109.13(4), 109.23(5), 109.25(9), 109.26(1)(g), 109.30, 109.31, 109.41 and 109.52; and creating ss. NR 109.04(2), (4), (5), (7), (8), (10) to (14), (16), (17), (20), (21), (25), (31), (35)(note), (37), (40) to (43), (45) to (47), 109.70, 109.725, 109 Part IV(title), 109.80(5) to (7), and 109.81(5)(j) to (1) of the Wisconsin Administrative code pertaining to safe drinking water

WS-20-90

Analysis Prepared by Department of Natural Resources

Statutory authority: ss. 144.025(2)(b)1. and 162.01(1), Stats.
Statutes interpreted: ch. 144, subch. II and ch. 162, Stats.

The major changes in this revision parallel recent changes in federal drinking water regulations under the 1986 Amendments to the Safe Drinking Water Act, and are required as an ongoing condition of the department's primacy agreement with the U.S. Environmental Protection Agency. Principal changes include increased microbiological monitoring at public water systems, changes in public notification requirements, and more stringent filtration and disinfection requirements for public water systems which utilize surface water or ground water determined to be under the direct influence of surface water.

Minor clean up of text has occurred in a number of sections and all required analytical methods have been consolidated under a single new section of the Code.

SECTION 1. NR 109.04(1) to (23) are renumbered 109.04(3), (6), (9), (15), (18), (19), (22) to (24), (26) to (30), (32) to (36), (38), (39), and (44), respectively.

SECTION 2. NR 109.04(2), (4), (5), (7), (8), (10) to (14), (16), (17), (20), (21), (25), (31), (35)(note), (37), (40) to (43), and (45) to (47) are created to read:

NR 109.04(2) "Coagulation" means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

(4) "Confirmed presence" means the presence of coliform bacteria in a water sample confirmed by a total coliform-positive repeat sample.

(5) "Confluent growth" means a continuous bacterial growth covering the entire filtration area of a membrane filter, or a portion thereof, in which bacterial colonies are not discrete.

(7) "Conventional filtration treatment" means a series of processes including coagulation, flocculation, sedimentation, and filtration resulting in substantial particulate removal.

(8) "CT" or "CTcalc" is the product of "residual disinfectant concentration" (C) in mg/l determined before or at the first customer, and the corresponding "disinfectant contact time" (T) in minutes, i.e., "C" x "T". If a public water system applies disinfectants at more than one point prior to the first customer, it shall determine the CT of each disinfectant sequence before or at the first customer, to determine the total percent inactivation or "total inactivation ratio." The inactivation ratio for a single disinfection sequence is:

$$\frac{CTcalc}{CT_{99.9}}$$

where "$CT_{99.9}$" is the CT value required for 99.9% (3 log) inactivation of *Giardia lamblia* cysts. The sum of the inactivation ratios, or total inactivation ratio for a series of disinfection sequences is:

$$\sum \frac{(CTcalc)}{(CT_{99.9})}$$

and is calculated by adding together the inactivation ratio for each disinfection sequence. A total inactivation ratio equal to or greater than 1.0 is assumed to provide a 3 log inactivation of *Giardia lamblia* cysts.

(10) "Diatomaceous earth filtration" means a process resulting in substantial particulate removal in which:

(a) A precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum); and

(b) While the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

(11) "Direct filtration" means a series of processes including coagulation and filtration but excluding sedimentation resulting in substantial particulate removal.

(12) "Disinfectant contact time" ("T" in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration ("C") is measured. Where only one "C" is measured, "T" is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or where residual disinfectant concentration ("C") is measured. Where more than one "C" is measured, "T" is:

(a) For the first measurement of "C", the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first "C" is measured: and

(b) For subsequent measurements of "C", the time in minutes that it takes for water to move from the previous "C" measurement point to the "C" measurement point for which the particular "T" is being calculated.

(13) "Disinfection" means a process which inactivates pathogenic organisms in water by chemical oxidants or equivalent agents.

(14) "Domestic or other non-distribution system plumbing problem" means a coliform contamination problem in a public water system with more than one service connection that is limited to the specific service connection from which the coliform-positive sample was taken.

(16) "Filtration" means a process for removing particulate matter from water by passage through porous media.

(17) "Flocculation" means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through gentle stirring by hydraulic or mechanical means.

(20) "Ground water under the direct influence of surface water" means any water beneath the surface of the ground with:

(a) Occurrence of insects or other macroorganisms, algae or large diameter pathogens such as *Giardia lamblia*, in greater than or equal to 10% of representative source water samples collected over a period of 6 months, immediately prior to the first or only point of disinfectant application, or

(b) Evidence of relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions.

(21) "*Legionella*" means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires disease.

(25) "Near the first service connection" means at one of the 20% of all service connections in the entire system that are nearest the water supply treatment facility or water supply source, as measured by water transport time within the distribution system.

(31) "Point-of-disinfectant application" is the point where the disinfectant is applied and water downstream of that point is not subject to recontamination by surface runoff.

(35)(note) Note: The definition of public water system as regulated by this chapter is broader and includes more water systems than those governed by the Public Service Commission under its definition of a public utility in ch. 196, Stats.

(37) "Residual disinfectant concentration" ("C" in CT calculations) means the concentration of disinfectant measured in mg/l in a representative sample of water.

(40) "Sedimentation" means a process for removal of solids before filtration by gravity or separation.

(41) "Slow sand filtration" means a process involving passage of raw water through a bed of sand at low velocity (generally less than 0.4 m/h) resulting in substantial particulate removal by physical and biological mechanisms.

(42) "Surface water" means all water which is open to the atmosphere and subject to surface runoff.

(43) "System with a single service connection" means a system which supplies drinking water to consumers via a single line.

(45) "Too numerous to count" means that the total number bacterial colonies exceeds 200 on a 47-mm diameter membrane filter used for coliform detection.

(46) "Waterborne disease outbreak" means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment or is supplied from a contaminated source, as determined by the department or other local or state agency.

(47) "Virus" means a virus of fecal origin which is infectious to humans by waterborne transmission.

SECTION 3. NR 109.05(1) is amended to read:

NR 109.05(1) Consists only of distribution and storage facilities (and does not have any collection ~~and~~ or treatment facilities); and

SECTION 4. NR 109.09(1) is amended to read:

NR 109.09(1) Maximum contaminant level goals (MCLGs) are zero for the following contaminants:

Benzene
Carbon tetrachloride
1,2-dichloroethane
Giardia lamblia
Legionella
Trichloroethylene
Total coliforms (including fecal coliforms and *Escherichia coli*)
Vinyl chloride
Viruses

SECTION 5. NR 109.12(6) is amended to read:

NR 109.12(6) Analyses conducted to determine compliance with s. NR 109.11 shall be made in accordance with methods ~~approved by the U.S. environmental protection agency. The department shall maintain a current list of approved methods~~ listed in s. NR 109.725, Table A.

SECTION 6. NR 109.13(4) is repealed and recreated to read:

NR 109.13(4) Analyses for sodium shall be performed as prescribed in s. NR 109.725, Table E.

Note: A primary maximum contaminant level has not been established for sodium.

SECTION 7. NR 109.14(3) is amended to read:

NR 109.14(3) Analyses conducted to determine the corrosivity of the water shall be made in accordance with methods ~~approved by the U.S. environmental protection agency. The department shall maintain a current list of approved methods~~ listed in s. NR 109.725, Table E.

SECTION 8. NR 109.21(4) is amended to read:

NR 109.21(4) Analysis made to determine compliance with s. NR 109.20 (1) and (2) shall be conducted in accordance with requirements in s. NR 109.725, Table B.

SECTION 9. NR 109.21(5) to (6) are repealed.

SECTION 10. NR 109.23(5) is repealed and recreated to read:

NR 109.23(5) Sampling and analyses made under this section shall be conducted as prescribed in s. NR 109.725, Table B.

SECTION 11. NR 109.23(6)(intro.) is amended to read:

NR 109.23(6) Before the supplier of water for a community water system makes any significant modifications to its existing treatment process for the purposes of achieving compliance with s. NR ~~109.20 (3)~~ 109.22, such supplier shall submit and obtain department approval of a detailed plan setting forth its proposed modification and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water provided by such system will not be adversely affected by such modification. Each system owner or operator shall comply with the provisions set forth in the department approved plan. At a minimum, a department approved plan shall require the supplier of water for a system modifying its disinfection practice to:

SECTION 12. NR 109.25(7)(a)3. is amended to read:

NR 109.25(7)(a)3. When VOCs are detected in any sample, the supplier of water shall report to the department within 7 days and ~~collect 3 additional samples at 5 to 10 day intervals during the next 30 days. Monitoring thereafter shall be repeated every 3 months, as required under sub. (1)~~ monitor quarterly thereafter as required in sub. (1).

SECTION 13. NR 109.25(7)(b)3. is amended to read:

NR 109.25(7)(b)3. When VOCs are detected in any sample, the supplier of water shall report to the department within 7 days and ~~collect 3 additional samples at 5 to 10 day intervals during the next 30 days. Monitoring thereafter shall be repeated every 3 months, as required under sub. (2)~~ monitor quarterly thereafter as required in sub. (2).

SECTION 14. NR 109.25(7)(c) is amended to read:

NR 109.25(7)(c) ~~Notwithstanding pars. (a) 3. and (b) 3., the~~ The department may reduce the frequency of monitoring to once per year for a groundwater system or surface water system having VOCs at levels consistently less than the MCL for 3 consecutive years.

SECTION 15. NR 109.25(8) is amended to read:

NR 109.25(8) Initial compliance with s. NR 109.24 (1) shall be ~~determined based upon the results of the first 4 samples collected under sub. (7) (a) 3. or (b) 3. Compliance with s. NR 109.24 (1) thereafter shall be~~ determined based on the results of a running annual average of up to 4 quarterly samples for each sampling location. When any ~~results~~ result is reported as detected, but less than the limit of quantitation, the limit of detection for that compound shall be used in the calculation of the average.

If one location's average is greater than the MCL, the system shall be deemed to be out of compliance. If ~~any one sample result~~ the result of any one or more samples would cause the running annual average to be exceeded, then the system shall be deemed to be out of compliance immediately. For systems required to take only one sample per location because no VOCs were detected, compliance shall be based on that one sample.

SECTION 16. NR 109.25(9) is repealed and recreated to read:

NR 109.25(9) Analysis under this section shall be conducted as prescribed in s. NR 109.725, Table B.

SECTION 17. NR 109.26(1)(g) is repealed and recreated to read:

NR 109.26(1)(g) Analysis under this section shall be conducted using the methods prescribed in s. NR 109.725, Table B.

SECTION 18. NR 109.30 is repealed and recreated to read:

NR 109.30 MAXIMUM MICROBIOLOGICAL CONTAMINANT LEVELS. The following are the maximum contaminant levels for coliform bacteria applicable to public water systems.

(1) The maximum contaminant level (MCL) for coliform bacteria is based on the presence or absence of total coliforms in a sample.

(a) For a system which collects at least 40 samples per month, if no more than 5.0% of the samples collected during a month are total coliform-positive, the system is in compliance with the MCL for total coliforms.

(b) For a system which collects fewer than 40 samples per month, if no more than one sample collected during a sampling period is total coliform-positive, the system is in compliance with the MCL for total coliforms.

(2) Any fecal coliform-positive repeat sample or E. Coli-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or E. coli-positive routine sample constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in s. NR 109.81, this is a violation that may pose an acute risk to health.

(3) The water supplier for a public water system shall determine compliance with the MCL for total coliforms in subs. (1) and (2) of this section for each period in which the system is required to monitor for total coliforms.

(4) The supplier of water shall initiate definitive action to identify the cause of the positive bacteriological sample results and to eliminate potential health hazards which may exist in the system when monitoring pursuant to s. NR 109.31 (1) or (2) shows the presence of any coliform organisms.

(5) If heterotrophic bacterial plate counts on water distributed to the consumer exceed 500 organisms per milliliter the department shall determine if the bacterial count is of public health or nuisance significance and may require appropriate action.

(6) The following are best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in subs. (1) and (2):

(a) Protection of wells from coliform contamination by appropriate placement and construction;

(b) Maintenance of a disinfectant residual throughout the distribution system;

(c) Proper maintenance of the distribution system including appropriate pipe replacement and repair procedures, main flushing programs, proper operation and maintenance of storage tanks and reservoirs, and continual maintenance of positive water pressure in all parts of the distribution system;

(d) Filtration and disinfection of surface water, or disinfection of ground water using strong oxidants such as chlorine, chlorine dioxide or ozone; or

(e) The development and implementation of a department approved wellhead protection program.

Note: The basic purpose of a wellhead protection program is to restrict potentially polluting activities near wells and well fields and within recharge areas of aquifers supplying water to these wells. In general, activities are more restricted close to the well and less so farther away.

SECTION 19. NR 109.31 is repealed and recreated to read:

NR 109.31 MICROBIOLOGICAL CONTAMINANT SAMPLING AND ANALYTICAL REQUIREMENTS. (1) ROUTINE MONITORING. (a) Suppliers of water for public water systems shall collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. These plans are subject to department review and revision.

(b) 1. Water suppliers for community water systems shall take water samples for coliform determination at regular intervals, and in a number proportionate to the population served by the system. Suppliers required to collect multiple samples each month shall sample at geographically representative locations and on dates evenly spaced during the month. Except as specified in subd. 2., the minimum sampling frequency shall be as set forth in the following:

Population served:	Minimum number of samples per month
25 to 1,000 (Not serving a municipality)	1
25 to 1,000 (Serving a municipality)	2
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,000 or more	480

2. Based on a history of no coliform bacterial contamination and on a sanitary survey by the department showing the water system to be supplied solely by a protected ground water source and free of sanitary defects, a non-municipal community water system serving 25 to 1,000 persons may, with written permission from the department, reduce this sampling frequency, except that in no case shall it be reduced to less than one per calendar quarter.

(c) The supplier of water for a non-community school or a non-transient non-community water system shall sample for coliform bacteria in each calendar quarter during which the system provides water to the public, unless the

department, on the basis of a sanitary survey or other factors, determines that some other frequency is more appropriate.

(d) The monitoring frequency for total coliforms for non-community water systems, notwithstanding par. (c), is as follows:

1. On or after June 29, 1994, a non-community water system using only ground water and serving 1,000 persons per day or fewer shall monitor each calendar quarter that the system provides water to the public, except that the department may reduce the monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. In no case may the monitoring frequency be reduced to less than once per year.

2. On or after December 31, 1990, a non-community water system using only ground water and serving on average more than 1,000 persons per day for any month shall monitor at the same frequency as a like-sized community water system, as specified in par. (b) 1., except that the department may reduce the monitoring frequency, in writing, for any month the average daily population served is less than 1,000 persons per day.

3. A non-community water system using ground water under the direct influence of surface water as defined in s. NR 109.04, in total or in part, shall monitor at the same frequency as a like-sized community municipal system, as specified in par. (b) 1. The system shall begin monitoring at this frequency beginning 6 months after the department determines that the ground water source is under the direct influence of surface water.

(e) Public water systems shall collect samples at regular time intervals throughout the month, except that a system which uses ground water and serves 1,000 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

(f) Special purpose samples such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement or repair, may not be used to determine compliance with the MCL for total coliforms in s. NR 109.30. Repeat samples taken pursuant to sub. (2) are not considered special purpose samples, and shall be used to determine compliance with the MCL for total coliforms in s. NR 109.30.

(2) REPEAT MONITORING. (a) If a routine sample is total coliform-positive, the water supplier of a public water system shall collect a set of repeat samples within 24 hours of being notified of the positive result. A system which is required to collect more than one routine sample/month shall collect no fewer than 3 repeat samples for each total coliform-positive sample found. A system which is required to collect one routine sample/month or fewer shall collect no fewer than 4 repeat samples for each total coliform-positive sample found. The department may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the department will specify how much time the water supplier has to collect repeat samples.

(b) The water supplier shall collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within 5 service connections upstream and at least one repeat sample at a tap within 5 service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one away from the end of the distribution system, the department may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

(c) The water supplier shall collect all repeat samples on the same day, except that the department may allow a system with a single service connection to collect the required set of repeat samples over a 4 day period or to collect a larger volume repeat samples in one or more sample containers of any size, as long as the total volume collected is at least 400 ml (300 ml for systems which collect more than one routine sample/month).

(d) If one or more repeat samples in the set is total coliform-positive, the public water supplier shall collect an additional set of repeat samples in the manner specified in pars. (a) to (c). The additional set of samples shall be collected within 24 hours of being notified of the positive result, unless the department extends the limit as provided in par. (a). The water supplier shall repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in s. NR 109.30 has been exceeded and notifies the department.

(e) If a water supplier collecting fewer than 5 routine samples/month has one or more total coliform-positive samples and the department does not invalidate the samples under sub. (3), the supplier shall collect at least 5 routine samples during the next month the system provides water to the public, except that the department may waive this requirement if the conditions of subd. 1. or 2. are met. The requirement for a water supplier to collect repeat samples in pars. (a) to (d) is not waiveable.

1. The department may waive the requirement to collect 5 routine samples the next month the system provides water to the public if the department performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit shall be sufficiently detailed to allow the department to determine whether additional monitoring or any corrective action is needed.

2. The department may waive the requirement to collect 5 routine samples the next month the system provides water to the public if the department has determined why the sample was total coliform-positive and establishes that the water supplier has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the decision to waive the following month's additional monitoring requirement will be documented in writing, signed by a qualified department official, and made available to the public. The written documentation shall describe the specific cause of the total coliform-positive sample and what action the water supplier has taken or will take to correct this problem. The requirement to collect 5 routine samples the next month the system provides

water to the public is not waiveable solely on the grounds that all repeat samples are total coliform-negative.

(f) After a water supplier collects a routine sample and before learning the results of the analysis of that sample, if the water supplier collects another routine sample from within 5 adjacent service connections of the initial sample, and the initial sample after analysis is found to contain total coliforms, then the system may count the subsequent sample as a repeat sample instead of as a routine sample.

(g) Results of all routine and repeat samples not invalidated by the department shall be included in determining compliance with the MCL for total coliforms in s. NR 109.30.

(3) INVALIDATION OF TOTAL COLIFORM SAMPLES. (a) A total coliform-positive sample invalidated under this subsection does not count towards meeting the minimum monitoring requirements of this section.

(b) The department may invalidate a total coliform-positive sample only if the conditions of subd. 1., 2. or 3. are met.

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result.

2. The department, on the basis of the results of repeat samples collected as required by sub. (2) (a) to (d), determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. No sample may be invalidated by the department on the basis of repeat sample results unless all repeat samples collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within 5 service connections of the original tap are total coliform-negative (e.g., the department will not invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water system has only one service connection).

3. The department has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system owner or operator shall still collect all repeat samples required under sub. (2) (a) to (d), and use them to determine compliance with the MCL for total coliforms in s. NR 109.30. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision shall be documented in writing, approved by a qualified department official and available to the public for inspection. The document shall state the specific cause of the total coliform-positive sample, and what action the system owner or operator has taken or will take, to correct this problem. The department may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(c) A laboratory shall invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence

of gas production using an analytical method where gas formation is examined (e.g., the Multiple Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence Coliform Test, or exhibits confluent growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system owner or operator shall collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system owner or operator shall continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. The department may waive the 24 hour time limit on a case-by-case basis.

(4) FECAL COLIFORMS/ESCHERICHIA COLI (E. COLI) TESTING. (a) If any routine or repeat sample is total coliform-positive, the system owner or operator shall analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for E. coli in lieu of fecal coliforms. If fecal coliforms or E. coli are present, the system owner or operator shall notify the department by the end of the day when the system is notified of the test result, unless the system is notified of the result after normal department business hours, in which case the system owner or operator shall notify the department before the end of the next business day.

(b) The department may allow a public water system, on a case-by-case basis, to forgo fecal coliform or E. coli testing on a total coliform-positive sample if that system owner or operator assumes that the total coliform-positive sample is fecal coliform-positive or E. coli-positive. Accordingly, the system owner or operator shall notify the department as specified in par. (a) and the provisions of s. NR 109.30 (2) apply.

(5) ANALYTICAL METHODOLOGY. (a) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

(b) Public water system owners or operators need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.

Note: The coliform density may, however, be helpful in selecting a remedial option.

(c) Samples collected in compliance with requirements of s. NR 109.30 shall be analyzed as prescribed in s. NR 109.725, Table C.

(6) SANITARY SURVEYS. (a) Public water systems which do not collect 5 or more routine samples/month shall undergo an initial sanitary survey by June 29, 1994 for community water systems and June 29, 1999 for non-community water systems. Thereafter, systems shall undergo another sanitary survey every 5 years, except that non-community water systems using only protected and disinfected ground water, as determined on a case-by-case basis by the department, shall undergo subsequent sanitary surveys at least every 10 years after the initial sanitary survey. The department will review the results of

each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.

(b) Sanitary surveys shall be performed by the department or an agent approved by the department. If the department requests a system owner to have a sanitary survey performed, the system owner is responsible for ensuring the survey is completed.

(7)(a) When a sample collected under subs. (1) to (4) exceeds a maximum contaminant level in s. NR 109.30 (1) or (2), the supplier of water shall report the violation to the department no later than the end of the next business day after it learns of the violation, and shall provide public notice of the violation in accordance with s. NR 109.81.

(b) A public water supplier who has failed to comply with a coliform monitoring requirement, shall report the monitoring violation to the department within 10 days after discovering the violation, and notify the public as specified in s. NR 109.81.

(8) In addition to sampling from the distribution system, each supplier of water for a system providing disinfection shall obtain at least one sample every 3 months from each well prior to the point of any chemical addition. For waterworks which have more than one well in the same location and utilizing the same aquifer, only one of the wells may be sampled each time on an alternating basis. If a well has a high potential for contamination, the department may, in individual cases, require more frequent sampling.

(9) At surface water facilities, the microbiological quality of the water shall be monitored sufficiently to maintain quality control of the treatment process. Each plant shall establish a schedule which will be subject to review and modification by the department.

Note: Generally, membrane filter or 5 tube fermentation tests and heterotrophic plate counts of the raw, settled and finished water on an established schedule will be necessary to meet this requirement.

(10) At all waterworks which have a potential for high total bacteria levels because of the water quality, the method of treatment, chemical addition or other cause, the department may require heterotrophic plate counts pursuant to an established schedule. Analyses shall be conducted in accordance with the analytical requirements in s. NR 109.725, Table C.

SECTION 20. NR 109.40 (intro) is amended to read:

NR 109.40 MAXIMUM CONTAMINANT LEVELS FOR TURBIDITY. The requirements in this section apply to filtered systems prior to June 29, 1993. The requirements in this section apply to unfiltered systems that the department has determined, in writing, shall install filtration, prior to June 29, 1993, or until filtration is installed, whichever is later. Turbidity requirements on or after June 29, 1993 are stated in s. NR 109.760. The maximum contaminant levels for turbidity are applicable to both community water

systems and non-community water systems using surface water sources and ground water sources under the direct influence of surface water, in whole or in part. The maximum contaminant levels for turbidity in drinking water, measured at a representative entry point(s) to the distribution system, are:

SECTION 21. NR 109.41 is repealed and recreated to read:

NR 109.41 TURBIDITY SAMPLING AND ANALYTICAL REQUIREMENTS. (1) The requirements of this section apply to filtered public water systems prior to June 29, 1993. The requirements of this section apply to unfiltered public water systems that the department has determined, in writing, shall install filtration, prior to June 29, 1993, or until filtration is installed, whichever is later. Turbidity requirements on or after June 29, 1993 are stated in s. NR 109.760.

(2) Samples shall be taken by suppliers of water for both community water systems and non-community water systems at representative entry points to the water distribution system at least once per day, for the purpose of making turbidity measurements to determine compliance with s. NR 109.40. The department may reduce the required sampling frequency at a non-community water system if it determines in writing that a reduced sampling frequency will not pose a risk to public health. The measurement shall be made by the Nephelometric Method as specified in s. NR 109.725, Table E.

(3) If the result of a turbidity analysis exceeds the maximum contaminant level, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum contaminant level has been exceeded, the supplier of water shall report to the department within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum contaminant level, or if the average of 2 samples taken on consecutive days exceeds 5 NTU, the supplier of water shall report to the department and notify the public as directed in ss. NR 109.80 and 109.81.

SECTION 22. NR 109.52 is repealed and recreated to read:

NR 109.52 ANALYTICAL METHODS FOR RADIOACTIVITY. (1) Analyses conducted to determine compliance with ss. NR 109.50 and 109.51 shall be made in accordance with approved methods listed in s. NR 109.725, Table D.

Note: Sections NR 109.50 to 109.52 are identical to the radioactivity standards of the department of health and social services in ch. H 57, Wis. Adm. Code, and to the National Interim Primary Drinking Water Regulations, 40 Code of Federal Regulations 141. These sections are adopted pursuant to s. 140.56 (2), Stats.

SECTION 23. NR 109 Part III (Title) is amended to read:

Part III (Title) Miscellaneous Chemical Monitoring Requirements, Raw Surface Water Standards, Approved Laboratories, and Approved Methods for Safe Drinking Water Analysis.

SECTION 24. NR 109.70 is renumbered NR 109.705

SECTION 25. NR 109.70 is created to read:

NR 109.70 GENERAL REQUIREMENTS. Public water systems shall meet applicable minimum monitoring requirements stated in this chapter. The department may increase monitoring requirements of any section of this chapter, if the department deems such an increase is necessary to protect public health, safety and welfare. The department may decrease the monitoring requirements of any section of this chapter, if the department determines that such a decrease will not adversely affect protection of public health, safety or welfare.

SECTION 26. NR 109.705(2) note is repealed, NR 109.705(2) is amended to read:

NR 109.705(2) CHLORINE. The suppliers of water for all waterworks which chlorinate water shall test chlorine residuals at locations and intervals necessary to control the chlorination process. At ground water supplies, the chlorine residual of a sample from a representative location in the distribution system shall be checked at least twice per week. Waterworks having surface water treatment plants shall determine the chlorine residual in the plant effluent at least every 2 hours and in the distribution system at least daily in representative locations. Where water quality changes rapidly, residuals shall be tested at more frequent intervals as specified by the department and in those individual cases, continuous monitoring equipment may be required if the department determines it is necessary to protect public health. Chlorine residual testing is required when bacteriological samples are taken.

SECTION 27. NR 109.71 is amended to read:

NR 109.71 RAW SURFACE WATER STANDARDS. The ~~intate~~ intake water shall be the highest quality reasonably available and which, with appropriate treatment and adequate safeguards, will meet the drinking water standards in this chapter.

SECTION 28. NR 109.72 is amended to read:

NR 109.72 LABORATORIES. (1) For the purpose of compliance with ss. NR 109.12, 109.13, 109.14, 109.21, 109.23, 109.25, and 109.26 samples shall be analyzed at the state laboratory of hygiene, at a laboratory facility acceptable to the U.S. environmental protection agency, or at a laboratory certified for the safe drinking water test category under ch. NR 149. For the purpose of compliance with ss. NR 109.31, ~~and~~ 109.52 and 109.78 bacteriological and radiological samples shall be analyzed at a laboratory facility certified or approved by the department of health and social services, or at a laboratory facility acceptable to the U.S. environmental protection agency.

SECTION 29. NR 109.725 is created to read:

NR 109.725 APPROVED ANALYTICAL METHODS FOR SAFE DRINKING WATER ANALYSES. Only the following analytical methods are approved for analyses required by this chapter:

TABLE A
Approved Methodology for Primary Inorganic Contaminants

Contaminant	Methodology	Reference (Method Number) EPA[1]	ASTM[2]	SM[3]	Other
Arsenic	Atomic absorption; furnace technique	206.2	-	-	-
	Atomic absorption; gaseous hydride	206.3	D2972-78B	301A-VII	I-1062-78[9]
	Spectrophotometric, silver diethyldithiocarbamate	206.4	D2972-78A	404A after B(4)	-
	Inductively Coupled Plasma (ICP)	200.7[10]	-	-	-
Barium	Atomic absorption; direct aspiration	208.1	-	301A-IV	-
	Atomic absorption; furnace technique	208.2	-	-	-
	ICP	200.7[10]	-	-	-
Cadmium	Atomic absorption; direct aspiration	213.1	D3557-78A or B	301A-II or III	-
	Atomic absorption; furnace technique	213.2	-	-	-
	ICP	200.7[10]	-	-	-
Chromium	Atomic absorption; direct aspiration	218.1	D1687-77D	301A-II or III	-
	Atomic absorption; furnace technique	218.2	-	-	-
	ICP	200.7[10]	-	-	-
Fluoride	Colorimetric SPADNS; with distillation	340.1	D1179-72A	-	413A and C[4]
	Potentiometric ion selective electrode	340.2	D1179-72B	-	413B[4]
	Automated Alizarin fluoride blue; with distillation	340.3	-	-	413E[4], 129-71W[5]
	Automated ion selective electrode	-	-	-	380-75WE[6]
Lead	Atomic absorption; direct aspiration	239.1	D3559-78A or B	301A-II or III	-
	Atomic absorption; furnace technique	239.2	-	-	-
	ICP	200.7[10]	-	-	-
Mercury	Manual cold vapor technique	245.1	D3223-79	301A-VI	-
	Automated cold vapor technique	245.2	-	-	-
Nitrate	Colorimetric brucine	352.1	D992-71	419D	-
	Spectrometric; cadmium reduction	353.3	D3867-79B	419C	-
	Automated hydrazine reduction	353.1	-	-	-
	Automated cadmium reduction	353.2	D3867-79A	605	-
	Ion selective electrode	-	-	-	93MM-79[7]
	Ion Chromatography[8]	300.0	-	-	-
Selenium	Atomic absorption; furnace technique	270.2	-	-	-
	Atomic absorption; gaseous hydride	270.3	D3859-79	301A-VII	I-1667-78[9]
Silver	Atomic absorption; direct aspiration	272.1	-	301A-II	-
	Atomic absorption; furnace technique	272.2	-	-	-
	ICP	200.7[10]	-	-	-
Turbidity	Nephelometric	180.1	-	214A	-

[1] "Methods for Chemical Analysis of Water and Wastes", EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, 45268 (EPA-600/4-79-020), March 1983, Available from ORD Publications, CERI, EPA, 26 W. St. Claire, Cincinnati, Ohio, 45268. For approved analytical procedures for metals, the technique applicable to total metals shall be used.

2 Annual Book of ASTM Standards, Part 31 Water, 1979. Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania, 19103.

3 "Standard Methods for the Examination of Water and Wastewater", 14th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1975. American Public Health Association, 1015 Fifteenth Street, N.W., Washington, D.C., 20005 (14th Edition is available on inter-library loan.)

4 "Standard Methods for the Examination of Water and Wastewater", 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985. American Public Health Association, 1015 Fifteenth Street, N.W., Washington, D.C. 20005.

5 "Fluoride in Water and Wastewater Industrial Method #129-71W". December 1972. Available from Brant Luebbe Analyzing Technologies, Inc., 103 Fairview Park Drive, Elmsford, New York 10523-1500.

6 "Fluoride in Water and Wastewater", February 1976. Available from Technicon Industrial Systems, Benedict Avenue, Tarrytown, New York, 10591.

7 "Methods Manual 93 Series Electrodes". Form 93 MM/9790, pp. 2-5, 1979. Available from Orion Research Incorporated, 840 Memorial Drive, Cambridge, Mass. 02138.

8 Method 300.0 has been incorporated into "Methods for Chemical Analysis of Water and Wastes" (EPA/600/4-79/020) by Technical Addition (EPA/600/4-84/017) and is available from the EMSL-Cincinnati, 26 W. St. Claire Street, Cincinnati, Ohio 45268.

9 Techniques of Water Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Flurial Sediments, Book 5 (1979, Stock #024, 001-03177-9). Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

10 Method 200.7 with appendix entitled "Inductively Coupled Plasma-Atonic Emission Analysis of Drinking Water", March 1987. Available from the EMSL-Cincinnati, 26 W. St. Claire Street, Cincinnati, Ohio 45268.

TABLE B
Approved Methodology for Organic Contaminants

Contaminant	Methodology	Reference (Method Number) EPA[1]	ASTM[2]	SM[3]	USGS[4]	Other
Chlorinated hydrocarbons: endrin lindane methoxychlor toxaphene	Solvent extraction, gas chromatography	pp.1-19	D3086-79	509A	pp. 24-39	SPE-500[16]
Chlorophenoxys 2,4-D 2,4,5-TP	Solvent extraction, derivatization, gas chromatography	pp. 20-35	D3478-79	509B	pp. 24-39	SPE-500[16]
Total Trihalomethanes (TTHM)[9]	Purge and trap, gas chromatography	([5])	-	-	-	
	Solvent extraction, gas chromatography	([6])	-	-	-	
	Gas chromatography/mass spectrometry (GC/MS)	([7])([8])	-	-	-	
Volatile Organic Chemicals other than TTHM	Purge and trap, gas chromatography	([10])([11])([12])				
	purge and trap, GC/MS	([13])([14])				
1,2,-Dibromoethane (EDB) & 1,2-Dibromo-3-chloropropane (DBCP)	Microextraction, gas chromatography	([15])				

1 "Methods for Organochlorine Pesticides and Chlorophenoxy Acid Herbicides in Drinking Water and Raw Source Water", Available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, Ohio 45268.

2 Annual Book of ASTM Standards, Part 31 Water, 1979. Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

3 "Standard Methods for the Examination of Water and Wastewater." 14th Edition, 1975, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1015 Fifteenth Street, N.W., Washington, D.C. 20036 (14th Edition no longer available).

4 Techniques of Water-Resources Investigation of the United States Geological Survey, "Methods for Analysis of Organic Substances in Water", Book 5, Chapter A-3, 1972. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

5 "The Analysis of Trihalomethanes in Finished Waters by the Purge and Trap Method", Method 501.1. Available from the EMSL, EPA, 26 W. St. Claire, Cincinnati, Ohio 45268.

6 "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction", Method 501.2. Available from the EMSL, EPA, 26 W. St. Claire, Cincinnati, Ohio 45268.

7 "Measurement of Trihalomethanes in Drinking Water by Gas Chromatography/Mass Spectrometry and Selection Monitoring", Method 501.3. Available from the EMSL, EPA, 26 W. St. Claire, Cincinnati, Ohio 45268.

[8] EPA Method 524 - "Measurement of Purgeable Organic Compounds in Drinking Water by GC/MS". Available from the EMSL, EPA, 26 W. St. Claire, Cincinnati, Ohio 45268.

[9] 40 CFR 141.30 Appendix C, Federal Register, October 26, 1984. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

[10] Method 502.1, "Volatile Halogenated Organic Chemicals in Water by Purge and Trap Gas Chromatography," Available from ORD Publications, CERI, EPA 20 W. St. Claire, Cincinnati, OH 45268.

[11] Method 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography", Available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, OH 45268.

[12] Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series", Available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, OH 45268.

[13] Method 524.1, "Volatile Organic Compounds in Water by Purge and Trap Gas Chromatography/Mass Spectrometry," available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, OH 45268.

[14] Method 524.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography/Mass Spectrometry," available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, OH 45288.

[15] "Measurement of 1,2-Dibromoethane (EDB) and 1,2-Dibromo-3-Chloropropane (DBCP) in Drinking Water by Microextraction and Gas Chromatography", Available from ORD Publications, CERI, EPA, 20 W. St. Claire, Cincinnati, Ohio 45268.

[16] "Solid Phase Extraction (SPE) test method number SPE-500 for EPA's "Methods for Organochlorine Pesticides and Chlorophenoxy Acid in Herbicides in Drinking Water and Raw Source Water". Available from J. T. Baker Chemical Company, 22 Red School Lane, Phillipsburg, NJ 08865.

TABLE C
Approved Methodology for Microbiological Measurements

	Methodology	EPA[1]	Standard Methods (16th Edition[2])
Total Coliform Bacteria	Multiple tube fermentation[3] (preferred for turbid or high noncoliform populations)	Part III, Section B, 4.1 thru 4.6.4(c) (pp. 114-118)	908, 908A, and 908B (pp. 870-878)
	Membrane filter[4] (preferred because large volumes of samples analyzed in much shorter time)	Part III, Section B, 2.1 thru 2.6 (pp. 108-112)	909, 909A, and 909B (pp. 886-896)
	Minimal Media ONPG-MUG(MMO-MUG) Test[5]		
	Presence - Absence (P-A) Coliform Test		908E (pp. 882-886)
Total Coliform, Concentration	Standard Total Coliform Multiple Tube (MPN) Tests		908A, 908B, and 908D
	Standard Total Coliform Membrane Filter (MF) Procedure		909A or 909B
	Minimal Medium ONPG-MUG Test[7]		
Fecal Coliform, follow up for positive total coliform test[6]	See note [6]		
Fecal Coliform Concentration	Fecal Coliform MPN Procedures		908C or 908D, (pp. 878-882)
	Fecal Coliform MF Procedures		909C (pp. 896-898)
Heterotrophic Plate Count	Pour Plate Method		907A (pp. 864-866)

TABLE C (continued)

1 "Microbiological Methods for Monitoring the Environment, Water and Wastes", EPA-600/8-78-017, December 1978. Available from the U.S. EPA, Environmental Monitoring and Support Laboratory, 26 W. St. Claire Street, Cincinnati, Ohio, 54268.

2 "Standard Methods for the Examination of Water and Wastewater", 16th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1985.

3 The standard sample size for MPN procedure shall be 10 times the standard portion of 10 ml.

4 A standard sample size of 100 ml shall be used for the membrane filter.

5 Analyses shall be conducted in accordance with the analytical recommendations set forth in "National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and Escherichia Coli from Drinking Water: Comparison with Presence - Absence Techniques", (Edberg et al.), Applied and Environmental Microbiology, 55, pp. 1003-1008, April 1989. Available from the American Water Works Association Research Foundation, 6666 West Quincy Ave., Denver, CO 80235.

6 Analyses shall be conducted in accordance with the analytical procedure described in Federal Register, Vol 54, No. 124, Thursday, June 29, 1989, Rules and Regulations, p. 27565, 40 CFR 141.21(f)(5).

7 Analyses shall be conducted in accordance with the analytical recommendations set forth in "National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and Escherichia Coli from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method", (Edberg et al.), pp. 1595-1601, June 1988 (as amended under Erratum, Volume 54, p. 3197, December, 1988). Available from the American Water Works Association Research Foundation, 6666 West Quincy Ave., Denver, CO 80235.

TABLE D
SDWA Approved Methodology for Radiological Measurements

Parameter	Method	EPA[1]	Standard Methods[2]	ASTM[3] (1975)	Others
1) Gross alpha & beta	Total, suspended and dissolved	p. 1	302		
2) Total radium	Precipitation	p. 24	304		
3) Radium 226	Soluble, suspended and total	p. 16	305		
4) Strontium - 89, 90	Total	p. 29	303		
5) Tritium		p. 34	306		
6) Cesium - 134	Gamma spectrometry	p. 4		D-2459	
7) Uranium	Fluorometry			D-2907	
8) Others					(4)(5)

1 "Interim Radiochemical Methodology for Drinking Water", EPA-600/4-75-008. Available from the EMSL, U.S. EPA, 26 W. St. Claire, Cincinnati, Ohio, 45268.

2 "Standard Methods for the Examination of Water and Wastewater", 13th Edition, (1971), APHA, 1015 Fifteenth Street, N.W., Washington, D.C. 20005 (13th Edition no longer available).

3 "1975 Annual Book of ASTM Standards, Water and Atmospheric Analysis", Part 31, (1975). Available from the ASTM, 1916 Race Street, Philadelphia, PA, 19103.

4 "Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions", May 1973, H. L. Krieger and S. Gold, EPA-R4-73-014. Available from U.S. EPA, 26 W. St. Claire Street, Cincinnati, Ohio, 45268.

5 "HASL Procedures Manual", Edited by John H. Hasley (1972), U.S., DOE, HASL-300. Available from the Environmental Measurements Laboratory, 376 Hudston Street, New York, NY, 10014.

TABLE E

Approved Methodology for Physical Parameters, Residual Chlorine, Sodium, Corrosivity and Secondary Contaminants

A. Inorganic

Parameter and Method	EPA 1979[1]	Standard Methods[2]	ASTM[3]	USGS[4]	Other
1. Alkalinity, Methyl orange titrimetric or potentiometric	310.1	403[a]	D1067-82B	-	-
2. Calcium					
EDTA titrimetric[11]	215.2	306C[a]	D511-82(B)	-	-
Atomic absorption; direct aspiration	215.1	301A-II[a]	D511-82(C)	-	-
Inductively Coupled Plasma	200.7[5]	-	-	-	-
3. Chloride					
Potentiometric[11]	-	408C[a]	-	-	-
Colorimetric (ferricyanide) manual or	-	-	D512-67(C)	I-1187-78	-
Automated	325.1, 325.2	407D[b]	-	I-2187-78	-
Titrimetric, Mercuric Nitrate	325.3	407B[b]	D512-67(A)	I-1184-78	p. 554[7]
Ion Chromatography	300.0[10]	-	-	-	-
4. Chlorine dioxide residual					
Amperometric	-	410B[c]	-	-	-
DPD	-	410C[c]	-	-	-
5. Color					
Colorimetric Pt-Co	110.2	204A[b]	-	I-1250-78	-
Spectrophotometric	110.3	204B[b]	-	-	-
6. Copper - Total[6], Digestion[6], followed by:					
AA direct aspiration	220.1	303A[b] or 303B[b]	D1688-77 (D or E)	I-3271-78 or I-3270-78	p. 557[7]
AA furnace	220.2	304[b]	-	-	-
Inductively Coupled Plasma	200.7[5]	-	-	-	-
7. Corrosivity:					
Langelier Index	-	203[a]	-	-	-
Aggressive Index	-	-	-	-	C400-77[8]

TABLE E (Cont.)

Parameter and Method	EPA 1979[1]	Standard Methods[2]	ASTM[3]	USGS[4]	Other
8. Foaming Agents (MBAS)					
Colorimetric	425.1	512A[b]	-	-	-
9. Free chlorine residual[12]					
Colorimetric or titrimetric DPD	-	408E[c] or 408F[c]	-	-	-
Lueco Crystal Violet Method	-	408F[c]	-	-	-
Amperometric	330.1	-	408C	D1253-76(A)	-
10. Iron - Total[6], Digestion[6], followed by:					
AA direct aspiration	236.1	303A[b] or 303B[b]	D1068-77 (C or D)	I-3381-78	p. 557[7]
AA furnace	236.2	304[b]	-	-	
Inductively Coupled Plasma	200.7[5]	-	-	-	
11. Manganese Total[6], Digestion[6], followed by:					
AA direct aspiration	243.1	303A[b] or 303B[b]	D858-77 (B or C)	I-3454-78	p. 557[7]
AA furnace	243.2	304[b]	-	-	
Inductively Coupled Plasma	200.7[5]	-	-	-	
Colorimetric (Persulfate)	-	319B[b]	D858-77 (A)	-	p. 564[7]
12. Odor - Threshold Odor	140.1	207[b]			
13. Ozone					
Indigo Method	-	-	-	-	pp. 169-176[13]
14. pH					
Potentiometric	150.1	423[c]	D1293-78 (A or B)	-	-
15. Sodium					
Atomic absorption; direct aspiration	273.1	-	-	-	-
Atomic absorption; furnace technique	273.2	-	-	-	-
Flame photometric	-	320A[a]	D1428-64A	-	-
Inductively Coupled Plasma	200.7[5]	-	-	-	-

TABLE E (Cont.)

Parameter and Method	EPA 1979[1]	Standard Methods[2]	ASTM[3]	USGS[4]	Other
16. Sulfate - Colorimetric, Automated, Chloranilate,	375.1	-	-	-	-
Automated, Methythymol Blue	375.2	-	-	I-2822-78	-
Ion Chromatography	300.0[10]	-	-	-	-
Gravimetric	375.3	426A[b] or 426B[b]	D516-68 (A)	-	pp. 562-63[7]
Turbidimetric[11]	375.4	427C[a]	D516-68 (B)	-	-
17. Sulfide (as S)					
Titrimetric (iodine)	376.1	427D[b]	-	I-3840-78	-
Colorimetric (methylene blue)	372.2	427C[b]	-	-	-
18. Temperature					
Thermometric	-	212[c]	-	-	-
19. Total Filterable Residue, gravimetric	160.1	208B[a]	-	-	-
20. Total Residue, gravimetric	160.3	209A[b]	-	I3750-78	-
21. Turbidity, nephelometric method	-	214A[c]	-	-	-
22. Zinc - Total[6], Digestion[6] followed by:					
AA direct aspiration	289.1	303A[b] or 303B[b]	D1691-77 (D)I-3900-78	p. 557[7]	
AA furnace	289.2	-	D1691-77 (C)	-	-
Inductively Coupled Plasma	200.7[5]	-	-	-	
Colorimetric (Dithizone)	-	328B[b]	-	-	-
Zincon	-	-	-	-	([9])

1 "Methods for Chemical Analysis of Water and Wastes", (EPA-600/4-79-020), March 1979, EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio, 45268. Available from ORD Publications, CERI, EPA, 26 W. St. Claire Street, Cincinnati, Ohio 45268. For approved analytical procedures for metals, the technique applicable to total metals shall be used.

2 "Standard Methods for the Examination of Water and Wastewater", American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1015 Fifteenth Street, N.W., Washington, D.C. 20005. [a] 14th edition, 1975; [b] 15th edition 1980, and; [c] 16th edition, 1985.

TABLE E (Cont.)

3 "Annual Book of ASTM Standards, Part 31, Water", 1980. Available from the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103. The same method in the current edition may be used if the date of method revision is the same as the 1980 edition.

4 "Methods for Analysis of Inorganic Substances in Water and Fluvial Sediments", U.S. Department of the Interior, U.S. Geological Survey, Open-File Report 78-679, or "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," N.W. Skongstad, et al; U.S. Geological Survey, TWRI, Book 5, Chapter A1, 1979. Available from U.S. Geological Survey, 604 S. Pickett Street, Alexandria, VA 22304.

5 Method 200.7 with appendix titled "Inductively Coupled Plasma Atomic Emission Analysis of Drinking Water", March 1987. Available from the EMSL - Cincinnati, 26 W. St. Claire Street, Cincinnati, Ohio 45268.

6 For the determination of total metals the sample is not filtered before processing. A digestion procedure is required to solubilize suspended material and to destroy possible organic-metal complexes. Two digestion procedures are given in "Methods for Chemical Analysis of Water and Wastes, 1979." One (§ 4.1.3), is a vigorous digestion using nitric acid. A less vigorous digestion using nitric and hydrochloric acids (§ 4.1.4) is preferred; however the analyst should be cautioned that this mild digestion may not suffice for all sample types. Particularly, if a colormetric procedure is to be employed, it is necessary to ensure that all organo-metallic bonds be broken so that the metal is in a reactive state. In those situations, the vigorous digestion is to be preferred making certain that at no time does the sample to dryness. Samples containing large amount of organic materials would also benefit by this vigorous digestion. Use of the graphite furnace technique, inductively coupled plasma, as well as determination for certain elements such as arsenic, the noble metals, mercury, selenium, and titanium require a modified digestion and in all cases the method write up should be consulted for specific instruction or cautions.

7 "Official Methods of Analysis of the AOAC" methods manual, 13th ed. (1980). Current edition available from the Association of Official Analytical Chemists, 1111 N. 19th Street, Suite 210, Arlington, VA 22209. (The method in the current edition may be used if the date of method revision is the same as the 13th edition.)

8 "AWWA Standards for Asbestos - Cement Pipe, 4 in. through 16 in. for Water and Other Liquids", AWWA C400-77, Revision of C400-75. Available from the AWWA, 6666 West Quincy Avenue, Denver Colorado, 80235.

9 Zinc, Zincon Method, Method 8009, Hach Handbook of Water Analysis, 1979, pages 2-231 and 2-333. Available from the Hach Chemical Company, P.O. Box 389, Loveland, Colorado 80537.

10 Method 300.0 has been incorporated into "Methods for Chemical Analysis of Water and Wastes", (EPA 600/4-79/020) by Technical Addition (EPA 600/4-84/017), and is available from the EMSL-Cincinnati, 26 W. St. Claire Street, Cincinnati, Ohio 45268.

11 This is the method to use for corrosivity determination.

12 Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits if approved by the department.

13 "Determination of Ozone in Water by the Indigo Method; A Submitted Standard Method"; Ozone Science and Engineering, Vol. 4, ppl 169-176, Pergamon Press Ltd., 1982, or automated methods which are calibrated in reference to the results obtained by the Indigo Method on a regular basis, if approved by the department.

SECTION 30. NR 109 Part IV and Part V are renumbered Part V and Part VI respectively.

SECTION 31. Part IV (title) is created to read:

Part IV - Filtration and Disinfection

SECTION 32. NR 109.75 to NR 109.78 are created to read:

NR 109.75 GENERAL REQUIREMENTS. (1) These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source or a groundwater source under the direct influence of surface water. Direct influence shall be determined for individual sources by the department. The department determination of direct influence may be based on site-specific measurements of water quality characteristics such as those stated in s. NR 109.04(20) or documentation of well construction characteristics and geology with field evaluation. These regulations also establish requirements for treatment techniques in lieu of maximum contaminant levels for *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella* and turbidity. Treatment technique requirements apply to every public water system which utilizes surface water or ground water under the direct influence of surface water and the requirements consist of installing and properly operating water treatment processes which reliably achieve:

(a) At least 99.9% (3 log) removal or inactivation of *Giardia lamblia* cysts between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer; and

(b) At least 99.99% (4 log) removal or inactivation of viruses between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer.

(2) A public water system using a surface water source or a ground water under the direct influence of surface water is considered to be in compliance with the requirements of sub. (1) if it meets the filtration requirements in s. NR 109.76 and the disinfection requirements in s. NR 109.77.

(3) Each public water system using a surface water source or a ground water under the direct influence of surface water shall be operated by qualified personnel who meet the requirements specified by the department.

NR 109.755 CRITERIA FOR AVOIDING FILTRATION. A public water system that uses ground water under the direct influence of surface water as a water supply source, shall meet all of the conditions of subs. (1) and (2), and is subject to sub. (3), on or after December 30, 1991, unless the department has determined, in writing, that filtration is required. If the department determines in writing, before December 30, 1991, that filtration is required, the system owner shall install filtration and shall meet the criteria for filtered systems specified in ss. NR 109.77 and 109.78 by June 29, 1993.

Within 18 months of the failure of a public water system using a ground water source under the direct influence of surface water to meet any one of the requirements of subs. (1) and (2) or after June 29, 1993, whichever is later, the system owner shall install filtration and shall meet the criteria for filtered systems specified in ss. NR 109.77 and 109.78.

(1) SOURCE WATER QUALITY CONDITIONS. (a) The fecal coliform concentration shall be equal to or less than 20/100 ml, or the total coliform concentration shall be equal to or less than 100/100 ml, measured as specified in s. NR 109.725 Table C, in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90% of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph shall be met.

(b) The turbidity level may not exceed 5 NTU, measured as specified in s. NR 109.725 Table A, in representative samples of the source water immediately prior to the first or only point of disinfectant application unless:

1. The department determines that any such event was caused by circumstances that were unusual and unpredictable; and

2. There have not been more than 2 events in the past 12 months the system served water to the public, or more than 5 events in the past 120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An "event" is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(2) SITE-SPECIFIC CONDITIONS (a) 1. The public water system shall meet the disinfection requirements of s. NR 109.77(1)(a) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the department determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

2. The public water system shall meet the requirements of s. NR 109.77(1)(b) at all times the system serves water to the public.

3. The public water system shall meet the requirements of s. NR 109.77(1)(c) at all times the system serves water to the public unless the department determines that any such failure was caused by circumstances that were unusual and unpredictable.

4. The public water system shall meet the requirements of s. NR 109.77(1)(d) on an ongoing basis unless the department determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(b) The public water system shall maintain a department approved well head protection program which minimizes the potential for contamination by *Giardia*

lamblia cysts and viruses in the source water. The department shall determine whether the well head protection program is adequate to meet this goal. At a minimum, the program shall:

1. Characterize the watershed hydrology, hydrogeology and land ownership;

2. Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

3. Monitor the occurrence of activities which may have an adverse effect on source water quality.

(c) The public water system is subject to an annual on-site inspection to assess the well head protection program and disinfection treatment process. Either the department or a party approved by the department shall conduct the on-site inspection. The inspection shall be conducted by competent individuals and shall include:

1. A review of the effectiveness of the watershed control program;

2. A review of the physical condition of the source intake and how well it is protected;

3. A review of the system's equipment maintenance program to ensure there is low probability for failure of the disinfection process;

4. An inspection of the disinfection equipment for physical deterioration;

5. A review of operating procedures;

6. A review of data records to ensure that all required tests are being conducted and recorded and disinfection is effectively practiced; and

7. Identification of any improvements which are needed in the equipment, system maintenance and operation, or data collection.

(d) The public water system may not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system shall be modified sufficiently to prevent another such occurrence, as determined by the department.

(e) The public water system shall comply with the maximum contaminant level (MCL) for total coliforms in s. NR 109.30 at least 11 months of the 12 previous 12 months that the system served water to the public, on an ongoing basis, unless the department determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(f) The public water system shall comply with the requirements for trihalomethanes in s. NR 109.23.

(3) TREATMENT TECHNIQUE VIOLATIONS. (a) A system that fails to meet any one of the criteria in subs. (1) and (2), and which the department has

determined in writing that filtration is required, and fails to install filtration by June 29, 1993, is in violation of a treatment technique requirement.

(b) A system that has not installed filtration is in violation of a treatment technique if:

1. The turbidity level in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

2. The system is identified as a source of a waterborne disease outbreak.

(4) ADDITIONAL CIRCUMSTANCES WHEN FILTRATION WOULD BE REQUIRED. The department may require a public water system to install filtration even when the system meets the requirements of subs. (1) and (2) if other water quality characteristics or site specific conditions present a threat to public health which could not be eliminated by disinfection alone.

NR 109.76 FILTRATION REQUIREMENTS. Public water systems that use a surface water source shall provide filtration which complies with the requirements of sub. (1) and meets the disinfection criteria for filtered systems specified in s. NR 109.77 (1) by June 29, 1993. Public water systems that use a ground water source under the direct influence of surface water shall provide filtration which complies with the specifications of sub. (1), (2), (3), (4) or (5) and meets the disinfection criteria for filtered systems specified in s. NR 109.77 by June 29, 1993 or within 18 months of the date that a source is determined to be under the direct influence of surface water, whichever is later.

(1) CONVENTIONAL FILTRATION TREATMENT. (a) For systems using conventional filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month, measured as specified in s. NR 109.725, Table E. The department may approve a turbidity limit up to 1 NTU if the water supplier provides the department with documentation which reliably indicates the system achieves at least 99.9% removal or inactivation of *Giardia lamblia* cysts at a turbidity level above 0.5 NTU at least 95% of the time that the system delivers water to the public.

(b) The turbidity level of representative samples of a system's filtered water may not exceed 5 NTU, measured as specified in s. NR 109.725, Table E.

(2) DIRECT FILTRATION. (a) For systems using direct filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month, measured as specified in s. NR 109.725, Table E. The department may approve a turbidity limit up to 1 NTU if the water supplier provides the department with documentation which reliably indicates the system achieves at least 99.9% removal or inactivation of *Giardia lamblia* cysts at a turbidity level above 0.5 NTU at least 95% of the time that the system delivers water to the public.

(b) The turbidity level of representative samples of a system's filtered water may not exceed 5 NTU, measured as specified in s. NR 109.725, Table E.

(3) SLOW SAND FILTRATION. (a) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 1 NTU in at least 95% of the measurements taken each month, measured as specified in s. NR 109.725, Table E.

(b) The turbidity level of representative samples of a system's filtered water may not exceed 5 NTU, measured as specified in s. NR 109.725, Table E.

(4) DIATOMACEOUS EARTH FILTRATION. (a) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water shall be less than or equal to 1 NTU in at least 95% of the measurements taken each month, measured as specified in s. NR 109.725, Table E.

(b) The turbidity level of representative samples of a system's filtered water may not exceed 5 NTU, measured as specified in s. NR 109.725, Table E.

(5) OTHER FILTRATION TECHNOLOGIES. A public water system supplier may use a filtration technology not listed in subs. (1) to (4) if the supplier demonstrates to the department, using pilot studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of s. NR 109.78, consistently achieves 99.9% removal or inactivation of *Giardia lamblia* cysts and 99.99% removal or inactivation of viruses. For a system that makes this demonstration, the requirements of sub. (3) apply.

NR 109.77 DISINFECTION REQUIREMENTS. A system which uses ground water under the direct influence of surface water and does not provide filtration treatment shall provide disinfection treatment specified in sub. (1) on or after December 31, 1991, or 18 months after the department determines that the ground water source is under the influence of surface water, whichever is later. A system which filters and uses surface water or ground water under the direct influence of surface water as a source, shall provide the disinfection treatment specified in sub. (2) on or after June 29, 1993, or when filtration is installed, whichever is later. Failure to meet any requirement of this section after June 29, 1993 is a treatment technique violation.

(1) DISINFECTION REQUIREMENTS FOR PUBLIC WATER SYSTEMS THAT DO NOT PROVIDE FILTRATION. (a) The disinfection treatment shall be sufficient to ensure at least 99.9% (3 log) inactivation of *Giardia lamblia* cysts and 99.99% (4 log) inactivation of viruses, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the water supplier shall calculate the CT value from the system's treatment parameters using the procedure specified in s. NR 109.78 (2), and determine whether this value is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. Systems using a disinfectant other than

chlorine shall demonstrate to the department through on-site challenge studies or other information that the system is achieving required minimum inactivation rates.

(b) The disinfection system shall have either redundant components, including and auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or automatic shut-off of water delivery to the distribution system whenever there is less than 0.2 mg/l of residual disinfectant concentration in the water. If the department determines that automatic shut-off of delivery of water to the distribution system would cause an unreasonable risk to health or property, the system shall have redundant components.

(c) The residual disinfectant concentration in the water entering the distribution system, measured as specified in s. NR 109.725, Table E, may not be less than 0.2 mg/l for more than 4 hours.

(d) 1. The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in s. NR 109.725 Table E, may not be undetectable in more than 5% of the samples each month, for any 2 consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in s. NR 109.725, Table C, is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5% in one month for any 2 consecutive months.

$$V = c+d+e/a+b \quad x \quad 100$$

where:
a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where no residual disinfectant concentration is detected and where the HPC is > 500/ml; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is > 500/ml.

2. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions required in s. NR 109.725, Table C, and that the system is

providing adequate disinfection in the distribution system, the requirements of subd. 1. do not apply.

(2) DISINFECTION REQUIREMENTS FOR PUBLIC WATER SYSTEMS WHICH PROVIDE FILTRATION. Each public water system that provides filtration treatment shall provide disinfection treatment as follows:

(a) Disinfection treatment shall be sufficient to ensure that the total treatment processes of that system achieve at least 99.9% (3 log) inactivation or removal of *Giardia lamblia* cysts and at least 99.99% (4 log) inactivation or removal of viruses, as determined by the department.

(b) The residual disinfectant concentration in the water entering the distribution system, measured as specified in s. NR 109.725, Table E, may not be less than 0.2 mg/l for more than 4 hours.

(c) 1. The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine or chlorine dioxide, as specified in s. NR 109.725, Table E, may not be undetectable in more than 5% of the samples each month, for any 2 consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in s. NR 109.725, Table C, is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula may not exceed 5% in one month, for any 2 consecutive months.

$$V = c+d+e/a+b \quad x \quad 100$$

where:
a = number of instances where the residual disinfectant concentration is measured;

b = number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c = number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d = number of instances where no residual disinfectant concentration is detected and where the HPC is > 500/ml; and

e = number of instances where the residual disinfectant concentration is not measured and HPC is > 500/ml.

2. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions required in s. NR 109.725, Table C, and that the system is providing adequate disinfection in the distribution system, the requirements of subd. 1. do not apply.

(3) The department may require continuous disinfection of public water systems using ground water not under the direct influence of surface water if it determines that an existing or potential public health threat to the water system warrants such a requirement. Additional treatment including disinfectant contact time may be required by the department on a case-by-case basis.

(a) The following conditions, as well as other conditions, are considered by the department to be existing or potential water system public health threats:

1. A public water system history of microbiological contamination in the water source or distribution system by either coliform or noncoliform bacteria.

2. The presence of color in raw water from a well serving a public system.

3. Inadequate construction, i.e. construction which does not meet current requirements of ch. NR 111 or 112, of a well which serves a public water system.

(b) Disinfectant treatment required under this section shall meet the requirements of sub. (1).

NR 109.78 MONITORING REQUIREMENTS. (1) MONITORING REQUIREMENTS FOR GROUND WATER SYSTEMS UNDER THE DIRECT INFLUENCE OF SURFACE WATER THAT DO NOT PROVIDE FILTRATION. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall begin monitoring as specified in sub. (2) December 31, 1990, or 6 months after the department determines that the ground water source is under the direct influence of surface water, whichever is later.

(a) Fecal coliform or total coliform density measurements as required by s. NR 109.755(1)(a) shall be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system owner or operator shall sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public:

System Size (persons served)	Samples/week[1]
< or = 500	1
501 to 3,330	2
3,301 to 10,000	3
10,001 to 25,000	4
> 25,000	5

[1] Shall be taken on separate days

In addition, one fecal or total coliform density measurement shall be performed every day the system serves water to the public and the turbidity of

the source water exceeds 1 NTU (these samples count toward the weekly coliform sampling requirement).

(b) Turbidity measurements as required by s. NR 109.755(1)(b) shall be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every 4 hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the department.

(c) The total inactivation ratio for each day that the system is in operation shall be determined based on the $CT_{99.9}$ values in Tables 1 to 8 of subd. 6., as appropriate. The parameters necessary to determine the total inactivation ratio shall be monitored as follows:

1. Temperature of the disinfected water shall be measured at least once per day at each residual disinfectant concentration sampling point.

2. If the system uses chlorine, the pH of the disinfected water shall be measured at least once per day at each chlorine residual disinfectant concentration sampling point.

3. The disinfectant contact time ("T") shall be determined for each day during peak hourly flow.

4. The residual disinfectant concentration ("C") of the water before or at the first customer shall be measured each day during peak hourly flow.

5. If a system uses a disinfectant other than chlorine, the system may demonstrate to the department, through the use of a department approved protocol for on-site disinfection challenge studies or other information satisfactory to the department, that $CT_{99.9}$ values other than those specified in tables 7 and 8, and other operational parameters, are adequate to demonstrate that the system is achieving the minimum inactivation rates specified in s. NR 109.77(1)(a).

6. CT Tables.

Table 1 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 0.5 ^{0}C or Lower[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	137	163	195	237	277	329	390
0.6	141	168	200	239	286	342	407
0.8	145	172	205	246	295	354	422
1.0	148	176	210	253	304	365	437
1.2	152	180	215	259	313	376	451
1.4	155	184	221	266	321	387	464
1.6	157	189	226	273	329	397	477
1.8	162	193	231	279	338	407	489
2.0	165	197	236	286	346	417	500
2.2	169	201	242	297	353	426	511
2.4	172	205	247	298	361	435	522
2.6	175	209	252	304	368	444	533
2.8	178	213	257	310	375	452	543
3.0	181	217	261	316	382	460	552

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 2 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 5.0 ^{0}C[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	97	117	139	166	198	239	279
0.6	100	120	143	171	204	244	291
0.8	103	122	146	175	210	252	301
1.0	105	125	149	179	216	260	312
1.2	107	127	152	183	221	267	320
1.4	109	130	155	187	227	274	329
1.6	111	132	158	192	232	281	337
1.8	114	135	162	196	238	287	345
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 3 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 10.0 ^0C[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	73	88	104	125	149	177	209
0.6	75	90	107	128	153	183	218
0.8	78	92	110	131	158	189	226
1.0	79	94	112	134	162	195	234
1.2	80	95	114	137	166	200	240
1.4	82	98	116	140	170	206	247
1.6	83	99	119	144	174	211	253
1.8	86	101	122	147	179	215	259
2.0	87	104	124	150	182	221	265
2.2	89	105	127	153	186	225	271
2.4	90	107	129	157	190	230	276
2.6	92	110	131	160	194	234	281
2.8	93	111	134	163	197	239	287
3.0	95	113	137	166	201	243	292

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 4 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 15.0 ^0C[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	63	75	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 5 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 20 ^0C[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	36	44	52	62	74	89	105
0.6	38	45	54	64	77	92	109
0.8	39	46	55	66	79	95	113
1.0	39	47	56	67	81	98	117
1.2	40	48	57	69	83	100	120
1.4	41	49	58	70	85	103	123
1.6	42	50	59	72	87	105	126
1.8	43	51	61	74	89	108	129
2.0	44	52	62	75	91	110	132
2.2	44	53	63	77	93	113	135
2.4	45	54	65	78	95	115	138
2.6	46	55	66	80	97	117	141
2.8	47	56	67	81	99	119	143
3.0	47	57	68	83	101	122	146

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 6 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Free Chlorine at 25 ^0C or Higher[1]

RESIDUAL (mg/l)	pH						
	<=6.0	6.5	7.0	7.5	8.0	8.5	<=9.0
< or = 0.4	24	29	35	42	50	59	70
0.6	25	30	36	43	51	61	73
0.8	26	31	37	44	53	63	75
1.0	26	31	37	45	54	65	78
1.2	27	32	38	46	55	67	80
1.4	27	33	39	47	57	69	82
1.6	28	33	40	48	58	70	84
1.8	29	34	41	49	60	72	86
2.0	29	35	41	50	61	74	88
2.2	30	35	42	51	62	75	90
2.4	30	36	43	52	63	77	92
2.6	31	37	44	53	65	78	94
2.8	31	37	45	54	66	80	96
3.0	32	38	46	55	67	81	97

[1] These CT values achieve greater than a 99.99 percent inactivation of viruses. CT values between the indicated pH values may be determined by linear interpolation. CT values between the indicated temperatures of different tables may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature and at the higher pH.

Table 7 - Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Chlorine Dioxide and Ozone[1]

DISINFECTANT	TEMPERATURE					
	<= 1 °C	5 °C	10 °C	15 °C	20 °C	>=25 °C
Chlorine Dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

[1] These CT values achieve greater than 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

Table 8 - CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of *Giardia Lamblia* Cysts by Chloramines[1]

TEMPERATURE					
< 1 °C	5 °C	10 °C	15 °C	20 °C	25 °C
3,800	2,200	1,850	1,500	1,100	750

[1] These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99 percent inactivation of viruses only if chlorine is added and mixed in the water prior to the addition of ammonia. If this condition is not met, the system shall demonstrate, based on site studies or other information, as approved by the department, that the system is achieving at least 99.99 percent inactivation of viruses. CT values between the indicated temperatures may be determined by linear interpolation. If no interpolation is used, use the $CT_{99.9}$ value at the lower temperature for determining $CT_{99.9}$ values between indicated temperatures.

(d) The total inactivation ratio shall be calculated as follows:

1. If the system uses only one point of disinfectant application, the system owner or operator may determine the total inactivation ratio based on either of the following 2 methods:

a. One inactivation ratio ($CTcalc/CT_{99.9}$) is determined before or at the first customer during peak hourly flow and if the $CTcalc/CT_{99.9}$ is greater than or equal to 1.0, the 99.9% *Giardia lamblia* inactivation requirement has been achieved; or

b. Successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, are determined between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the following method shall be used to calculate the total inactivation ratio:

1) Determine $CTcalc/CT_{99.9}$ for each sequence,

2) Add the $CTcalc/CT_{99.9}$ values together ($(CTcalc)/CT_{99.9}$)

3) If $(CTcalc/CT_{99.9}) > \text{or} = 1.0$, the 99.9% *Giardia lamblia* inactivation requirement has been achieved.

2. If the system uses more than one point of disinfectant application before or at the first customer, the system owner or operator shall determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak flow. The $CTcalc/CT_{99.9}$ value of each sequence and

$$CTcalc/CT_{99.9}$$

shall be calculated using the method in subd. 1.b. to determine if the system is in compliance with s. NR 109.77.

3. Although not required, the total percent inactivation for a system with one or more points of residual disinfectant concentration monitoring may be calculated by solving the following equation:

Percent inactivation = $100 - (100/10^z)$, where

$z = 3 \times$ summation of $(CTcalc/CT_{99.9})$

(e) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment, and systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the following prescribed frequencies:

System Size by Population	Samples/day[1]
< or = 500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

[1] The day's samples cannot be taken at the same time. The sampling intervals are subject to department review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every 4 hours until the residual concentration is equal to or greater than 0.2 mg/l.

(f) 1. The residual disinfectant concentration shall be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, except that the department may allow a public water system which uses a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in s. NR 109.725, Table C, may be measured in lieu of residual disinfectant concentration, when approved by the department.

2. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by s. NR 109.725, Table C, and that the system is providing adequate disinfection in the distribution system, the requirements of subd. 1. do not apply to that system.

(2) MONITORING REQUIREMENTS FOR SYSTEMS USING FILTRATION TREATMENT. A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment shall monitor in accordance with this section on or after June 29, 1993 or when filtration is installed whichever is later.

(a) Turbidity measurements as specified in s. NR 109.76 shall be performed on representative samples of the system's filtered water every 4 hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the department. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration or diatomaceous earth filtration, the department may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the department may reduce the turbidity sampling frequency to once per day, regardless of the

type of filtration treatment used, if the department determines that less frequent monitoring is sufficient to indicate effective filtration performance.

(b) The residual disinfectant concentration of the water entering the distribution system shall be monitored continuously, and the lowest value shall be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every 4 hours may be conducted in lieu of continuous monitoring, but for no more than 5 working days following the failure of the equipment. Systems serving 3,300 or fewer persons may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed as follows:

System Size by Population	Samples/day[1]
< or = 500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

[1] The day's samples cannot be taken at the same time. The sampling intervals are subject to department review and approval.

If at any time the residual disinfectant concentration falls below 0.2 mg/l in a system using grab sampling in lieu of continuous monitoring, the system shall take a grab sample every 4 hours until the residual disinfectant concentration is equal to or greater than 0.2 mg/l.

(c) 1. The residual disinfectant concentration shall be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled. The department may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source to take disinfectant residual samples at points other than the total coliform sampling points if the department determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in s. NR 109.725, Table C, may be measured in lieu of residual disinfectant concentration, when approved by the department.

2. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in s. NR 109.725, Table C, and that the system is providing adequate disinfection in the distribution system, the requirements of subd. 1. do not apply to that system.

SECTION 33. NR 109.80(2) is amended to read:

NR 109.80(2) ~~The~~ Except where some other period is specified in this chapter, the supplier of water shall report to the department within 48 hours

the failure to comply with any maximum contaminant level or monitoring requirement set forth in this chapter.

SECTION 34. NR 109.80(5) is renumbered NR 109.80(8)

SECTION 35. NR 109.80(5), (6) and (7) are created to read:

NR 109.80(5) A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment shall report monthly to the department the information specified in this subsection on or after December 31, 1990, or 6 months after the department has determined that filtration is required in writing.

(a) Source water quality information shall be reported to the department within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

1. The cumulative number of months for which results are reported.

2. The number of fecal or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliforms shall be reported), the dates of sample collection, and the dates when the turbidity level exceeded 1 NTU.

3. The number of samples during the month that had equal to or less than 20/100 fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed.

4. The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous 6 months the system served water to the public.

5. The cumulative number of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous 6 months the system served water to the public.

6. The percentage of samples that had equal to or less than 20/100 ml fecal coliforms or equal to or less than 100/100 ml total coliforms, whichever are analyzed, during the previous 6 months the system served water to the public.

7. The maximum turbidity level measured during the month, the dates of occurrence for any measurements which exceeded 5 NTU, and the dates the occurrences were reported to the department.

8. For the first 12 months of record keeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after one year of record keeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 12 months the system served water to the public.

9. For the first 120 months of record keeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of record keeping for turbidity measurements, the dates and cumulative number of events during which the turbidity exceeded 5 NTU in the previous 120 months the system served water to the public.

(b) Disinfection information specified in s. NR 109.785(1) shall be reported to the department within 10 days after the end of each month the system serves water to the public. Information that shall be reported includes:

1. For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.

2. The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the department was notified of the occurrence.

3. The daily residual disinfectant concentrations (in mg/l) and disinfectant contact times (in minutes) used for calculating the CT values.

4. If chlorine is used, the daily measurements of pH of disinfected water following each point of chlorine disinfection.

5. The daily measurements of water temperature in °C following each point of disinfection.

6. The daily CTcalc and $CTcalc/CT_{99.9}$ values for each disinfectant measurement or sequence and the sum of all $CTcalc/CT_{99.9}$ values ($\sum (CTcalc/CT_{99.9})$) before or at the first customer.

7. The daily determination of whether disinfection achieves adequate *Giardia* cyst and virus inactivation, i.e., whether $(CTcalc/CT_{99.9})$ is at least 1.0, or where disinfectants other than chlorine are used, other indicator conditions that the department determines are appropriate, are met.

8. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to s. NR 109.77:

a. Number of instances where the residual disinfectant concentration is measured;

b. Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c. Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d. Number of instances where no residual disinfectant concentration is detected and where HPC is > 500/ml;

e. Number of instances where the residual disinfectant concentration is not measured and HPC is > 500/ml;

f. For the current and previous month the system serves water to the public, the value of "V" in the following formula:

$$V = c+d+e/a+b \times 100$$

where:

a = the value in subpar. a.
b = the value in subpar. b.
c = the value in subpar. c.
d = the value in subpar. d.
e = the value in subpar. e.

g. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions specified by s. NR 109.78 and that the system is providing adequate disinfection in the distribution system, the requirements of subpars. a. to f. do not apply.

9. A public water system owner or operator need not report the data listed in subds. 1. to 3. if all data listed in par. (a) remain on file at the system and department determines that:

a. The system owner or operator has submitted to the department all the information required by subds. 1. to 8. for at least 12 months; and

b. The department has determined that the system is not required to provide filtration treatment.

(c) No later than 10 days after the end of each federal fiscal year (September 30), each water supplier shall provide a report which summarizes their water system compliance with all well head protection program requirements specified in s. NR 109.755(2)(b).

(d) No later than 10 days after the end of each federal fiscal year (September 30), each water supplier shall provide to the department a report of the on-site inspection conducted during that year pursuant to s. NR 109.755(2)(c), unless the on-site inspection was conducted by the department. If the inspection was conducted by the department, the department shall provide a copy of its report to the public water system.

(e) 1. Each water supplier, upon discovering that a waterborne disease outbreak potentially attributable to their water system has occurred, shall

report that occurrence to the department as soon as possible, but no later than by the end of the next business day.

2. If at any time the turbidity exceeds 5 NTU, the water supplier shall inform the department as soon as possible, but no later than the end of the next business day.

3. If at any time the disinfectant residual falls below 0.2 mg/l in the water entering the distribution system, the water supplier shall notify the department as soon as possible, but no later than by the end of the next business day. The water supplier also shall notify the department by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

(6) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment shall report monthly to the department the information specified in this subsection on or after June 29, 1993, or when filtration is installed, whichever is later.

(a) Turbidity measurements as required by s. NR 109.785(2)(a) shall be reported within 10 days after the end of the each month the system serves water to the public. Information that shall be reported includes:

1. The total number of filtered water turbidity measurements taken during the month.

2. The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in s. NR 109.78 for the filtration technology being used.

3. The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

(b) Disinfection information specified in s. NR 109.76 shall be reported to the department. Information that shall be reported includes:

1. For each day, the lowest measurement of residual disinfectant concentration in mg/l in water entering the distribution system.

2. The date and duration of each period when the residual disinfectant concentration in water entering the distribution system fell below 0.2 mg/l and when the department was notified of the occurrence.

3. The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to s. NR 109.770:

a. Number of instances where the residual disinfectant concentration is measured;

b. Number of instances where the residual disinfectant concentration is not measured but heterotrophic bacteria plate count (HPC) is measured;

c. Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

d. Number of instances where no residual disinfectant concentration is detected and where HPC is > 500/ml;

e. Number of instances where the residual disinfectant concentration is not measured and HPC is > 500/ml;

f. For the current and previous month the system serves water to the public, the value of "V" in the following formula:

$$V = c+d+e/a+b \times 100$$

where:

a = the value in subpar. a.
b = the value in subpar. b.
c = the value in subpar. c.
d = the value in subpar. d.
e = the value in subpar. e.

g. If the department determines, based on site specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions specified by s. NR 109.78 and that the system is providing adequate disinfection in the distribution system, the requirements of subpars. a. to f. do not apply.

4. A water supplier need not report the data listed in subd. 1. if all data listed in par. (b) remain on file at the system and the department determines that the water supplier has submitted all the information required by par. (b) for at least 12 months.

(c) 1. If at any time the turbidity exceeds 5 NTU, the water supplier shall inform the department as soon as possible, but no later than the end of the next business day.

2. If at any time the disinfectant residual falls below 0.2 mg/l in the water entering the distribution system, the water supplier shall notify the department as soon as possible, but no later than the end of the next business day. The water supplier also shall notify the department by the end of the next business day whether or not the residual was restored to at least 0.2 mg/l within 4 hours.

(7) Each water supplier, upon discovering that a waterborne disease outbreak potentially attributable to their water system has occurred, shall report that occurrence to the department as soon as possible, but no later than by the end of the next business day.

SECTION 36. NR 109.81(1)(a)3.(intro.) is amended to read:

NR 109.81(1)(a)3.(intro.) For violation of the MCLs of contaminants that may pose an acute risk to human health, by furnishing a copy of the notice to the radio and television stations serving the area served by the community water system or by hand delivery to each customer as soon as possible but in no case later than 72 hours after the violation. The following violations are acute violations:

SECTION 37. NR 109.81(2)(intro.) is amended to read:

NR 109.81(2) Other violations, variances, conditional waivers. The owner or operator of a public water system which fails to perform monitoring required by this chapter, fails to comply with a testing procedure established by this chapter, is subject to a variance granted under Part ~~V~~ VI of this chapter or is subject to a conditional waiver under Part ~~V~~ VI of this chapter shall notify persons served by the system as follows:

SECTION 38. NR 109.81(5)(j) to (l) are created to read:

NR 109.81(5)(j) TOTAL COLIFORMS (To be used when there is a violation of NR 109.30 (1) and not a violation of NR 109.30 (2)). The United States environmental protection agency (EPA) sets drinking water standards and has determined that the presence of total coliforms is a possible health concern. Total coliforms are common in the environment and are generally not harmful themselves. The presence of these bacteria in drinking water, however, generally is a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for total coliforms to reduce the risk of these adverse health effects. Under this standard, no more than 5.0% of the samples collected during any month can contain these bacteria, except that systems collecting fewer than 40 samples/month that have one total coliform-positive sample per month are not violating the standard. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe.

(k) FECAL COLIFORMS/E. COLI (To be used when there is a violation of NR 109.30 (2) or both NR 109.30 (1) and (2)). The United States environmental protection agency (EPA) sets drinking water standards and has determined that the presence of fecal coliforms and E. coli is a serious health concern. Fecal coliforms and E. coli are generally not harmful themselves, but their presence in drinking water is serious because they usually are associated with

sewage or animal wastes. The presence of these bacteria is generally a result of a problem with water treatment or the pipes which distribute the water, and indicates that the water may be contaminated with organisms that can cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease-causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set an enforceable drinking water standard for fecal coliforms and E. coli to reduce the risk of these adverse health effects. Under this standard, all drinking water shall be free of these bacteria. Drinking water which meets this standard is usually not associated with a health risk from disease-causing bacteria and should be considered safe. State and local health authorities recommend that consumers take the following precautions: (To be inserted by the public water system owner or operator, according to instructions from the department)

(1) MICROBIOLOGICAL CONTAMINANTS (for use when there is a violation of the treatment technique requirements for filtration and disinfection in Part IV of this chapter). The United States environmental protection agency (EPA) sets drinking water standards and has determined that the presence of microbiological contaminants are a health concern at certain levels of exposure. If water is inadequately treated, microbiological contaminants in that water may cause disease. Disease symptoms may include diarrhea, cramps, nausea, and possibly jaundice, and any associated headaches and fatigue. These symptoms, however, are not just associated with disease causing organisms in drinking water, but also may be caused by a number of factors other than your drinking water. EPA has set enforceable requirements for treating drinking water to reduce the risk of these adverse health effects. Treatment such as filtering and disinfecting the water removes or destroys microbiological contaminants. Drinking water which is treated to meet EPA requirements is associated with little to none of this risk and should be considered safe.

The foregoing rules were approved and adopted by the State of Wisconsin Natural Resources Board on September 27, 1990.

The rules shall take effect the first day of the month following publication in the Wisconsin administrative register as provided in s. 227.22(2)(intro.), Stats.

Dated at Madison, Wisconsin November 12, 1990

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

By Carroll D Besadny
Carroll D. Besadny, Secretary

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Carroll D. Besadny, Secretary
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Madison, Wisconsin 53707
TELEFAX NO. 608-267-3579
TDD NO. 608-267-6897

November 12, 1990

Mr. Gary L. Poulson
Assistant Revisor of Statutes
119 Martin Luther King, Jr., Blvd.

Dear Mr. Poulson:

Enclosed are two copies, including one certified copy, of State of Wisconsin Natural Resources Board Order No. WS-20-90. These rules were reviewed by the Assembly Committee on Natural Resources and the Senate Committee on Urban Affairs, Environmental Resources, Utilities and Elections pursuant to s. 227.19, Stats. Summaries of the final regulatory flexibility analysis and comments of the legislative review committees are also enclosed.

You will note that this order takes effect following publication. Kindly publish it in the Administrative Code accordingly.

Sincerely,

C. D. Besadny
Secretary

Enc.