

TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 2 PUBLIC WATER SUPPLY SYSTEMS

SECTION 002 DRINKING WATER STANDARDS AND TREATMENT TECHNIQUES

2-002.01 SCOPE AND AUTHORITY: These regulations establish drinking water standards, treatment techniques, best available technologies (BATs) and compliance technologies for public water systems. The authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

2-002.02 DEFINITIONS

Best Available Technology or BAT means the best technology, treatment techniques, or other means which the U.S. Environmental Protection Agency finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration). For the purposes of setting MCLs for synthetic organic chemicals, any BAT must be at least as effective as granular activated carbon.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with Title 179 NAC 24 (upon its effective date) MCLs under 179 NAC 2-002.04E2a(1) is 120 days.

GAC20 means granular activated carbon filter beds with an empty-bed contact time of 20 minutes based on average daily flow and a carbon reactivation frequency of every 240 days.

Maximum Contaminant Level (MCL) means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

2-002.03 DRINKING WATER STANDARDS AND TREATMENT TECHNIQUES: The basis for the establishment of maximum contaminant levels is based either upon potential acute health effects over a short length of time of exposure or chronic health effects over a long length of time of exposure.

2-002.03A Standards Based upon Acute Health Effects: Standards based upon acute health effects over a short length of time of exposure shall apply to all public water systems. Contaminants governed by these standards are:

1. Nitrates;
2. Turbidity;
3. Microbiological; and
4. Chlorine dioxide

2-002.03B Standards Based upon Chronic Health Effects: Standards based upon chronic health effects over a long length of time of exposure apply to community and/or non-transient, non-community water systems as specified in Title 179. Contaminants governed by these standards are:

1. Inorganic chemicals except for nitrate;
2. Organic chemicals; and
3. Radioactive contaminants.

2-002.04 Maximum Contaminant Levels

2-002.04A Maximum Contaminant Levels for Inorganic Chemicals: All the following maximum contaminant levels (MCLs) for inorganic chemical contaminants apply to community water systems. All the following maximum contaminant levels for inorganic chemicals, except the MCL for fluoride, apply to non-transient, non-community water systems. Only the maximum contaminant levels for nitrate, nitrite, and total nitrate and nitrite apply to transient, non-community systems.

<u>CONTAMINANT</u>	<u>MCL (mg/L)</u>
(1) Antimony	0.006
(2) Asbestos (fibers >10 µm)	7 million fibers/Liter
(3) Arsenic	0.010
(4) Barium	2
(5) Beryllium	0.004
(6) Cadmium	0.005
(7) Chromium total	0.10
(8) Cyanide (as free cyanide)	0.2
(9) Fluoride*	4.0
(10) Mercury	0.002
(11) Nickel	0.1
(12) Nitrate (as Nitrogen)	10
(13) Nitrite (as Nitrogen)	1
(14) Total Nitrate and Nitrite (as Nitrogen)	10
(15) Selenium	0.05
(16) Sodium	500.0
(17) Thallium	0.002

*Community water systems experiencing fluoride levels above 2.0 milligrams per liter must notify the public as required in 179 NAC 4-010.

2-002.04A1 At the discretion of the Director, nitrate levels not to exceed 20 mg/L may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the Director that:

2-002.04A1a Such water will not be available to children under six months of age, pregnant women, or mothers nursing children under six months of age; and

2-002.04A1b The non-community water system is meeting the public notification requirements under 179 NAC 4-011, including continuous posting of the fact that nitrate levels exceed 10 mg/L and the potential health effects of exposure; and

2-002.04A1c Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/L; and

2-002.04A1d No adverse health effects shall result.

2-002.04B Maximum Contaminant Levels for Synthetic Organic Chemicals: The following maximum contaminant levels for organic chemical contaminants apply to community and non-transient, non-community water systems.

2-002.04B1 Volatile Organic Chemicals (VOCs):

<u>CONTAMINANT</u>	<u>MCL (mg/L)</u>
(1) Vinyl chloride	0.002
(2) Benzene	0.005
(3) Carbon tetrachloride	0.005
(4) 1,2-Dichloroethane	0.005
(5) Trichloroethylene	0.005
(6) para-Dichlorobenzene	0.075
(7) 1,1-Dichloroethylene	0.007
(8) 1,1,1-Trichloroethane	0.2
(9) cis-1,2-Dichloroethylene	0.07
(10) 1,2-Dichloropropane	0.005
(11) Ethylbenzene	0.7
(12) Monochlorobenzene	0.1
(13) o-Dichlorobenzene	0.6
(14) Styrene	0.1
(15) Tetrachloroethylene	0.005
(16) Toluene	1
(17) trans-1,2-Dichloroethylene	0.1
(18) Xylenes (total)	10
(19) Dichloromethane	0.005
(20) 1,2,4-Trichlorobenzene	0.07
(21) 1,1,2-Trichloroethane	0.005

2-002.04B2 Non-Volatile Synthetic Organic Chemicals

<u>CONTAMINANT</u>	<u>MCL (mg/L)</u>
(1) Alachlor	0.002
(2) reserved	
(3) reserved	
(4) reserved	
(5) Atrazine	0.003
(6) Carbofuran	0.04
(7) Chlordane	0.002
(8) Dibromochloropropane	0.0002
(9) 2,4-D	0.07
(10) Ethylene dibromide	0.00005
(11) Heptachlor	0.0004
(12) Heptachlor epoxide	0.0002
(13) Lindane	0.0002
(14) Methoxychlor	0.04
(15) Polychlorinated biphenyls	0.0005
(16) Pentachlorophenol	0.001
(17) Toxaphene	0.003
(18) 2,4,5-TP	0.05
(19) Benzo[a]pyrene	0.0002
(20) Dalapon	0.2
(21) Di(2-ethylhexyl)adipate	0.4
(22) Di(2-ethylhexyl)phthalate	0.006
(23) Dinoseb	0.007
(24) Diquat	0.02
(25) Endothall	0.1
(26) Endrin	0.002
(27) Glyphosate	0.7
(28) Hexachlorobenzene	0.001
(29) Hexachlorocyclopentadiene	0.05
(30) Oxamyl (Vydate)	0.2
(31) Picloram	0.5
(32) Simazine	0.004
(33) 2,3,7,8-TCDD (Dioxin)	3 x 10 ⁻⁸

2-002.04C Microbiological: The maximum contaminant levels for coliform bacteria, applicable to all public water systems, are as follows:

2-002.04C1 The ~~Until March 31, 2016, the total coliform~~ MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

2-002.04C1a 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.

2-002.04C1b For a system which collects fewer than 40 samples per month, if no more than one sample collected during a month is total coliform-positive, the system is in compliance with the MCL for total coliforms.

2-002.04C1c Results of all routine samples and repeat samples (when required by 179 NAC 3-004.02) which are not invalidated must be included in determining compliance with 179 NAC 2-002.04C1a and 2-002.04C1b.

2-002.04C2 Until March 31, 2016 ~~Any 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 179 NAC 4 this is a violation that may pose an acute risk to health.

2-002.04C3 Compliance with the MCL for total coliforms in 179 NAC 2-002.04C1 and 2-002.04C2 will be determined each month for systems which are required to monitor monthly for total coliforms, and each quarter for systems which are required to monitor once per quarter for total coliforms.

2-002.04C4 Beginning April 1, 2016, a system is in compliance with the MCL for *E. coli* for samples taken under the provisions of 179 NAC 26 unless any of the conditions identified in 179 NAC 2-002.04C4 items 1 through 4 occur. For purposes of the public notification requirements in 179 NAC 4, violation of the MCL may pose an acute risk to health.

1. The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.
2. The system has a total coliform-positive repeat sample following an *E. coli*-positive repeat sample.
3. The system fails to take all required repeat samples following an *E. coli*-positive routine sample.
4. The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.

2-002.04C5 Until March 31, 2016, a public water system must determine compliance with the MCL for total coliforms in 179 NAC 2-002.04C1 and 2-002.04C2 for each month in which it is required to monitor for total coliforms. Beginning April 1, 2016, a public water system must determine compliance with the MCL for *E. coli* in 179 NAC 2-002.04C4 for each month in which it is required to monitor for total coliforms.

2-002.04C6 The Department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in 179 NAC 2-002.04C1 and 2-002.04C2 and for achieving compliance with the maximum contaminant level for *E. coli* in 179 NAC 2-002.04C4.

1. Protection of wells from fecal contamination by appropriate placement and construction;
2. Maintenance of a disinfectant residual throughout the distribution system;
3. 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, cross connection control, and continual maintenance of positive water pressure in all parts of the distribution system;
4. Filtration and/or disinfection of surface water, as described in 179 NAC 13, 17, 19, and 25, or disinfection of ground water, as described in 179 NAC 24, using strong oxidants such as chlorine, chlorine dioxide, or ozone; and
5. For systems using ground water, compliance with the requirements of an EPA-approved state wellhead protection program.

2-002.04C7 The Director identifies the technology, treatment techniques, or other means available identified in 179 NAC 2-002.04C6 as affordable technology, treatment techniques, or other means available to systems serving 10,000 or fewer people for achieving compliance with the maximum contaminant level for total coliforms in 179 NAC 2-002.04C1 and 2-002.04C2 and for achieving compliance with the maximum contaminant level for *E. coli* in 179 NAC 2-002.04C4.

2-002.04D Maximum contaminant levels for radionuclides

2-002.04D1 MCL for combined radium-226 and -228: The MCL for combined radium-226 and radium-228 is 5 pCi per liter. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

2-002.04D2 MCL for gross alpha particle activity (excluding radon and uranium): The MCL for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi per liter.

2-002.04D3 MCL for Beta Particle and Photon Radioactivity

1. The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose

equivalent to the total body or any internal organ greater than 4 millirem per year (mrem/year).

2. Except for the radionuclides listed in the following table, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of a two liter per day drinking water intake using the 168 hour data listed in "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure", NBS Handbook 69, as amended August 1963, U.S. Department of Commerce, which is incorporated by reference. A copy may be inspected at the Division of Public Health of the Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, 301 Centennial Mall South, Lincoln, NE 68509 or copies are available from the National Technical Information Service, NTIS, ADA-280-282, U.S. Department of Commerce, ~~5285 Port Royal Road, Springfield~~ 5301 Shawnee Road, Alexandria, Virginia, 22164-22312, phone 800-553-6847. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ must not exceed 4 millirem per year.

**AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE A
TOTAL BODY OR ORGAN DOSE OF 4 MILLIREM PER YEAR**

Radionuclide	Critical Organ	pCi per liter
Tritium	Total Body	20,000
Strontium-90	Bone Marrow	8

2-002.04D4 MCL for Uranium: The maximum contaminant level for uranium is 30 µg/L.

2-002.04D5 Compliance Dates for Combined Radium-226 and -228, Gross Alpha Particle Activity, Gross Beta Particle and Photon Radioactivity, and Uranium: Community water systems must comply with the MCLs listed in 179 NAC 2-002.04D1 through 2-002.04D4 beginning December 8, 2003 and compliance will be determined in accordance with the requirements of 179 NAC 3-008.01 and 3-008.02.

2-002.04E Maximum Contaminant Levels for Disinfection Byproducts

2-002.04E1 Bromate and chlorite: The maximum contaminant levels (MCLs) for bromate and chlorite are as follows:

Disinfection Byproduct	MCL (mg/L)
Bromate	0.010
Chlorite	1.0

2-002.04E1a Compliance Dates for Community Water Systems (CWSs) and Non-Transient Non-Community Water Systems (NTNCWSs): Public water systems using surface water or ground water under the direct influence of surface water serving 10,000 or more individuals must comply with 179 NAC 2-002.04E1 beginning January 1, 2002. Public water systems using surface water or ground water under the direct influence of surface water serving fewer than 10,000 individuals and systems using only ground water not under the direct influence of surface water must comply with 179 NAC 2-002.04E1 beginning January 1, 2004.

2-002.04E1b The Department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for bromate and chlorite identified in 179 NAC 2-002.04E1.

BATs FOR BROMATE AND CHLORITE-DBPs

Disinfection Byproduct	Best Available Technology
Bromate	Control of ozone treatment process to reduce production of bromate.
Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

2-002.04E2 TTHMs and HAA5s

2-002.04E2a Running Annual Average (RAA) Compliance for 179 NAC 16

2-002.04E2a(1) Compliance Dates: All systems must comply with these MCLs until the date specified for 179 NAC 24 (~~upon its effective date~~) compliance in 179 NAC 24-003.01.

Disinfection byproduct	MCL (mg/L)
Total trihalomethanes (TTHMs)	0.080
Haloacetic acids (five) (HAA5)	0.060

2-002.04E2a(2) The Department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHMs and HAA5s identified in 2-002.04E2a(1).

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHMs) and Haloacetic acids (five) (HAA5s)	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant

2-002.04E2b LRAA Compliance for 179 NAC 24 (~~upon its effective date~~)

2-002.04E2b(1) Compliance Dates: The 179 NAC 24 MCLs for TTHMs and HAA5 must be complied with as a locational running annual average at each monitoring location beginning the date specified for compliance in 179 NAC 24-003.01.

Disinfection byproduct	MCL (mg/L)
Total trihalomethanes (TTHMs)	0.080
Haloacetic acids (five) (HAA5)	0.060

2-002.04E2b(2) The Department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHMs and HAA5 identified in 179 NAC 2-002.04E2b for all systems that disinfect their source water:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHMs) and Haloacetic acids (five) (HAA5s)	Enhanced coagulation or enhanced softening plus GAC10, or nanofiltration with a molecular weight cutoff ≤ 1000 Daltons; or GAC20

2-002.04E2b(3) The Department identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHMs and HAA5s identified in 179 NAC 2-002.04E2b for consecutive systems and applies only to disinfected water that consecutive systems buy or otherwise receive:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHMs) and Haloacetic acids (five) (HAA5s)	Systems serving $\geq 10,000$: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance Systems serving $< 10,000$: Improved distribution system and storage tank management to reduce residence time

2-002.04F Maximum Residual Disinfectant Levels

2-002.04F1 Maximum residual disinfectant levels (with compliance determined in accordance with 179 NAC 16-006) are as follows:

MRDLs

DISINFECTANT RESIDUAL	MRDL (MG/L)
Chlorine	4.0 (as Cl ₂).
Chloramines	4.0 (as Cl ₂).
Chlorine dioxide	0.8 (as ClO ₂).

2-002.04F2 Compliance dates

2-002.04F2a CWSs and NTNCWSs: Surface water systems and ground water systems under the direct influence of surface water serving 10,000 or more individuals must comply with 179 NAC 2-002.04F beginning January 1, 2002. Surface water systems and ground water systems serving fewer than 10,000 individuals and systems using only ground water not under the direct influence of surface water must comply with these maximum residual disinfectant levels beginning January 1, 2004.

2-002.04F2b Transient NCWSs: Surface water systems and ground water systems under the direct influence of surface water serving 10,000 or more individuals and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Surface water systems and ground water systems serving fewer than 10,000 individuals and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

2-002.04F3 The Department hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in 179 NAC 2-002.04F1: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

2-002.05 Treatment Techniques

2-002.05A The requirements of 179 NAC 2-002.05 establish treatment techniques in lieu of maximum contaminant levels for specified contaminants.

2-002.05B Treatment Techniques for Acrylamide and Epichlorohydrin: Each public water system owner must certify annually in writing to the Director (using third party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows. Certifications can rely on manufacturers or third parties, as approved by the Director.

2-002.05B1 Acrylamide = 0.05% dosed at 1 ppm (or equivalent)

2-002.05B2 Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)

2-002.06 BAT (Best Available Technology): The Director hereby identifies as indicated in the table below granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in 179 NAC 2-002.04B1 and 2-002.04B2.

BAT FOR CONTAMINANTS LISTED IN 179 NAC 2-002.04B1 and 2-002.04B2

CAS NO.	Contaminant	GAC	PTA	OX
15972-60-8	Alachlor	X	--	--
116-06-3	Aldicarb	X	--	--
1646-88-4	Aldicarb sulfone	X	--	--
1646-87-3	Aldicarb sulfoxide	X	--	--
1912-24-9	Atrazine	X	--	--
71-43-2	Benzene	X	X	--
1563-66-2	Carbofuran	X	--	--
56-23-5	Carbon tetrachloride	X	X	--
57-74-9	Chlordane	X	--	--
75-99-0	Dalapon	X	--	--
94-75-7	2,4-D	X	--	--
103-23-1	Di(2-ethylhexyl)adipate	X	X	--
117-81-7	Di(2-ethylhexyl)phthalate	X	--	--
96-12-8	Dibromochloropropane (DBCP)	X	X	--
95-50-1	o-Dichlorobenzene	X	X	--
106-46-7	para-Dichlorobenzene	X	X	--
107-06-2	1,2-Dichloroethane	X	X	--
75-35-4	1,1-Dichloroethylene	X	X	--
156-59-2	cis-1,2-Dichloroethylene	X	X	--
156-60-5	trans-1,2-Dichloroethylene	X	X	--
75-09-2	Dichloromethane	--	X	--

CAS NO.	Contaminant	GAC	PTA	OX
78-87-5	1,2-Dichloropropane	X	X	--
88-85-7	Dinoseb	X	--	--
72-20-8	Endrin	X	--	--
100-41-4	Ethylbenzene	X	X	--
106-93-4	Ethylene Dibromide (EDB)	X	X	--
1071-83-6	Glyphosate	--	--	X
76-44-8	Heptachlor	X	--	--
1024-57-3	Heptachlor epoxide	X	--	--
118-74-1	Hexachlorobenzene	X	--	--
77-47-3	Hexachlorocyclopentadiene	X	X	--
58-89-9	Lindane	X	--	--
72-43-5	Methoxychlor	X	--	--
108-90-7	Monochlorobenzene	X	X	--
23135-22-0	Oxamyl (Vydate)	X	--	--
87-86-5	Pentachlorophenol	X	--	--
1918-02-1	Picloram	X	--	--
1336-36-3	Polychlorinated biphenyls (PCB)	X	--	--
122-34-9	Simazine	X	--	--
100-42-5	Styrene	X	X	--
1746-01-6	2,3,7,8-TCDD (Dioxin)	X	--	--
127-18-4	Tetrachloroethylene	X	X	--
108-88-3	Toluene	X	X	--
8001-35-2	Toxaphene	X	--	--
93-72-1	2,4,5-TP (Silvex)	X	--	--
120-82-1	1,2,4-Trichlorobenzene	X	X	--
71-55-6	1,1,1-Trichloroethane	X	X	--

CAS NO.	Contaminant	GAC	PTA	OX
79-00-5	1,1,2-Trichloroethane	X	X	--
79-01-6	Trichloroethylene	X	X	--
75-01-4	Vinyl chloride	--	X	--
1330-20-7	Xylene	X	X	--

2-002.07 BAT FOR INORGANIC COMPOUNDS LISTED IN 179 NAC 2-002.04A (EXCEPT FLUORIDE)

BATs FOR INORGANIC COMPOUNDS

Chemical Name	BAT(s)
Antimony	2,7
Asbestos	2,3,8
Arsenic ⁴	1,2,5,6,7,9,12 ^{5,6}
Barium	5,6,7,9
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6 ² ,7
Cyanide	5,7,13
Mercury	2 ¹ ,4,6 ¹ ,7 ¹
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,2 ³ ,6,7,9
Thallium	1,5

¹ BAT only if influent Hg concentrations $\leq 10\mu\text{g/L}$.

² BAT for Chromium III only.

³ BAT for Selenium IV only.

⁴BAT for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

⁵To obtain high removals, iron to arsenic ratio must be at least 20:1.

⁶Effective for the purpose of compliance on January 23, 2006.

Key to BATS in Table

1 = Activated Alumina

2 = Coagulation/Filtration (not BAT for systems <500 service connections)

3 = Direct and Diatomite Filtration

4 - Granular Activated Carbon

5 = Ion Exchange

6 = Lime Softening (not BAT for systems <500 service connections)

- 7 = Reverse Osmosis
- 8 = Corrosion Control
- 9 = Electrodialysis
- 10 = Chlorine
- 11 = Ultraviolet
- 12 = Oxidation/Filtration
- 13 = Alkaline Chlorination (pH \geq 8.5)

2-002.08 Best Available Technologies (BATs) for Radionuclides: The Director hereby identifies as indicated in the following table the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

BAT FOR COMBINED RADIUM-226 AND RADIUM-228, URANIUM, GROSS ALPHA PARTICLE ACTIVITY, AND BETA PARTICLE AND PHOTON RADIOACTIVITY

Contaminant	BAT
1. Combined radium-226 and radium-228	Ion exchange, reverse osmosis, lime softening
2. Uranium	Ion exchange, reverse osmosis, lime softening, coagulation/filtration
3. Gross alpha particle activity (excluding radon and uranium)	Reverse osmosis
4. Beta particle and photon radioactivity	Ion exchange, reverse osmosis

2-002.09 Small Systems Compliance Technologies List for Radionuclides

LIST OF SMALL SYSTEMS COMPLIANCE TECHNOLOGIES FOR RADIONUCLIDES AND LIMITATIONS TO USE

Unit Technologies	Limitations (See Footnotes)	Operator Skill Level Required¹	Raw Water Quality Range and Considerations¹
1. Ion exchange (IE)	a	Intermediate	All ground waters
2. Point of use (POU ²) IE	b	Basic	All ground waters
3. Reverse osmosis (RO)	c	Advanced	Surface waters usually require pre-filtration
4. POU ² RO	b	Basic	Surface waters usually require pre-filtration
5. Lime softening	d	Advanced	All waters
6. Green sand filtration	e	Basic	
7. Co-precipitation with barium sulfate	f	Intermediate to Advanced	Ground waters with suitable water quality
8. Electrodialysis/	---	Basic to Intermediate	All ground waters

Unit Technologies	Limitations (See Footnotes)	Operator Skill Level Required ¹	Raw Water Quality Range and Considerations ¹
electrodialysis reversal			
9. Pre-formed hydrous manganese oxide filtration	g	Intermediate	All ground waters
10. Activated alumina	a, h	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency
11. Enhanced coagulation/filtration	i	Advanced	Can treat a wide range of water qualities

¹ National Research Council (NRC), Safe Water from Every Tap: Improving Water Service to Small Communities. National Academy Press. Washington, D.C. 1997.

² A POU, or “point-of-use” technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 Federal Register Notice of Data Availability (NODA) at <http://www.epa.gov/safewater/radws/frnoda.pdf> for more details.

Limitations Footnotes: Technologies for Radionuclides

- a The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.
- b When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.
- c Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR compliance technologies table.
- d The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.
- e Removal efficiencies can vary depending on water quality.
- f This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.
- g This technology is most applicable to small systems that already have filtration in place.
- h Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.
- i Assumes modification to a coagulation/filtration process already in place.

2-002.10 Small System Compliance Technologies (SSCTs) for Arsenic: The Director identifies in the following table the affordable technology, treatment technique, or other means available to systems serving 10,000 individuals or fewer for achieving compliance with the maximum contaminant level for arsenic effective for the purpose of compliance as of January 23, 2006:

SMALL SYSTEM COMPLIANCE TECHNOLOGIES (SSCTs)¹ FOR ARSENIC²

Small system compliance technology	Affordable for listed small system
---	---

	categories³
Activated Alumina (centralized)	All size categories
Activated Alumina (Point-of-use) ⁴	All size categories
Coagulation/Filtration ⁵	501-3,300, 3,301-10,000
Coagulation-assisted Microfiltration	501-3,300, 3,301-10,000
Electrodialysis reversal ⁶	501-3,300, 3,301-10,000
Enhanced coagulation/filtration	All size categories
Enhanced lime softening (pH>10.5)	All size categories
Ion Exchange	All size categories
Lime Softening ⁵	501-3,300, 3,301-10,000
Oxidation/Filtration ⁷	All size categories
Reverse Osmosis (centralized) ⁶	501-3,300, 3,301-10,000
Reverse Osmosis (Point-of-Use) ⁴	All size categories

¹ Section 1412(b)(4)(E)(ii) of the federal Safe Drinking Water Act (SDWA) specifies that SSCTs must be affordable and technically feasible for small systems.

²SSCTs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

³The federal SDWA specifies three categories of small systems: (i) those serving 25 or more, but fewer than 501, (ii) those serving more than 500, but fewer than 3,301, and (iii) those serving more than 3,300, but fewer than 10,001.

⁴When POU or POE devices are used for compliance, programs to ensure proper long-term operation, maintenance, and monitoring must be provided by the water system to ensure adequate performance.

⁵Unlikely to be installed solely for arsenic removal. May require pH adjustment to optimal range if high removals are needed.

⁶Technologies to reject a large volume of water—may not be appropriate for areas where water quantity may be an issue.

⁷To obtain high removals, iron to arsenic ratio must be at least 20:1.

2-002.11 Compliance Technologies by System Size Category for Radionuclide Drinking Water Standards

COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDE DRINKING WATER STANDARDS

Contaminant	Compliance technologies¹ for system size categories (population served)		
	25-500	501-3,300	3,300-10,000
Combined radium-226 and radium-228	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7,8,9	1,2,3,4,5,6,7,8,9
Gross alpha particle activity	3,4	3,4	3,4
Beta particle activity and photon activity	1,2,3,4	1,2,3,4	1,2,3,4
Uranium	1,2,4,10,11	1,2,3,4,5,10,11	1,2,3,4,5,10,11

¹ **Note:** Numbers correspond to those technologies found listed in the unit technologies column in the table in 179 NAC 2-002.09.

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 3 MONITORING AND ANALYTICAL REQUIREMENTS

3-001 SCOPE AND AUTHORITY: These regulations govern the monitoring and analytical requirements of public water systems. The statutory authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

3-002 DEFINITIONS

Compliance cycle means the nine-year calendar year cycle during which public water systems must monitor. Each compliance cycle consists of three three-year compliance periods. The first calendar year cycle began January 1, 1993 and ended December 31, 2001; the second began January 1, 2002 and ended December 31, 2010; the third began January 1, 2011 and ends December 31, 2019.

Compliance period means a three-year calendar year period within a compliance cycle. Each compliance cycle has three three-year compliance periods. Within the first compliance cycle, the first compliance period ran from January 1, 1993 to December 31, 1995; the second from January 1, 1996 to December 31, 1998; the third from January 1, 1999 to December 31, 2001.

Department means the Division of Public Health of the Department of Health and Human Services.

Director means the Director of Public Health of the Division of Public Health or his/her authorized representative.

Ground water under the direct influence of surface water means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Department. The Department determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation as described in 179 NAC 13 Attachment 2.

Initial compliance period means the three-year compliance period which ended December 31, 1995 except as follows. For the contaminants listed in 179 NAC 2-002.04A(1), (5), (8), (11), (17); and in 2-002.04B1 (19), (20), (21); and in 2-002.04B2(19) to (33); the initial

compliance period means the three-year compliance period which began January 1, 1993 and ended December 31, 1995 for systems with 150 or more service connections, and means the three-year compliance period which began January 1, 1996 and ended December 31, 1998 for systems having fewer than 150 service connections.

3-003 GENERAL: The owners of public water systems are responsible for accomplishing monitoring requirements as demonstrated by possession of an official copy of laboratory results. The Director will establish schedules for sampling. Samples will be examined at timed intervals and on schedules designed to meet monitoring requirements and maintain a uniform laboratory work load. The owner of each public water system will be informed of this schedule and, if for any reason the schedule is not met, will be responsible for initiating arrangements for an alternate date to effect compliance with established monitoring requirements. The arrangements must be timed to provide the required number of samples within the designated sample period used to determine compliance with these regulations. All sample analyses needed to meet monitoring requirements of 179 NAC 3, unless otherwise stated, must be examined by the Department Laboratory or a laboratory which has entered into an agreement with the Department pursuant to 179 NAC 3-009.

3-004 COLIFORM SAMPLING: [The provisions of 179 NAC 3-004.01 and 3-004.04 are applicable until March 31, 2016. The provisions of 179 NAC 3-004.02, 3-004.03, 3-004.05, 3-004.06, and 3-004.07 are applicable until all required repeat monitoring under 179 NAC 3-004.02 and fecal coliform or *E. coli* testing under 179 NAC 3-004.05 that was initiated by a total coliform-positive sample taken before April 1, 2016 is completed, as well as analytical method, reporting, recordkeeping, public notification, and consumer confidence report requirements associated with that monitoring and testing. Beginning April 1, 2016, the provisions of 179 NAC 26 are applicable, with systems required to begin regular monitoring at the same frequency as the system-specific frequency required on March 31, 2016.](#)

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3-004.01 Routine Monitoring

3-004.01A The owners of public water systems must collect total coliform samples at sites which are representative of water throughout the distribution systems according to a written sample site plan. These plans are subject to review and revision by the Director. All biological samples must be mailed to the assigned laboratory through the U.S. Postal Service, with the owner paying the postage, unless the Director authorizes other means of transportation. The sample site plan must consist of sampling points at sites scattered throughout various zones of the distribution system. Each plan must provide for at least five sampling sites in each zone and there must be as many zones as the number of routine total coliform samples required each month up to 16 zones. Systems which are required to collect more than 16 samples per month may elect to have more than 16 zones, but it is not required. A map of the area served by the public water system, showing the distribution system and the boundaries of the various zones, labeled numerically, must be included in the plan. A list of all sampling sites, by name and address (or by a readily identifiable location) for each zone must be included with the map and, except for supplies having only one zone, the location of the sites need not be indicated on the map. All zones must be sampled monthly. The actual sites used within each zone must be varied on a scheduled rotation basis. Both the zone number and the site location must be noted on the laboratory report form by the person taking the sample. The owner of each community water systems (CWS) must update the system's sample site plan annually. The Director, at any time, may

require a plan be modified as a result of population or system changes which may have rendered an existing plan non-representative.

3-004.01B The owner of a community water system must take total coliform samples at regular time intervals established by the Director. The number of samples required must in no instance be less than as set forth below:

Population Served	Number of Sampling Zones	Minimum # or Samples per Month	Population Served	Minimum # of Sampling Zones	Minimum # of Samples per Month
25-1,000	1	1	33,001-41,000	16	40
1,001-2,500	2	2	41,001-50,000	16	50
2,501-3,300	3	3	50,001-59,000	16	60
3,301-4,100	4	4	59,001-70,000	16	70
4,101-4,900	5	5	70,001-83,000	16	80
4,901-5,800	6	6	83,001-96,000	16	90
5,801-6,700	7	7	96,001-130,000	16	100
6,701-7,600	8	8	130,001-220,000	16	120
7,601-8,500	9	9	220,001-320,000	16	150
8,501-12,900	10	10	320,001-450,000	16	180
12,901-17,200	15	15	450,001-600,000	16	210
17,201-21,500	16*	20	600,001-780,000	16	240
21,501-25,000	16*	25	780,001-970,000	16	270
25,001-33,000	16*	30	970,001-1,230,000	16	300

* Minimum Number of Sampling Zones

3-004.01C The owner of a non-community water system must take samples for total coliforms according to a frequency as follows:

1. A non-community water system using only ground water (except ground water under the direct influence of surface water) and serving 1,000 individuals or fewer must sample each calendar quarter that the system provides water to the public.
2. A non-community water system using only ground water (except ground water under the direct influence of surface water) and serving more than 1,000 individuals during any month must sample at the same frequency as a like-sized community water system, as specified in 179 NAC 3-004.01B.
3. The owner of a non-community water system using surface water, in total or in part, must sample at the same frequency as a like-sized community water system, as specified in 179 NAC 3-004.01B, regardless of the number of individuals it serves.
4. The owner of a non-community water system using ground water under the direct influence of surface water, must sample at the same frequency as a like-sized community water system, as specified in 179 NAC 3-004.01B. The owner must sample at this frequency beginning six months after the Director determines that the ground water is under the direct influence of surface water.

3-004.01D The owner of a public water system must collect samples at regular time intervals throughout the month.

3-004.01E The owner of a public water system that uses surface water or ground water under the direct influence of surface water and does not practice filtration in compliance with 179 NAC 13 must collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in 179 NAC 13-007.02B exceeds 1 NTU. The owner must collect this coliform sample within 24 hours of the first exceedance. Sample results from this coliform monitoring must be included in determining compliance with the maximum contaminant level (MCL) for total coliforms in 179 NAC 2-002.04C.

3-004.01F Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, must not be used to determine compliance with the MCL for total coliforms in 179 NAC 2-002.04C. Repeat samples taken pursuant to 179 NAC 3-004.02 are not considered special purpose samples, and must be used to determine compliance with the MCL for total coliforms in 179 NAC 2-002.04C.

3-004.02 Repeat Monitoring

3-004.02A If a routine sample is total coliform-positive, the owner of the public water system must 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 per month must have no fewer than three repeat samples collected for each total coliform-positive sample found. A system which is required to collect one routine sample per month or fewer must have no fewer than four repeat samples collected for each total coliform-positive sample found. The Director may extend the 24-hour limit on a case-by-case basis if the owner has a logistical problem in collecting the repeat samples within the 24 hours that is beyond his/her control. In the case of an extension, the Director must specify how much time the owner has to collect the repeat samples.

3-004.02B The system owner must 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 five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. The fourth repeat sample, if required by 179 NAC 3-004.02A, must be collected within five service connections upstream or 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 Director may waive the requirement to collect at least one repeat sample upstream or downstream of the original sampling site.

3-004.02C The owner must collect all repeat samples on the same day, except that an owner of a system with a single service connection may collect the required set of repeat samples over a four-day period.

3-004.02D If one or more repeat samples in the set is total coliform-positive, the owner of the public water system must collect an additional set of repeat samples in the manner specified in 179 NAC 3-004.02A to 3-004.02C. The owner must repeat

this process until either total coliforms are not detected in one complete set of repeat samples or the MCL for total coliforms in 179 NAC 2-002.04C has been exceeded and the Director determines that no additional repeat samples are required.

3-004.02E If a system which is required to collect fewer than five routine samples per month has one or more total coliform-positive samples and the Director does not invalidate the sample(s) under 179 NAC 3-004.03, the owner must collect at least five routine samples during the next month the system provides water to the public, except that the Director may waive this requirement if the conditions of 179 NAC 3-004.02E1 or 3-004.02E2 are met. The Director will not waive the requirement for a system to collect repeat samples in 179 NAC 3-004.02A to 3-004.02D.

3-004.02E1 The Director may waive the requirement to collect five routine samples the next month the system provides water to the public if the Director or an agent approved by the Director 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 must be sufficiently detailed to allow the Director to determine whether additional monitoring and/or any corrective action is needed. The Director will not approve an employee of the system owner to perform this site visit, even if the employee is an agent approved by the Director to perform sanitary surveys.

3-004.02E2 The Director may waive the requirement to collect five routine samples the next month the system provides water to the public if the Director has determined why the sample was total coliform-positive and establishes that the owner of the system will correct the problem before the end of the next month the system serves water to the public. In this case, the Director must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the Director's authorized representative who recommends such a decision, and make this document available to the United States Environmental Protection Agency (EPA) and the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The Director will not waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the requirement to collect five routine samples the next month is waived under 179 NAC 3-004.02E2, the system owner must still take at least one additional routine sample before the end of the next month the system serves water to the public and use it to determine compliance with the MCL for total coliforms in 179 NAC 2-002.04C.

3-004.02E3 The Director will consider the waiver of the requirement to collect five routine samples the next month only upon receipt of a request in writing from the system owner. The waiver will not be considered until after the repeat samples required in 179 NAC 3-004.02A to 3-004.02D have been collected and the results reported to the Director. The waiver will not be granted if any of the repeat samples are coliform-positive, unless all positive samples have been invalidated under 179 NAC 3-004.03, or if a similar waiver

has been granted within the six months previous to the date of the collection of the initial coliform positive sample.

3-004.02F Results of all routine and repeat samples not invalidated by the Director must be included in determining compliance with the MCL for total coliforms in 179 NAC 2-002.04C.

3-004.03 Invalidation of Total Coliform Samples: A total coliform-positive sample invalidated under 179 NAC 3-004.03 does not count towards meeting the minimum monitoring requirements of 179 NAC 3-004.01. If a total coliform-positive sample is invalidated under 179 NAC 3-004.03, the system owner must collect another sample from the same zone as the original sample to meet monitoring requirements.

3-004.03A The Director may invalidate a total coliform-positive sample only if one or more of the following conditions are met:

1. The laboratory establishes that improper sample analysis caused the total coliform-positive result.
2. The Director, on the basis of the results of repeat samples collected as required by 179 NAC 3-004.02A to 3-004.02D determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The Director will not invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., the Director 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 Director 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 must still collect all repeat samples required under 179 NAC 3-004.02A to 3-004.02D and use them to determine compliance with the MCL for total coliforms in 179 NAC 2-002.04C. To invalidate a total coliform-positive sample under 179 NAC 3-004.03A item 3, the decision with the rationale for the decision must be documented in writing and approved and signed by the Director's authorized representative. The Director must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken or will take to correct this problem. The Director will not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.
4. The Director will consider invalidation of a coliform-positive sample under 179 NAC 3-004.03 only upon receipt of a request in writing from the owner of the public water system from which the coliform-positive sample was collected. Such sample will not be invalidated if any of the

repeat samples collected at locations other than that of the coliform-positive sample are coliform-positive. No coliform-positive sample will be invalidated if any of the most recent six samples collected from the system were coliform-positive.

3-004.03B A laboratory must 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 (P-A) 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 must 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 must continue to re-sample within 24 hours and have the samples analyzed until a valid result is obtained. The Director may waive the 24-hour time limit on a case-by-case basis.

3-004.04 Sanitary Surveys

3-004.04A Public water systems which do not collect five or more routine samples per month must undergo an initial sanitary survey by June 29, 1994, for community public water systems and June 29, 1999, for non-community systems. Thereafter, systems must undergo another sanitary survey every five years, except that non-community water systems using only disinfected ground water and wells which have been constructed in accordance with and continue to meet the siting requirements of 179 NAC 7, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey.

3-004.04B Sanitary surveys must be performed by Department personnel or an agent approved by the Department. The system is responsible for ensuring the survey takes place.

3-004.04C Sanitary surveys conducted by the Department under 179 NAC 8-004 (~~upon its effective date~~) may be used to meet the sanitary survey requirements of 179 NAC 3-004.04.

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3-004.05 Fecal Coliforms/*Escherichia coli* (*E. coli*) Testing

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3-004.05A If any routine or repeat sample is total coliform-positive, that total coliform-positive culture medium must be analyzed to determine if fecal coliforms are present, except that *E. coli* may be tested for in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present in samples analyzed by a laboratory other than the Department Laboratory, the system owner must notify the Director by the end of the day when the system owner is notified of the test result, unless the system owner is notified of the result after the Director's office is closed, in which case the system owner must notify the Director before the end of the next business day.

3-004.05B The Director has the discretion to allow the owner of 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 the owner assumes that the total coliform-positive sample is fecal-coliform-positive or *E. coli*-positive. Accordingly, the owner must notify the Director as specified in 179 NAC 3-004.05A and the provisions of 179 NAC 2-002.04C2 apply.

3-004.06 Analytical Methodology

3-004.06A The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

3-004.06B Public water systems need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.

3-004.06C Public water systems must conduct total coliform analyses in accordance with one of the analytical methods in ~~the following table or an equivalent method approved by EPA. These methods are incorporated herein by reference and are available for viewing at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509. Copies may be obtained from the addresses listed below.~~

<u>Organism</u>	<u>Methodology^{1,2}</u>	<u>Citation¹</u>
Total Coliforms ²	Total Coliform Fermentation Technique ^{3,4,5}	9221 A, B
	Total Coliform Membrane Filter Technique ⁶	9222 A, B, C
	Presence-Absence (P-A) Coliform Test ^{6,7}	9221 D
	ONPG-MUG Test ⁸	9223
	Colisure Test ⁹	
	E-Collite [®] Test ¹⁰	
	m-Colibluo24 [®] Test ¹¹	
	ReadyCult [®] Coliform 100 Presence/Absence Test ¹³	
	Membrane Filter Technique using Chromocult [®] Coliform Agar ¹⁴	

¹ ~~Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005. The cited methods published in any of these three editions may be used. In addition, the following on-line versions may also be used: 9221 A, B, D-99, 9222 A, B, C-97, and 9223 B-97. Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.~~

² ~~The time from sample collection to initiation of analysis may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10°C during transit.~~

³ ~~Lactose broth, as commercially available, may be used in lieu of lauryl tryptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl tryptose broth using the water normally tested, and this comparison demonstrates that the false positive rate and false negative rate for total coliforms, using lactose broth, is less than 10%.~~

⁴ ~~If inverted tubes are used to detect gas production, the media should cover these tubes at least one-half to two-thirds after the sample is added.~~

⁵ ~~No requirement exists to run the completed phase on 10% of all total coliform positive confirmed tubes.~~

⁶ ~~MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al, 1993, Appl. Environ. Microbiol. 59:3534-3544. Also available from the Office of Water Resource Center (RC-~~

4100T), 1200 Pennsylvania Avenue, NW, Washington, D.C. 20460, EPA/600/J-99/225. Verification of colonies is not required.

⁷Six times formulation strength may be used if the medium is filter-sterilized rather than autoclaved.

⁸The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

⁹A description of the Colisure Test, Feb. 28, 1994, may be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. The Colisure Test may be read after an incubation time of 24 hours.

¹⁰A description of the E-Colite[®] Test, "Presence/Absence for Coliforms and *E. Coli* in Water," Dec. 21, 1997, is available from Charm Sciences, Inc., 36 Franklin Street, Malden, MA 02148-4120.

¹¹A description of the m-ColiBlue24[®] Test, Aug. 17, 1999, is available from the Hach Company, 100 Dayton Avenue, Ames, IA 50010.

¹²EPA strongly recommends that laboratories evaluate the false positive and negative rates for the method(s) they use for monitoring total coliforms. EPA also encourages laboratories to establish false-positive and false-negative rates within their own laboratory and sample matrix (drinking water or source water) with the intent that if the method they choose has an unacceptable false-positive or negative rate, another method can be used. EPA suggests that laboratories perform these studies on a minimum of 5% of all total coliform-positive samples, except for those methods where verification/confirmation is already required, e.g., the M-Endo and LES-Endo Membrane Filter Tests, Standard Total Coliform Fermentation Technique, and Presence-Absence Coliform Test. Methods for establishing false-positive and negative rates may be based on lactose fermentation, the rapid test for β -galactosidase and cytochrome oxidase, multi-test identification systems, or equivalent confirmation tests. False positive and false negative information is often available in published studies and/or from the manufacturer(s).

¹³The ReadyCult[®] Coliforms 100 Presence/Absence Test is described in the document, "ReadyCult[®] Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGaA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800)222-0342, e-mail address is adellenbusch@emscience.com.

¹⁴Membrane Filter Technique using Chromocult[®] Coliform Agar is described in the document, "Chromocult[®] Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGaA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297. Telephone number is (800)222-0342, e-mail address is adellenbusch@emscience.com. 40 CFR 141.21(f)(5) which is hereby incorporated by reference and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-21.pdf>

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3-004.06D Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (PA) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into a brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For Department-approved analytical methods that use a membrane filter, transfer the total coliform-positive culture by one of the following methods: remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium (the laboratory may first remove a small portion of selected colonies for verification), swab the entire membrane filter surface with a sterile cotton swab and transfer the inoculum to EC medium (do not leave the cotton swab in the EC medium), or inoculate individual total coliform positive colonies into EC medium. Gently shake the inoculated tubes of EC medium to insure adequate mixing and incubate in a waterbath at $44.5 \pm 0.2^\circ\text{C}$ for 24 ± 2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test.

~~The preparation of EC medium is described in Method 9221E (paragraph 1a) in *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), and 20th edition (1998); the cited method in any one of these three editions may be used. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required. 40 CFR 141.21(f)(5) which is incorporated by reference and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-21.pdf>~~

~~3-004.06E Public water systems must conduct analysis of *Escherichia coli* in accordance with one of the following analytical methods or an equivalent method approved by EPA:~~

- ~~1. EC medium supplemented with 50 µg/ml of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in *Standard Methods for the Examination of Water and Wastewater*, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 ml of EC medium as described in 179 NAC 3-004.06D, is supplemented with 50 µg/ml of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in 179 NAC 3-004.06D for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at 44.5 ± 0.2°C for 24 ± 2 hours; and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, *E. coli* are present.~~
- ~~2. Nutrient agar supplemented with 100 µg/ml 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration) as described in Method 9222G in *Standard Methods for the Examination of Water and Wastewater*, 19th edition (1995) and 20th edition (1998). Either edition may be used for determining if a total coliform-positive sample, as determined by the Membrane Filter Technique, contains *E. coli*. Alternately, the 18th edition (1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to a nutrient agar, as described in Method 9221B (paragraph 3) of *Standard Methods* (18th edition), supplemented with 100 µg/ml (final concentration) of MUG. If the 18th edition is used, incubate the agar plate at 35°C for 4 hours; observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, *E. coli* are present.~~
- ~~3. Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article "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*, Volume 55, pp. 1003-1008, April 1989. (Note: The Autoanalysis Colilert System is an MMO-MUG test). If the MMO-MUG test is total coliform-positive after a 24 hour incubation, test the medium for fluorescence with a 366 nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is *E. Coli*-positive. If fluorescence is questionable (cannot be definitely read) after 24 hours incubation,~~

~~incubate the culture for an additional four hours (but not to exceed 28 hours total), and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is the only approved formulation for the detection of *E. coli*.~~

- ~~4. The Colisure Test: A description of the Colisure Test may be obtained from the Millipore Corporation, Technical Services Department, 80 Ashby Road, Bedford, MA 01730.~~
- ~~5. The Membrane Filter Method with MI Agar, a description of which is cited in footnote 6 to the table in 179 NAC 3-004.06C.~~
- ~~6. E-Colite[®] Test, a description of which is cited in footnote 10 to the table in 179 NAC 3-004.06C.~~
- ~~7. m-ColiBlue24[®] Test, a description of which is cited in footnote 11 to the table in 179 NAC 3-004.06C.~~
- ~~8. ReadyCult[®] Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 13 to the table in 179 NAC 3-004.06C.~~

~~9. Membrane Filter Technique using Chromocult[®] Coliform Agar, a description of which is cited in footnote 14 to the table in 179 NAC 3-004.06C. analytical methods found in 40 CFR 141.21(f)(6) and 141.21(f)(7) which are incorporated by reference and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-21.pdf>.~~

~~3-004.06F. As an option to 179 NAC 3-004.06E item 3, a system with a total coliform positive, MUG-negative, MMO-MUG test may further analyze the culture for the presence of *E. coli* by transferring a 0.1 ml, 28-hour MMO-MUG culture to EC Medium + MUG with a pipet. The formulation and incubation conditions of EC Medium + MUG, and observation of the results are described in 179 NAC 3-004.06E item 1.~~

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3-004.07 Response to Violation

3-004.07A A public water system which has exceeded the MCL for total coliforms in 179 NAC 2-002.04C must report the violation to the Department no later than the end of the next business day after it learns of the violation, and notify the public in accordance with 179 NAC 4.

3-004.07B A public water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, must report the monitoring violation to the Department within ten days after the system discovers the violation, and notify the public in accordance with 179 NAC 4.

3-005 INORGANIC CHEMICAL SAMPLING AND ANALYTICAL REQUIREMENTS: Community water systems and non-transient, non-community water systems must conduct monitoring to determine compliance with the maximum contaminant levels specified in 179 NAC 2-002.04A in accordance with 179 NAC 3-005. Transient, non-community water systems must conduct monitoring to determine compliance with the nitrate and nitrite maximum contaminant

levels in 179 NAC 2-002.04A (12), (13), and (14) in accordance with 179 NAC 3-005. Monitoring must be conducted as follows.

3-005.01 Sampling Sites and Protocol

1. Ground Water Sources: Ground water sources must be monitored at every entry point to the distribution system which is representative of each ground water source after treatment (hereafter called a sampling point or entry point). The system owner must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
2. Surface Water Sources: Surface water sources must be monitored at every entry point to the distribution system after any application of treatment or in the distribution system at a point which is representative of each source after treatment (hereafter called a sampling point or entry point). The system owner must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

NOTE: For the purpose of 179 NAC 3-005.01 item 2, surface water systems include systems with a combination of surface and ground sources.

3. Multiple Sources: If a system draws water from more than one source and the sources are combined before distribution, the system owner must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water is representative of all sources being used).
4. Composite Sampling: The Director may reduce the total number of samples which must be analyzed by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed. Compositing of samples must be done in the laboratory.
 - a. If the concentration in the composite sample is greater than or equal to the detection limit of any inorganic chemical, then a follow-up sample must be analyzed within 14 days from each sampling point included in the composite. These samples must be analyzed for the contaminants which were detected in the composite sample. Detection limits for each analytical method are the following:

DETECTION LIMITS FOR INORGANIC CONTAMINANTS

<u>Contaminant</u>	<u>MCL (mg/L)</u>	<u>Methodology</u>	<u>Detection Limit (mg/L)</u>
Antimony	0.006	Atomic Absorption; Furnace	0.003
		Atomic Absorption; Platform	0.0008 ⁵
		ICP-Mass Spectrometry	0.0004
Arsenic	0.010 ⁶	Hydride- Atomic Absorption	0.001
		Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform - Stabilized Temperature	0.0005 ⁷

		Atomic Absorption; Gaseous Hydride	0.001
		ICP-Mass Spectrometry	0.0014 ⁸
Asbestos	7 MFL ¹	Transmission Electron Microscopy	0.01 MFL
Barium	2	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; direct aspiration	0.1
		Inductively Coupled Plasma	0.002, (0.001)
Beryllium	0.004	Atomic Absorption; Furnace	0.0002
		Atomic Absorption; Platform	0.00002 ⁵
		Inductively Coupled Plasma ²	0.0003
		ICP-Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007 (0.001)
Cyanide	0.2	Distillation, Spectrophotometric ³	0.02
		Distillation, Automated, Spectrophotometric ³	0.005
		Distillation, Selective Electrode ^{3,4}	0.05
		Distillation, Amenable, Spectrophotometric ⁴	0.02
		UV, Distillation, Spectrophotometric ⁹	0.0005
		Micro Distillation, Flow Injection, Spectrophotometric ³	0.0006
		Ligand Exchange with Amperometry ⁴	0.0005
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	xl	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006 ⁵
		Inductively Coupled Plasma ²	0.005
		ICP-Mass Spectrometry	0.0005
Nitrate	10 (as N)	Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05
		Ion Selective Electrode	1
		Ion Chromatography	0.01
		Capillary Ion Electrophoresis	0.076
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
		Capillary Ion Electrophoresis	0.103
Selenium	0.05	Atomic Absorption; furnace	0.002
		Atomic Absorption; gaseous hydride	0.002
Thallium	0.002	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0007 ⁵
		ICP-Mass Spectrometry	0.0003

¹ MFL = million fibers per liter >10 µm.

² Using a 2X preconcentration step as noted in Method 200.7. Lower MDLs may be achieved when using a 4X preconcentration.

³ Screening method for total cyanides.

⁴ Measures "free" cyanides when distillation, digestion, or ligand exchange is omitted.

⁵ Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.

⁶ The value for arsenic is effective January 23, 2006. Until then, the MCL is 0.05 mg/L.

⁷ The MDL reported for EPA Method 200.9 (Atomic Absorption; Platform–Stabilized Temperature) was determined using a 2x concentration step during sample digestion. The MDL determined for samples analyzed using direct analyses (i.e., no sample digestion) will be higher. Using multiple depositions, EPA 200.9 is capable of obtaining an MDL of 0.0001 mg/L.

⁸ Using selective ion monitoring, EPA Method 200.8 (ICP-MS) is capable of obtaining an MDL of 0.0001 mg/L.

⁹Measures total cyanides when UV-digester is used, and "free" cyanides when UV-digester is bypassed.

- b. If the population served by the system is greater than 3,300 individuals, then compositing may only be permitted by the Director at sampling points within a single system. In systems serving less than or equal to 3,300 individuals, the Director may permit compositing among different systems provided the five-sample limit is maintained.
- c. If duplicates of the original sample taken from each sampling point used in the composite are available, the system owner may use these instead of resampling. The duplicates must be analyzed and the results reported to the Director within 14 days of collection.

3-005.02 Asbestos Sampling: The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos must be conducted as follows:

1. Each community and non-transient, non-community water system owner must monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period which ends December 31, 1995.
2. Waiver from Monitoring: If a system owner believes its water system is not vulnerable to either asbestos contamination in its source water or due to corrosion of asbestos-cement pipe, or both, it may apply to the Director for a waiver from the monitoring requirement in 179 NAC 3-005.02 item 1. If the Director grants the waiver, the system owner is not required to monitor.
3. Basis of an Asbestos Waiver: The director may grant a waiver based on a consideration of the following factors:
 - a. Potential asbestos contamination of the water source, and
 - b. The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.
4. Effect of an Asbestos Waiver: A waiver remains in effect until the completion of the three-year compliance period. Systems not receiving a waiver must monitor in accordance with the provisions of 179 NAC 3-005.02 item 1.
5. Distribution System Vulnerable to Asbestos Contamination: A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe must take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
6. Source Water Vulnerable to Asbestos Contamination: A system vulnerable to asbestos contamination due solely to source water must monitor in accordance with the provisions of 179 NAC 3-005.01.
7. Combined Asbestos Vulnerability: A system vulnerable to asbestos contamination due both to its source water and corrosion of asbestos-cement

pipe must take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.

8. Exceedance of the Asbestos MCL: A system which exceeds the maximum contaminant levels as determined in 179 NAC 3-005.01 item 4.a. must monitor quarterly beginning in the next quarter after the violation occurred.
9. Asbestos Reliably and Consistently Below the MCL: The Director may decrease the quarterly monitoring requirement to the frequency specified in 179 NAC 3-005.02 item 1 provided the Director has determined that the system is reliably and consistently below the maximum contaminant level. In no case will the Director make this determination unless a ground water system takes a minimum of two quarterly samples and a surface (or combined surface/ground) water system takes a minimum of four quarterly samples.
10. Grandfathered Asbestos Data: If monitoring data collected after January 1, 1990 are generally consistent with the requirements of 179 NAC 3-005.02, then the Director may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period which ends December 31, 1995.

3-005.03 Monitoring for Inorganic Chemicals (Except Asbestos, Nitrate, and Nitrite): The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in 179 NAC 2-002.04A for antimony, arsenic, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, and thallium is as follows.

1. Owners of ground water sources must take one sample at each sampling point during each compliance period. Owners of surface water sources or combined (surface/ground) must take one sample annually at each sampling point.
2. Monitoring Waivers: The owner of a system may apply to the Director for a waiver from the monitoring frequencies specified in 179 NAC 3-005.03 item 1.
3. Monitoring During a Waiver: As a condition of the waiver, the system owner must take a minimum of one sample while the waiver is effective. The term during which the waiver is effective must not exceed one compliance cycle (i.e., nine years).
4. Basis of a Waiver and Grandfathered Data: The Director may grant a waiver provided a surface water system has monitored annually for at least three years and a ground water system has monitored for a minimum of three rounds. (At least one sample must have been taken since January 1, 1990.) Owners of both surface and ground water systems must demonstrate that all previous analytical results were less than the maximum contaminant level. Systems that use a new water source are not eligible for a waiver until three rounds of monitoring from the new source have been completed.
5. In determining the appropriate reduced monitoring frequency, the Director will consider:

- a. Reported concentrations from all previous monitoring;
 - b. The degree of variation in reported concentrations; and
 - c. Other factors which may affect contaminant concentrations such as changes in ground water pumping rates, changes in the system's configuration, changes in the system's operating procedures, or changes in stream flows or characteristics.
6. A decision by the Director to grant a waiver will be made in writing and will set forth the basis for the determination. The determination may be initiated by the Director or upon an application by the public water system owner. The public water system owner must specify the basis for its request. The Director may review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system owner submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.
 7. Exceedance of an MCL: Entry points which exceed the maximum contaminant levels as calculated in 179 NAC 3-005.09 must monitor quarterly beginning in the next quarter after the violation occurred.
 8. Reliably and Consistently Below the MCL: The Director may decrease the quarterly monitoring requirement to the frequencies specified in 179 NAC 3-005.03 items 1 and 2 provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case will the Director make this determination unless a ground water system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
 9. All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies must be conducted in accordance with the requirements in 179 NAC 3-005.

3-005.04 Monitoring Requirements for Nitrate: The owners of all public water systems (community; non-transient, non-community; and transient, non-community systems) must monitor to determine compliance with the maximum contaminant levels for nitrate.

3-005.04A Base Nitrate Sampling: Owners of community and non-transient, non-community water systems must monitor for nitrate as follows. Ground water entry points must be monitored annually beginning January 1, 1995 except as required in 179 NAC 3-005.04E; surface water entry points must be monitored quarterly beginning January 1, 1995.

3-005.04B Increased Nitrate Sampling Frequency: For community and non-transient non-community water systems; the monitoring frequency for ground water entry points must be quarterly following any one sample in which the concentration is greater than or equal to 5.0 milligrams per liter of nitrate as nitrogen. The monitoring frequency will reduce to annual after four consecutive quarterly samples

are reliably and consistently less than the MCL except as required in 179 NAC 3-005.04E. In this case, annual monitoring must be done during the quarter which previously resulted in the highest analytical result.

3-005.04C Surface Water Reduced Nitrate Sampling Frequency: For community and non-transient, non-community water systems; the monitoring of surface water entry points will be reduced to annual if all analytical results from four consecutive quarters are less than 5.0 mg/L (as nitrogen) except as required in 179 NAC 3-005.04E. In this case, annual monitoring must be done during a quarter which previously resulted in the highest analytical result. Surface water entry points will return to quarterly monitoring if any one sample is greater than or equal to 5.0 mg/L (as nitrogen).

3-005.04D Nitrate Monitoring of Transient, Non-Community Systems: The owner of each transient, non-community water system must monitor annually for nitrate beginning January 1, 1995 except as required in 179 NAC 3-005.04E.

3-005.04E If water prior to treatment exceeds the nitrate MCL and the water is treated to reduce the nitrate concentration, then the owner of the treatment system, regardless of the type of system, must monitor the treated water on a quarterly basis.

3-005.05 Monitoring Requirements for Nitrite: The owners of all public water systems (community; non-transient, non-community; and transient, non-community systems) must monitor to determine compliance with the maximum contaminant level for nitrite in 179 NAC 2-002.04A.

1. Monitoring must be conducted at the same time and frequency as required for nitrate in 179 NAC 3-005.04 unless the requirement under 179 NAC 3-005.05 item 2 would cause monitoring to be more frequent than required under 179 NAC 3-005.04.
2. For community; non-transient, non-community; and transient, non-community water systems; the increased monitoring frequency for any entry point must be quarterly for at least one year following any one sample in which the concentration is greater than or equal to 0.5 mg/L nitrite (as nitrogen). The sampling frequency will reduce to annual after the Director has determined that the entry point is reliably and consistently below the MCL. In such case, each subsequent sample must be taken during the quarter which previously resulted in the highest nitrite result.

3-005.06 Confirmation Samples

3-005.06A Where the results of sampling for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, or thallium indicate an exceedance of the maximum contaminant level, the system owner must collect a confirmation sample at the same sampling point within two weeks of the system owner's receipt of notification of the analytical results of the first sample.

3-005.06B Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system owner must take a confirmation sample within 24 hours of the system owner's receipt of notification of the analytical results of the first sample. System owners unable to comply with the 24-hour sampling requirement must immediately notify persons served by the public water system in accordance with 179 NAC 4-004 and meet other Tier 1 public notification requirements under 179 NAC 4. Systems exercising this option must take and analyze a confirmation sample within two weeks of notification of the analytical results of the first sample.

3-005.06C If a confirmation sample is taken for any contaminant as required by 179 NAC 3-005.06, then the results of the initial and confirmation sample will be averaged. The resulting average will be used to determine the system's compliance in accordance with 179 NAC 3-005.09. The Director has the discretion to delete results of obvious sampling errors.

3-005.07 Director's Designation of Increased Sampling Frequency: The Director may require more frequent monitoring than specified in 179 NAC 3-005.02 through 3-005.05 or may require confirmation samples for positive and negative results at his/her discretion.

3-005.08 Public water systems may apply to the Director to conduct more frequent monitoring than the minimum monitoring frequencies specified.

3-005.09 Compliance Calculations: Compliance with 179 NAC 2-002.04A must be determined based on the analytical result(s) obtained at each sampling point.

3-005.09A Sampling More Frequently Than Once Per Year: For entry points at which monitoring is conducted more frequently than once per year, compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, or thallium is determined by a running annual average at each sampling point. If the average at any sampling point is greater than the MCL, then the system is out of compliance. If any one sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any sample below the method detection limit will be calculated at zero for the purpose of determining the annual average. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

3-005.09B Sampling Once Per Year Or Less Frequently: For entry points at which monitoring is conducted annually or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium, or thallium if the level of a contaminant is greater than the MCL. If confirmation samples are required by the Director, the determination of compliance will be based on the annual average of the initial MCL exceedance and any Director required confirmation samples. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

3-005.09C Compliance Calculations for Nitrate and Nitrite: Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one

sample if the levels of these contaminants are below the MCLs. If the levels of nitrate or nitrite exceed the MCLs in a sample, a confirmation sample is required in accordance with 179 NAC 3-005.06B, and compliance will be determined based on the average of the initial and confirmation samples. If a confirmation sample is not collected within two weeks, as required in 179 NAC 3-005.06B, the determination of compliance will be based on the one sample result.

3-005.09D Arsenic sampling results will be reported to the nearest 0.001 mg/L as of January 23, 2006.

3-005.10 State Designated Sampling Schedules: Each public water system owner must monitor at the time designated by the Director during each compliance period.

3-005.11 Analytical Methods for Inorganic Analysis

~~3-005.11A Analysis for the following contaminants must be conducted in accordance with the methods in the following table, or their equivalent, as determined by EPA. The following methods are incorporated herein by reference. Criteria for analyzing arsenic, barium, beryllium, cadmium, calcium, chromium, copper, lead, nickel, selenium, sodium, and thallium with digestion or directly without digestion, and other analytical test procedures are contained in *Technical Notes on Drinking Water Methods*, EPA-600/R-94-173, October 1994, which is incorporated herein by reference. This document also contains approved analytical test methods which were available for compliance monitoring until July 1, 1996. These methods were not available for use after July 1, 1996. This document is available from the National Technical Information Service, NTIS PB95-104766, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847. Copies of the documents may be obtained from the sources listed in the footnotes. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791. These documents may be inspected at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.~~

<u>Contaminant and Methodology¹³</u>	<u>EPA</u>	<u>ASTM²</u>	<u>SM⁴</u> <u>(18th, 19th ed)</u>	<u>SM⁴</u> <u>(20th ed</u>	<u>SM</u> <u>(online²³)</u>	<u>Other¹²</u>
1. Alkalinity:						
 Titrimetric		D 1067-92, 02 B	2320 B	2320 B	2320 B-97	
 Electrometric titration						I-1030-85⁵
2. Antimony:						
 Inductively Coupled Plasma (ICP)-Mass Spectrometry	200.8²					
 Hydride-Atomic Absorption		D 3697-92, 02				
 Atomic Absorption; Platform	200.9²					
 Atomic Absorption; Furnace			3113 B		3113 B-99	
3. Arsenic¹⁴						
 Inductively Coupled Plasma¹⁶	200.7²		3120 B	3120 B	3120 B-99	
 ICP-Mass Spectrometry	200.8²					
 Atomic Absorption; Platform	200.9²					
 Atomic Absorption; Furnace		D 2972-97, 03 C	3113 B		3113 B-99	
 Hydride Atomic Absorption		D 1972-97, 03 B	3114 B		3114 B-97	
4. Asbestos:						
 Transmission Electron Microscopy	100.1⁹					
 Transmission Electron Microscopy	100.2¹⁰					
5. Barium:						
 Inductively Coupled Plasma	200.7²		3120 B	3120 B	3120 B-99	
 ICP-Mass Spectrometry	200.8²					

Atomic Absorption; Direct		3111 D		3111 D-99	
Atomic Absorption; Furnace		3113 B		3113 B-99	
6. Beryllium:					
Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99
ICP-Mass Spectrometry	200.8 ²				
Atomic Absorption; Platform	200.9 ²				
Atomic Absorption; Furnace		D 3645-07, 03 B	3113 B	3113 B-99	
7. Cadmium:					
Inductively Coupled Plasma	200.7 ²				
ICP-Mass Spectrometry	200.8 ²				
Atomic Absorption; Platform	200.9 ²				
Atomic Absorption; Furnace			3113 B		3113 B-99
8. Calcium:					
EDTA titrimetric		D 511-93, 03 A	3500 Ca-D	3500 Ca-B	3500 Ca-B-97
Atomic Absorption; direct aspiration		D 511-93, 03 B	3111 B		3111 B-99
Inductively-coupled plasma	200.7 ²		3120 B	3120 B	3120 B-99
Ion Chromatography		D6919-03			
9. Chromium					
Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99
ICP-Mass Spectrometry	200.8 ²				
Atomic Absorption; Platform	200.9 ²				
Atomic Absorption; Furnace			3113 B		3113 B-99
10. Copper					
Atomic absorption; furnace		D 1688-95, 02 C	3113 B		3113 B-99
Atomic absorption; direct aspiration		D 1688-95, 02 A	3111B		3111 B-99
Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99
ICP-Mass spectrometry	200.8 ²				
Atomic absorption; platform	200.9 ²				
11. Conductivity Conductance					
		D 1125-95 (Re-approved 1999)	2510 B	2510 B	2510 B-97
12. Cyanide					
Manual Distillation followed by Spectrophotometric, Amenable		D 2036-98A	4500-CN-C	4500-CN-C	
Spectrophotometric, Manual		D 2036-98B	4500-CN-G	4500-CN-G	4500-CN-G-99
Spectrophotometric, Manual		D 2036-98A	4500-CN-E	4500-CN-E	4500-CN-E-99 I-3300-85 ⁵
Spectrophotometric, Semiautomated	335.4 ⁶				
Selective Electrode			4500-CN-F	4500-CN-F	4500-CN-F-99
UV/Distillation/Spectrophotometric					Kelada 01 ¹²
Micro-Distillation, Flow Injection, Spectrophotometric					QuikChem 10-204-00-1-X ¹⁸
Ligand Exchange and Amperometry ²¹		D 6888-04			OIA-1677, DW ²⁰
13. Fluoride:					
Ion Chromatography	300.0 ⁶	D 4327-07, 03	4110 B	4110 B	4110 B-00
	300.1 ¹⁰				
Manual Distill.; Color. SPADNS			4500-F-B,D	4500-F-B,D	4500-F-B, D-97
Manual Electrode		D 1179-93, 99 B	4500-F-C	4500-F-C	4500-F-C-97
Automated Electrode					380-75WE ¹⁴
Automated Alizarin			4500-F-E	4500-F-E	4500-F-E-97 129-71W ¹⁴
Capillary Ion Electrophoresis					D6508, Rev. 2 ²³
14. Lead:					
Atomic Absorption; furnace		D 3559-96, 03D	3113 B		3113 B-99
ICP-Mass Spectrometry	200.8 ²				
Atomic Absorption; platform	200.9 ²				
Differential Pulse Anodic Stripping					Method 1001 ¹⁶
15. Magnesium:					
Atomic Absorption		D 511-93, 03 B	3111B		3111 B-99
ICP	200.7 ²		3120 B	3120 B	3120 B-99
Complexation Titrimetric Methods		D 511-93, 03 A	3500-Mg-E	3500-Mg-B	3500-Mg-B-97
Ion Chromatography		D 6919-03			
16. Mercury					
Manual, Cold Vapor	245.1 ²	D 3223-07, 02	3112 B		3112 B-99
Automated, Cold Vapor	245.2 ⁴				
ICP-Mass Spectrometry	200.8 ²				
17. Nickel:					
Inductively Coupled Plasma	200.7 ²		3120 B	3120 B	3120 B-99

ICP-Mass Spectrometry	200.8 ²					
Atomic Absorption; Platform	200.9 ²					
Atomic Absorption; Direct			3111 B			3111 B-99
Atomic Absorption; Furnace			3113 B			3113 B-99
18. Nitrate:						
Ion Chromatography	300.0 ⁶	D 4327-97, 03	4110 B	4110 B	4110 B-00	B-1014 ⁸
	300.1 ¹⁹					
Automated Cadmium Reduction	353.2 ⁶	D 3867-90A	4500-NO ₃ -F	4500-NO ₃ -F	4500-NO ₃ -F-00	
Ion Selective Electrode			4500-NO ₃ -D	4500-NO ₃ -D	4500-NO ₃ -D-00	601 ⁷
Manual Cadmium Reduction		D 3867-90B	4500-NO ₃ -E	4500-NO ₃ -E	4500-NO ₃ -E-00	
Capillary Ion Electrophoresis						D6508, Rev. 2 ²³
19. Nitrite:						
Ion Chromatography	300.0 ⁶	D 4327-97, 03	4110 B	4110 B	4110 B-00	B-1014 ⁸
	300.1 ¹⁹					
Automated Cadmium Reduction	353.2 ⁶	D 3867-90A	4500-NO ₃ -F	4500-NO ₃ -F	4500-NO ₃ -F-00	
Manual Cadmium Reduction		D 3867-90B	4500-NO ₃ -E	4500-NO ₃ -E	4500-NO ₃ -E-00	
Spectrophotometric			4500-NO ₂ -B	4500-NO ₂ -B	4500-NO ₂ -B-00	
Capillary Ion Electrophoresis						D6508, Rev. 2 ²³
20. Orthophosphate: ¹²						
Colorimetric, automated, ascorbic acid	365.1 ⁶		4500-P-F	4500-P-F		
Colorimetric, ascorbic acid, single reagent		D 515-88A	4500-P-E	4500-P-E		
Colorimetric, phosphomolybdate; automated-segmented flow; automated discrete						I-1601-85 ⁵ I-2601-90 ⁶ I-2598-85 ⁵
Ion Chromatography	300.0 ⁶	D 4327-97, 03	4110 B	4110 B	4110 B-00	
Capillary Ion Electrophoresis						D6508, Rev. 2 ²³
21. pH: Electrometric						
	150.1	D 1293-95, 99	4500-H ⁺ -B	4500-H ⁺ -B	4500-H ⁺ -B-00	
	150.2 ⁴					
22. Selenium						
Hydride-Atomic Absorption		D 3859-98A, 03 A	3114 B			3114 B-97
ICP-Mass Spectrometry	200.8 ²					
Atomic Absorption; Platform	200.9 ²					
Atomic Absorption; Furnace		D 3859-98, 03 B	3113 B			3113 B-99
23. Silica:						
Colorimetric, molybdate blue; automated-segmented flow						I-1700-85 ⁵ I-2700-85 ⁵
Colorimetric		D 859-95, 00				
Molybdesilicate			4500-Si-D	4500-Si ₂ -C		4500-Si ₂
C-97						
Heteropoly blue			4500-Si-E	4500-Si ₂ -D		4500-Si ₂
D-97						
Automated method for molybdate-reactive silica			4500-Si-F	4500-Si ₂ -E		4500-Si ₂
E-97						
Inductively-coupled plasma	200.7 ²		3120 B	3120 B	3120 B-99	
24. Sodium:						
Inductively-coupled plasma	200.7 ²					
Atomic Absorption; direct aspiration			3111 B			3111 B-99
Ion Chromatography		D6919-03				
25. Temperature: Thermometric						
			2550	2550	2550-00	
26. Thallium:						
ICP-Mass Spectrometry	200.8 ²					
Atomic Absorption; Platform	200.9 ²					

The procedures must be done in accordance with the documents listed below which are hereby incorporated by reference. Copies of the documents may be obtained from the sources listed below. Documents may be inspected at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.

¹ "Methods for Chemical Analysis of Water and Wastes," March 1983, EPA Environmental Monitoring and Support Laboratory, Cincinnati, OH 45268. EPA-600/4-79/020. Available at NTIS, PB84-128677.

² "Methods for the Determination of Metals in Environmental Samples—Supplement I", EPA/600/R-94/111, May 1994. Available at NTIS, PB95-125472.

³ ~~Annual Book of ASTM Standards, 1994, 1996, 1999, or 2003, Vols 11.01 and 11.02, ASTM International; any year containing the cited version of the method may be used. The previous versions of D1688-95A, D1688-95C (copper), D3559-95D (lead), D1293-95 (pH), D1125-91A (conductivity) and D859-94 (silica) are also approved. These previous versions D1688-90A, C; D3559-90D, D1293-84, D1125-91A and D859-88, respectively are located in the Annual Book of ASTM Standards, 1994, Vol. 11.01. Copyrighted and available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, Phone 215-299-5585, FAX 215-977-9679.~~

⁴ ~~Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), or 20th edition (1998). The cited methods published in any of these three editions may be used, except that the versions of 3111-B, 3111-D, 3113-B, and 3114-B in the 20th edition may not be used. Available from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005 and from American Water Works Association, Phone 800-926-7337, FAX 303-795-1989, HSL0017.~~

⁵ ~~Method I-2601-90, Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93-125, 1993. For Methods I-1030-85; I-1601-85; I-1700-85; I-2598-85; I-2700-85; and I-3300-85, see Techniques of Water Resources Investigations of the U.S. Geological Survey, Book 5, Chapter A-1, 3rd ed., 1989; Available from Information Services, U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225-0426.~~

⁶ ~~"Methods for the Determination of Inorganic Substances in Environmental Samples," EPA/600/R-93/100, August 1993. Available at NTIS, PB94-120821, 5285 Port Royal Road, Springfield, VA 22161. The toll free telephone number is 800-553-6847.~~

⁷ ~~The procedure must be done in accordance with the Technical Bulletin 601 "Standard Method of Test for Nitrate in Drinking Water," July 1994, PN 221890-001, Analytical Technology, Inc. Copies may be obtained from ATI-Orion, 529 Main Street, Boston, MA 02129.~~

⁸ ~~Method B-1011, "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography," August 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757, Telephone: 508-482-2131, Fax: 508-482-3625.~~

⁹ ~~Method 100.1 "Analytical Method For Determination of Asbestos Fibers in Water," EPA/600/4-83/043, EPA, September 1983. Available at NTIS, PB83-260471.~~

¹⁰ ~~Method 100.2 "Determination of Asbestos Structure Over 10 µm in Length in Drinking Water," EPA/600/R-94/134, June 1994. Available at NTIS, PB94-201902.~~

¹¹ ~~Industrial Method No. 129-71W, "Fluoride in Water and Wastewater," December 1972 and Method No. 380-75WE, "Fluoride in Water and Wastewater," February 1976, Technicon Industrial Systems. Copies may be obtained from Bran & Luebbe, 1025 Busch Parkway, Buffalo Grove, IL 60089.~~

¹² ~~Unfiltered, no digestion or hydrolysis.~~

¹³ ~~Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2X preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (i.e., no sample digestion) will be higher. For direct analysis of cadmium by Method 200.7, sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113-B; and lead by Method D3559-90D unless multiple in-furnace depositions are made.~~

¹⁴ ~~If ultrasonic nebulization is used in the determination of arsenic by Method 200.8, the arsenic must be in the pentavalent state to provide uniform signal response. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain one mg/L of sodium hypochlorite.~~

¹⁵ ~~Starting January 23, 2006, analytical methods using the ICP-AES technology, may not be used because the detection limits for these methods are 0.008 mg/L or higher. This restriction means that the two ICP-AES methods (EPA Method 200.7 and SM 3120-B) approved for use for the MCL of 0.05 mg/L may not be used for compliance determinations for the revised MCL of 0.010 mg/L.~~

~~However, prior to January 23, 2006 systems may have compliance samples analyzed with these less sensitive methods.~~

~~¹⁶ The description of Method Number 1001 for lead is available from Palintest, LTD, 21 Kenton Lands Road, P.O. Box 18395, Erlanger, KY 41018, or from the Hach Company, P.O. Box 389, Loveland, CO 80539.~~

~~¹⁷ The description for the Kelada 01 Method, "Kelada Automated Test Methods for Total Cyanide, Acid Dissociable Cyanide, and Thiocyanate," Revision 1.2, August 2001, EPA #821-B-01-009 for cyanide is available from the National Technical Information Service (NTIS), PB 2001-108275, 5285 Port Royal Road, Springfield, VA 22161. The toll free telephone number is 800-553-6847. **Note:** A 450-W UV lamp may be used in this method instead of the 550-W lamp specified if it provides performance within the quality control (QC) acceptance criteria of the method in a given instrument. Similarly, modified flow cell configurations and flow conditions may be used in the method, provided that the QC acceptance criteria are met.~~

~~¹⁸ The description for the QuikChem Method 10-204-00-1-X, "Digestion and distillation of total cyanide in drinking and wastewaters using MICRO-DIST and determination of cyanide by flow injection analysis," Revision 2.1, November 30, 2000 for cyanide is available from Lachat Instruments, 6645 W. Mill Rd., Milwaukee, WI 53218, USA. Phone: 414-358-4200.~~

~~¹⁹ "Methods for the Determination of Organic and Inorganic Compounds in Drinking Water," Vol. 1, EPA 815-R-00-014, August 2000. Available at NTIS, PB2000-106981.~~

~~²⁰ Method OIA-1677, DW "Available Cyanide by Flow Injection, Ligand Exchange, and Amperometry," January 2004. EPA 821-R-04-001, Available from ALPKEM, A Division of OI Analytical, P.O. Box 9010, College Station, TX 77842-9010.~~

~~²¹ Sulfide levels below those detected using lead acetate paper may produce positive method interferences. Test samples using a more sensitive sulfide method to determine if a sulfide interference is present, and treat samples accordingly.~~

~~²² Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.~~

~~²³ Method D6508, Rev. 2, "Test Method for Determination of Dissolved Inorganic Anions in Aqueous Matrices Using Capillary Ion Electrophoresis and Chromate Electrolyte," available from Waters Corp, 34 Maple St., Milford, MA 01757, Telephone: 508-482-2131, Fax: 508-482-3625. Analysis for inorganic contaminants must be done in accordance with 40 CFR 141.23(k) which is incorporated herein by reference and is available online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-23.pdf>~~

3-005.11B Sample Collection for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under 179 NAC 3-005.11 must be conducted using the sample preservation, container, and maximum holding time procedures specified in the following table.

Contaminant	Preservative ¹	Container ²	Time ³
Antimony	HNO ₃	P or G	6 months
Arsenic	Conc HNO ₃ to pH<2	P or G	6 months
Asbestos	4°C	P or G	48 hours ⁴
Barium	HNO ₃	P or G	6 months
Beryllium	HNO ₃	P or G	6 months
Cadmium	HNO ₃	P or G	6 months
Chromium	HNO ₃	P or G	6 months
Cyanide	4°C, NaOH	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	HNO ₃	P or G	28 days

Nickel	HNO ₃	P or G	6 months
Nitrate	4°C	P or G	48 hours ⁵
Nitrate-Nitrite ⁶	H ₂ SO ₄	P or G	28 days
Nitrite	4°C	P or G	48 hours
Selenium	HNO ₃	P or G	6 months
Thallium	HNO ₃	P or G	6 months

¹For cyanide determinations samples must be adjusted with sodium hydroxide to pH 12 at the time of collection. When chilling is indicated, the sample must be shipped and stored at 4°C or less. Acidification of nitrate or metals samples may be with a concentrated acid or a dilute (50% by volume) solution of the applicable concentrated acid. Acidification of samples for metals analysis is encouraged and allowed at the laboratory rather than at the time of sampling provided the shipping time and other instructions in Section 8.3 of EPA Methods 200.7 or 200.8 or 200.9 are followed.

²P = plastic, hard or soft; G = glass, hard or soft.

³In all cases, samples should be analyzed as soon after collection as possible. Follow additional (if any) information on preservation, containers or holding times that is specified in method.

⁴Instructions for containers, preservation procedures and holding times as specified in Method 100.2 must be adhered to for all compliance analyses including those conducted with Method 100.1

⁵If the sample is chlorinated, the holding time for an unacidified sample kept at 4°C is extended to 14 days.

⁶Nitrate-Nitrite refers to a measurement of total nitrate.

~~3-005.11C Analytical Methods for Arsenic: Analyses for arsenic must be conducted using the following methods, incorporated herein by reference: Method 206.2^{4,6}, Atomic Absorption Furnace Technique; or Method 206.3^{4,6}, or Method D 2972-93B^{4,7}, or Method 3500-AS-B^{2,7}, Atomic Absorption Gaseous Hydride; or Method 206.4^{4,6}, or Method D 2972-93A^{4,7}, or Method 3500-AS-C^{2,7}, Spectrophotometric, Silver Diethyl-dithiocarbamate; or Method 200.7A^{5,6}, Inductively Coupled Plasma Technique.~~

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~~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. For approved analytical procedures for metals, the technique applicable to total metals must be used.~~

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~~²"Standard Methods for the Examination of Water and Wastewater," 18th Edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1992. Copyrighted and available from AWWA, Phone 800-926-7337, FAX 303-795-1989, HSL0017.~~

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~~³[Reserved]~~

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~~⁴Annual Book of ASTM Standards, Vols. 11.01 and 11.02, 1994, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103-1187. Copyrighted and available from ASTM, Phone 215-299-5585, FAX 215-977-9679.~~

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~~⁵Appendix to EPA Method 200.7, March 1987.~~

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~~⁶Methods are available upon request from the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, 3rd Floor, Lincoln, NE 68509, Phone 402-471-2541.~~

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~~⁷Methods are copyrighted and available from the sources listed or methods may be viewed at Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.~~

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~~3-005.11D Analytical Methods for Fluoride: Analyses for fluoride must be conducted using the following methods, which are incorporated herein by reference.~~

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~~Reference (Method Number)~~

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~~Methodology EPA^{1,2} ASTM^{3,4} SM^{5,6} Other~~

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Colorimetric SPADNS, with distillation	340.1	D1179-93A	4500 F A, B&D
Potentiometric ion selective electrode	340.2	D1179-93B	4500 F C
Automated Alizarin fluoride blue, with distillation (complexone)	340.3		4500 F E

~~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. For approved analytical procedures for metals, the technique applicable to total metals must be used.~~

~~²Methods are included in Attachment 2.~~

~~³Methods are copyrighted and available from the sources listed OR methods may be viewed at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.~~

~~⁴Annual Book of ASTM Standards, Vols. 11.01 and 11.02, 1994, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103-1187. Copyrighted and available from ASTM, Phone 215-299-5585, FAX 215-977-9679.~~

~~⁵"Standard Methods for the Examination of Water and Wastewater," 18th Edition, American Public Health Association, American Water Works Association, Water Environment Federation, 1992. Copyrighted and available from AWWA, Phone 800-926-7337, FAX 303-795-1989, HLS0017.~~

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~~3-005.41E-11C~~ Analysis under 179 NAC 3-005 must only be conducted by the Department Laboratory or other laboratories that have been approved by the Director in accordance with 179 NAC 3-009 and that have been certified by EPA or the Director. Laboratories may conduct sample analysis under provisional certification until January 1, 1996. To receive certification to conduct analyses for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium and thallium, the laboratory must:

1. Analyze Performance Evaluation samples which include those substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the Director at least once a year.
2. For each contaminant that has been included in the PE sample and for each method for which the laboratory desires certification, achieve quantitative results on the analyses that are within the following acceptance limits:

Contaminant	Acceptance Limit
Antimony	± 30% at ≥0.006 mg/L
Arsenic	± 30% at ≥0.003 mg/L effective January 23, 2006
Asbestos	2 standard deviations based on study statistics
Barium	± 15% at ≥0.15 mg/L
Beryllium	± 15% at ≥0.001 mg/L
Cadmium	± 20% at ≥0.002 mg/L
Chromium	± 15% at ≥0.01 mg/L
Cyanide	± 25% at ≥0.1 mg/L
Fluoride	± 10% at ≥1 to 10 mg/L
Mercury	± 30% at ≥0.0005 mg/L
Nickel	± 15% at ≥0.01 mg/L
Nitrate	± 10% at ≥0.4 mg/L
Nitrite	± 15% at ≥0.4 mg/L

Selenium ± 20% at ≥0.01 mg/L
Thallium ± 30% at ≥0.002 mg/L

3-005.12 If the result of an analysis made under 179 NAC 3-005 indicates that the level of arsenic exceeds the maximum contaminant level, the owner of the public water system must initiate three additional analyses at the sampling point within one month.

3-005.13 When the average of four analyses made pursuant to 179 NAC 3-005.12, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the owner of the system must notify the Department pursuant to 179 NAC 5 and give notice to the public pursuant to 179 NAC 4. Monitoring after public notification must be at a frequency designated by the Director and must continue until the maximum contaminant level has not been exceeded in two successive samples or until a monitoring schedule as a condition to a variance, exemption or enforcement action becomes effective.

3-005.14 The provisions of 179 NAC 3-005.12 and 3-005.13 notwithstanding, compliance with the maximum contaminant level for nitrate will be determined on the basis of the mean of two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis must be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water must report his findings to the Department pursuant to 179 NAC 5 and must notify the public pursuant to 179 NAC 4.

3-006 MONITORING REQUIREMENTS FOR DISINFECTION BYPRODUCTS

3-006.01 Monitoring requirements for disinfection byproducts are specified in 179 NAC 16-005.

3-007 ORGANIC CHEMICALS OTHER THAN DISINFECTION BYPRODUCTS SAMPLING AND ANALYTICAL REQUIREMENTS

3-007.01 Analyses for the contaminants in 179 NAC 3-007 must be conducted using the following EPA methods or their equivalent as approved by EPA.

~~3-007.01A The following documents are incorporated herein by reference. Copies may be inspected at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509. Method 508A and 515.1 are in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA/600/4-88-039, December 1988, Revised July 1991. Methods 547, 550, and 550.1 are in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement I*, EPA/600/4-90-020, July 1990. Methods 548.1, 549.1, 552.1, and 555 are in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement II*, EPA/600/R-92-129, August 1992. Methods 502.2, 504.1, 505, 506, 507, 508, 508.1, 515.2, 524.2, 525.2, 531.1, 551.1 and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water - Supplement III*, EPA/600/R-95-131, August 1995. Method 1613 is titled "Tetra-through Octa Chlorinated Dioxins and Furans by Isotope Dilution HRGC/HRMS", EPA/821-B-94-005, October 1994. These documents are available from the National Technical Information Service, NTIS PB91-231480, PB91-146027, PB92-207703, PB95-261616 and PB95-104774, U.S. Department of Commerce, 5285~~

~~Port Royal Road, Springfield, Virginia 22161. The toll free number is 800-553-6847. Method 6651 must be followed in accordance with *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association (APHA); any one of these three editions may be used. Method 6610 must be followed in accordance with 18th edition of *Standard Methods for the Examination of Water and Wastewater*, (18th Edition Supplement) (1994) or with the 19th edition (1995) or 20th edition (1998) of *Standard Methods for the Examination of Water and Wastewater*, any of these publications may be used. The APHA documents are available from APHA, 1015 Fifteenth Street NW, Washington, D.C. 20005. Other required analytical test procedures germane to the conduct of these analyses are contained in *Technical Notes on Drinking Water Methods*, EPA/600/R-94-173, October 1994, NTIS PB95-104766. EPA Methods 515.3 and 549.2 are available from U.S. Environmental Protection Agency, National Exposure Research Laboratory (NERL) Cincinnati, 26 West Martin Luther King Drive, Cincinnati, OH 45268. ASTM Method D 5317-93, 98 (reapproved 2003) is available in the *Annual Book of ASTM Standards*, 1999, Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, any edition containing the cited version of the method may be used. EPA Method 515.4, "Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Microextraction, Derivatization and Fast Gas Chromatography with Electron Capture Detection," Revision 1.0, April 2000, EPA/815/B-00/001 and EPA Method 552.3, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection," Revision 1.0, July 2003, EPA 815-B-03-002, can be accessed and downloaded directly on line at <http://www.epa.gov/safewater/methods/sourcalt.html>. Syngenta Method AG-625, "Atrazine in Drinking Water by Immunoassay," February 2001 is available from Syngenta Crop Protection, Inc., 410 Swing Road, P. O. Box 18300, Greensboro, NC 27419, phone number (336) 632-6000. Method 531.2 "Measurement of N-methylcarbamoyloximes and N-methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization," Revision 1.0, September 2001, EPA 815/B-01/002 can be accessed and downloaded directly on line at www.epa.gov/safewater/methods/sourcalt.html.~~

Contaminant	EPA Method	Standard Methods	ASTM	Other
Benzene	502.2, 524.2			
Carbon tetrachloride	502.2, 524.2, 551.1			
Chlorobenzene	502.2, 524.2			
1,2-Dichlorobenzene	502.2, 524.2			
1,4-Dichlorobenzene	502.2, 524.2			
1,2-Dichloroethane	502.2, 524.2			
cis-Dichloroethylene	502.2, 524.2			
trans-Dichloroethylene	502.2, 524.2			
Dichloromethane	502.2, 524.2			
1,2-Dichloropropane	502.2, 524.2			
Ethylbenzene	502.2, 524.2			
Styrene	502.2, 524.2			
Tetrachloroethylene	502.2, 524.2, 551.1			
1,1,1-Trichloroethane	502.2, 524.2, 551.1			

Trichloroethylene	502.2, 524.2, 551.1			
Toluene	502.2, 524.2			
Contaminant	EPA Method	Standard Methods	ASTM	Other
1,2,4-Trichlorobenzene	502.2, 524.2			
1,1-Dichloroethylene	502.2, 524.2			
1,1,2-Trichloroethane	502.2, 524.2, 551.1			
Vinyl chloride	502.2, 524.2			
Xylenes (total)	502.2, 524.2			
2,3,7,8-TCDD (dioxin)	1613			
2,4-D ⁴ (as acids, salts and esters)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
2,4,5-TP ⁴ (Silvex)	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Alachlor ²	507, 525.2, 508.1, 505, 551.1			
Atrazine ²	507, 525.2, 508.1, 505, 551.1			Syngenta ⁵ AG-625
Benzo(a)pyrene	525.2, 550, 550.1			
Carbofuran	531.1, 531.2	6610		
Chlordane	508, 525.2, 508.1, 505			
Dalapon	552.1, 515.1, 552.2, 515.3, 515.4, 552.3			
Di(2-ethylhexyl)adipate	506, 525.2			
Di(2-ethylhexyl)phthalate	506, 525.2			
Dibromochloropropane (DBCP)	504.1, 551.1			
Dinoseb ⁴	515.2, 555, 515.1, 515.3, 515.4			
Diquat	549.2			
Endothall	548.1			
Endrin	508, 525.2, 508.1, 505, 551.1			
Ethylene dibromide (EDB)	504.1, 551.1			
Glyphosate	547	6651		
Heptachlor	508, 525.2, 508.1, 505, 551.1			
Heptachlor-Epoxide	508, 525.2, 508.1, 505, 551.1			
Hexachlorobenzene	508, 525.2, 508.1, 505, 551.1			
Hexachlorocyclopentadiene	508, 525.2, 508.1, 505, 551.1			
Lindane	508, 525.2, 508.1, 505, 551.1			

Methoxychlor	508, 525.2, 508.1, 505, 551.1			
Contaminant	EPA Method	Standard Methods	ASTM	Other
Oxamyl	531.1, 531.2	6640		
PCBs ³ (as decachlorobiphenyl)	508A			
———— (as Aroclors)	508.1, 508, 525.2, 505			
Pentachlorophenol	515.2, 525.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Picloram ⁴	515.2, 555, 515.1, 515.3, 515.4		D5317-93, 98 (Reapproved 2003)	
Simazine ²	507, 525.2, 508.1, 505, 551.1			
Toxaphene	508, 508.1, 525.2, 505			
Total Trihalomethanes	502.2, 524.2, 551.1			

¹Reserved.

²Substitution of the detector specified in Method 505, 507, 508 or 508.1 for the purpose of achieving lower detection limits is allowed as follows: Either an electron capture or nitrogen phosphorous detector may be used provided all regulatory requirements and quality control criteria are met.

³PCBs are qualitatively identified as Aroclors and measured for compliance purposes as decachlorobiphenyl. Users of Method 505 may have more difficulty in achieving the required detection limits than users of Methods 508.1, 525.2, or 508.

⁴Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2, 515.3, 515.4, and 555, and ASTM Method D 5317-93, 98 (Reapproved 2003).

⁵This method may not be used for the analysis of atrazine in any system where chlorine dioxide is used for drinking water treatment. In samples from all other systems, any result for atrazine generated by Method AG-625 that is greater than one-half the maximum contaminant level (MCL) (in other words, greater than 0.0015 mg/L or 1.5µg/L) must be confirmed using another approved method for this contaminant and should use additional volume of the original sample collected for compliance monitoring. In instances where a result from Method AG-625 triggers such confirmatory testing, the confirmatory result is to be used to determine compliance.

methods found in 40 CFR 141.24(e) which is incorporated herein by reference and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-24.pdf>

3-007.02 Monitoring Requirements: Monitoring for the contaminants listed in 179 NAC 2-002.04B1 (VOC) for purposes of determining compliance with the maximum contaminant levels must be conducted as follows.

3-007.02A Ground Water Sources: Ground water sources must be monitored at every entry point to the distribution system which is representative of each ground water source after treatment (hereafter called a sampling point or entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

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3-007.02B Surface Water Sources: Surface water sources (or combined surface/ground water sources) must take a minimum of one sample at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point or entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source, treatment plant, or within the distribution system.

3-007.02C Multiple Sources: If an entry point represents more than one source and the sources are combined before distribution, the system owner must sample at an entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).

3-007.02D Monitoring Frequency: Each community and non-transient, non-community water system must take four consecutive quarterly samples for each contaminant listed in 179 NAC 2-002.04B during each compliance period, beginning in the initial compliance period.

3-007.02E If No Contaminant Is Detected: If the initial monitoring for contaminants listed in 179 NAC 2-002.04B1 (1) through (8) and the monitoring for the contaminants listed in 179 NAC 2-002.04B1 (9) through (21) was completed by December 31, 1992, and the system did not detect any contaminant listed in 179 NAC 2-002.04B1 (1) through (21), then each ground and surface water system must take one sample annually beginning with the initial compliance period.

3-007.02F Reduced VOC Monitoring: After a minimum of three years of annual sampling, the Director may allow ground water systems with no previous detection of any contaminant listed in 179 NAC 2-002.04B1 to take one sample during each compliance period.

3-007.02G Waiver: The owner of each community and non-transient, non-community ground water entry point, at which no contaminant listed in 179 NAC 2-002.04B1 is detected, may apply to the Director for a waiver from the requirements of 179 NAC 3-007.02E and 3-007.02F after completing the initial monitoring. (For the purposes of 179 NAC 3-007.02G, detection is defined as ≥ 0.0005 mg/L.) A waiver will be effective for no more than six years (two compliance periods). The Director may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.

3-007.02H Bases of a Sampling Waiver: The Director may grant a waiver after evaluating the following factor(s):

1. Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the system. If a determination by the Director reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.
2. If previous use of the contaminant is unknown or it has been used previously, then the following factors must be used to determine whether a waiver is granted:
 - a. Previous analytical results;
 - b. The proximity of the sources for the entry point to a potential point or non-point source of contamination (point sources include spills

and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities);

- c. The environmental persistence and transport of the contaminants;
- d. The number of individuals served by the public water system and the proximity of a small system to a larger system;
- e. How well the water source is protected against contamination, such as whether it is a surface or ground water system. (For ground water sources, the Director will consider factors such as depth of the well, the type of soil, and wellhead protection. For surface water sources, the Director will consider watershed protection.)

3-007.02I As a condition of the waiver, the owner of a ground water system must take one sample at an entry point which received a waiver during the time the waiver is effective (i.e., one sample during two compliance periods or six years) and update its vulnerability assessment considering the factors listed in 179 NAC 3-007.02H. Based on this vulnerability assessment, the Director will reconfirm that the entry point is non-vulnerable. If the Director does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated.

3-007.02J The owner of each community and non-transient, non-community surface water entry point, at which no contaminant listed in 179 NAC 2-002.04B1 is detected, may apply to the Director for a waiver from the requirements of 179 NAC 3-007.02E after monitoring at least one time. (For the purposes of this section, detection is defined as ≥ 0.0005 mg/L.) Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Entry points meeting this criterion must be determined by the Director to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver must sample at the frequency specified by the Director (if any).

3-007.02K If a contaminant in 179 NAC 2-002.04B1 (1) through (21) is detected at a level exceeding 0.0005 mg/L in any sample, for the first time, then:

1. The owner of the system must monitor quarterly at each sampling point which resulted in a detection.
2. The Director may decrease the quarterly monitoring requirement specified in 179 NAC 3-007.02K item 1 provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case will the Director make this determination unless a ground water system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
3. If the Director determines that the system is reliably and consistently below the MCL, the Director may allow the system to monitor annually. Systems that monitor annually must monitor during the quarter(s) that previously yielded the highest analytical result.
4. Systems that have three consecutive annual samples with no detection of a contaminant may apply to the Director for a waiver as specified in 179 NAC 3-007.02G.

5. Vinyl Chloride Monitoring: Analysis for vinyl chloride is required only for ground water systems that have detected one or more of the following two-carbon organic compounds: Trichloroethylene, tetrachloroethylene, 1,2-dichloroethane, 1,1,1-trichloroethane, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, or 1,1-dichloroethylene. The analysis for vinyl chloride is required at each distribution or entry point at which one or more of the two-carbon organic compounds were found. If the first analysis does not detect vinyl chloride, the Director may reduce the frequency of vinyl chloride monitoring to one every three years for that sample location or other sample locations which are more representative of the same source. Surface water systems may be required to analyze for vinyl chloride at the discretion of the Director.

3-007.02L Entry points which violate the requirements of 179 NAC 2-002.04B1, as determined by 179 NAC 3-007.02O, must monitor quarterly. After a minimum of four consecutive quarterly samples which show the entry point is in compliance and the Director determines that the entry point is reliably and consistently below the maximum contaminant level, the owner of the entry point may monitor at the frequency and time specified in 179 NAC 3-007.02K item 3.

3-007.02M The Director may require confirmation samples for positive or negative results. If a confirmation sample(s) is required by the Director, then the sample result(s) must be averaged with the first sampling result and the average used for compliance determination in accordance with 179 NAC 3-007.02O. The Director has discretion to delete results of obvious sampling errors from this calculation.

3-007.02N Composite Samples: The Director may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples is to be done in the laboratory by the procedures listed below. Samples must be analyzed within 14 days of collection.

1. If the concentration in the composite sample is greater than or equal to 0.0005 mg/L for any contaminant listed in 179 NAC 2-002.04B1, then a follow-up sample must be taken and analyzed within 14 days from each sampling point included in the composite.
2. If duplicates of the original sample taken from each sampling point used in the composite are available, the system owner may use these duplicates instead of resampling. The duplicate must be analyzed within 14 days of collection.
3. If the population served by the system is greater than 3,300 individuals, then compositing may only be permitted at sampling points within a single system. In systems serving less than or equal to 3,300 individuals, compositing among different systems is allowed provided the 5-sample limit is maintained.
4. Compositing Samples prior to GC Analysis

- a. Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to a 25 ml glass syringe. Special precautions must be made to maintain zero headspace in the syringe.
- b. The samples must be cooled at 4°C during this step to minimize volatilization losses.
- c. Mix well and draw out a 5-ml aliquot for analysis.
- d. Follow sample introduction, purging and desorption steps described in the method.
- e. If less than five samples are used for compositing, a proportionately smaller syringe may be used.

5. Compositing Samples Prior to GC/MS Analysis

- a. Inject 5-ml or equal larger amounts of each aqueous sample (up to 5 samples are allowed) into a 25-ml purging device using the sample introduction technique described in the method.
- b. The total volume of the sample in the purging device must be 25 ml.
- c. Purge and desorb as described in the method.

3-007.02O Compliance Calculations: Compliance with the MCL in 179 NAC 2-002.04B1 will be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

1. For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.
2. Systems monitoring annually or less frequently whose sample result exceeds the MCL must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.
3. If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
4. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.
5. If a sample result is less than the detection limit, zero will be used to calculate the annual average.

3-007.02P Certified and Approved Laboratories: Analysis under 179 NAC 3-007 must only be conducted by the Department of Health and Human Services Public Health Environmental Laboratory or other laboratories that are certified by the Department or EPA according to the following conditions.

1. To receive certification to conduct analyses for the contaminants in 179 NAC 2-002.04B1 (2) through (21), the laboratory must:
 - a. Analyze Performance Evaluation (PE) samples which include these substances provided by EPA Environmental Monitoring and Support

Laboratory or equivalent samples provided by the Director at least once a year by each method for which the lab desires certification.

- b. Achieve the following quantitative acceptance limits under 179 NAC 3-007.02P items 1.c. and 1.d. for at least 80% of the regulated organic chemicals included in the PE sample.
 - c. Achieve quantitative results on the analyses performed under 179 NAC 3-007.02P item 1.a. that are within $\pm 20\%$ of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/L.
 - d. Achieve quantitative results on the analyses performed under 179 NAC 3-007.02P item 1.a. that are within $\pm 40\%$ of the actual amount of the substances in the Performance Evaluation sample when the actual amount is less than 0.010 mg/L.
 - e. Achieve a method detection limit of 0.0005 mg/L, according to the procedures in Appendix B ~~of to~~ Part 136 of the Code of Federal Regulations which is incorporated by reference ~~and attached hereto as Attachment 1~~ and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-part136-appB.pdf>.
2. To receive certification to conduct analyses for vinyl chloride, the laboratory must:
- a. Analyze Performance Evaluation (PE) samples provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the Director at least once a year by each method for which the laboratory desires certification.
 - b. Achieve quantitative results on the analyses performed under 179 NAC 3-007.02P item 2.a. that are within $\pm 40\%$ of the actual amount of vinyl chloride in the Performance Evaluation sample.
 - c. Achieve a method detection limit of 0.0005 mg/L, according to the procedures in Appendix B ~~of to~~ Part 136 of the Code of Federal Regulations which is incorporated by reference and ~~can be found online at~~ <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-part136-appB.pdf> ~~is attached hereto as Attachment 1~~.
 - d. Obtain certification for the contaminants listed in 179 NAC 2-002.04B1 (2) through (21).

3-007.02Q The Director may increase required monitoring where necessary to detect variations within the system.

3-007.02R Laboratory Certification: Each approved laboratory must determine the method detection limit (MDL), (as defined in Appendix B to Part 136 of the Code of Federal Regulations which is incorporated by reference and ~~attached hereto as~~

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~~Attachment 1~~ can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-part136-appB.pdf> at which it is capable of detecting VOCs. The acceptable MDL is 0.0005 mg/L. This concentration is the detection concentration for purposes of 179 NAC 3-007.

3-007.02S State Designated VOC Sampling Schedules: Each public water system owner must monitor at the time designated by the Director within each compliance period.

3-007.02T New Systems Or Sources: All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies must be conducted in accordance with the requirements in 179 NAC 3-007.

3-007.03 Monitoring Sites and Protocol: Analysis of the contaminants listed in 179 NAC 2-002.04B2 for the purposes of determining compliance with the maximum contaminant level must be conducted as follows:

1. Ground Water Sources: Ground water sources must be monitored at every entry point to the distribution system which is representative of each ground water source after treatment (hereafter called a sampling point or entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
2. Surface Water Sources: Surface water sources must be monitored at points in the distribution system that are representative of each source or at each entry point to the distribution system after treatment (hereafter called a sampling point or entry point). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

NOTE: For the purposes of 179 NAC 3-007.03 item 2, surface water systems include systems with a combination of surface and ground water sources.

3. Multiple Sources: If an entry point represents more than one source and the sources are combined before distribution, the system owner must sample at the entry point to the distribution system during periods of normal operating conditions (i.e., when water representative of all sources is being used).
4. Monitoring Frequency
 - a. Initial Compliance Period Monitoring: Owners of each community and non-transient, non-community water system must take four consecutive quarterly samples during the three-year compliance period which ends December 31, 1995 for each contaminant listed in 179 NAC 2-002.04B2 during the compliance period which began January 1, 1996 and ended December 31, 1998.

- b. Repeat Compliance Period Monitoring: Systems serving more than 3,300 individuals that do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of two quarterly samples in one year during each repeat compliance period.
 - c. Systems serving less than or equal to 3,300 individuals that do not detect a contaminant in the initial compliance period may reduce the sampling frequency to a minimum of one sample during each repeat compliance period.
5. Waivers from Initial and Repeat Compliance Period Monitoring: A system owner may apply to the Director for a waiver from the requirements in 179 NAC 3-007.03 item 4. A system owner must reapply for a waiver for each compliance period.
6. The Director may grant a waiver after evaluating the following factor(s): Knowledge of previous use (including transport, storage, or disposal) of the contaminant within the watershed or zone of influence of the entry point source(s). If a determination by the Director reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted. If previous use of the contaminant is unknown or it has been used previously then the following factors will be used to determine whether a waiver is granted:
 - a. Previous analytical results.
 - b. The proximity of the entry point source(s) to a potential point or non-point source of contamination. Point sources include spills and leaks of chemicals at or near a water treatment facility or at manufacturing, distribution, or storage facilities, or from hazardous and municipal waste landfills and other waste handling or treatment facilities. Non-point sources include use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.
 - c. The environmental persistence and transport of the pesticide or PCBs.
 - d. How well the water source is protected against contamination due to such factors as depth of the well and the type of soil and the integrity of the well casing.
 - e. Elevated nitrate levels at the entry point source(s).
 - f. Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps, transformers, etc.).

7. If Detected: If an organic contaminant listed in 179 NAC 2-002.04B2 is detected (as defined by 179 NAC 3-007.03 item 17) in any sample, then:
 - a. The owner must monitor quarterly at each sampling point which resulted in a detection for each contaminant which was detected.
 - b. The Director may decrease the quarterly monitoring requirement specified in 179 NAC 3-007.03 item 7.a. provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case will the Director make this determination unless a ground water system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
 - c. After the Director determines the system is reliably and consistently below the maximum contaminant level, the Director may allow the system to monitor annually. Systems that monitor annually must monitor during the quarter that previously yielded the highest analytical result.
 - d. Systems that have three consecutive annual samples with no detection of a contaminant may apply to the Director for a waiver as specified in 179 NAC 3-007.03 item 6.
 - e. If monitoring results in detection of one or more of certain related contaminants (aldicarb, aldicarb sulfone, aldicarb sulfoxide and heptachlor, heptachlor epoxide), then subsequent monitoring must analyze for all related contaminants.
8. MCL Violation and Reliably/Consistently Below the MCL: Entry points which violate an MCL in 179 NAC 2-002.04B2 as determined by 179 NAC 3-007.03 item 11 must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the Director determines the entry point is reliably and consistently below the MCL, as specified in 179 NAC 3-007.03 item 11, the system owner must monitor the entry point at the frequency specified in 179 NAC 3-007.03 item 7.c.
9. Confirmation Sampling: The Director may require a confirmation sample for positive or negative results. If a confirmation sample is required by the Director, the result must be averaged with the first sampling result and the average used for the compliance determination as specified in 179 NAC 3-007.03 item 11. The Director has the discretion to delete results of obvious sampling errors from this calculation.
10. Composite Sampling: The Director may reduce the total number of samples a system must analyze by allowing the use of compositing. Composite samples from a maximum of five sampling points are allowed, provided that the detection limit of the method used for analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory and analyzed within 14 days of sample collection.

- a. If the concentration in the composite sample detects one or more contaminants listed in 179 NAC 2-002.04B2, then a follow-up sample must be taken and analyzed within 14 days from each sampling point included in the composite.
 - b. If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these instead of resampling. The duplicates must be analyzed and the results reported to the Director within 14 days of collection.
 - c. If the population served by the system is greater than 3,300 individuals, compositing may only be permitted by the Director at sampling points within a single system. In systems serving less than or equal to 3,300 individuals, the Director may permit compositing among different systems provided the 5-sample limit is maintained.
11. Compliance Calculations: Compliance with 179 NAC 2-002.04B2 must be determined based on the analytical results obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.
- a. For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average of all samples taken at each sampling point.
 - b. Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by 179 NAC 3-007 item 17 must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.
 - c. If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.
 - d. If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.
 - e. If a sample result is less than the detection limit, zero will be used to calculate the annual average.
12. PCB Analysis: Analysis for PCBs must be conducted as follows using the methods in 179 NAC 3-007.01:
- a. Each system owner who monitors for PCBs must analyze each sample using either Method 508.1, 525.2, 508 or 505. (Note: Users of Method 505 may have more difficulty in achieving the

required Aroclor detection limits than users of Methods 508.1, 525.2 or 508.)

- b. If PCBs (as one of seven Aroclors) are detected (as designated in 179 NAC 3-007.03 item 12.b.) in any sample analyzed using Methods 505 or 508, the system must reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

<u>Aroclor</u>	<u>Detection Limit (mg/L)</u>
1016	0.00008
1221	0.02
1232	0.0005
1242	0.0003
1248	0.0001
1254	0.0001
1260	0.0002

- c. Compliance with the PCB MCL will be determined based upon the quantitative results of analyses using Method 508A.
13. Grandfathered Data: If monitoring data collected after January 1, 1990, are generally consistent with the requirements of 179 NAC 3-007.03, then the Director will allow owners of systems to use that data to satisfy the monitoring requirement for the initial compliance period.
 14. Increased Sampling: The Director may increase the required monitoring frequency, where necessary, to detect variations within the system (e.g., fluctuations in concentration due to seasonal use, changes in water source).
 15. State Enforcement: The Director has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by its sanctioned representatives and agencies.
 16. Designated Sampling Schedules: Each public water system owner must monitor at the time designated by the Director within each compliance period.
 17. Detection Limits: Detection as used in 179 NAC 3-007.03 item 17 is defined as greater than or equal to the following concentrations for each contaminant.

<u>Contaminant</u>	<u>Detection Limit (mg/L)</u>
Alachlor	0.0002
Aldicarb	0.0005
Aldicarb sulfoxide	0.0005
Aldicarb sulfone	0.0008
Atrazine	0.0001
Benzo[a]pyrene	0.00002

<u>Contaminant</u>	<u>Detection Limit (mg/L)</u>
Carbofuran	0.0009
Chlordane	0.0002
Dalapon	0.001
1,2-Dibromo-3-chloropropane (DBCP)	0.00002
Di(2-ethylhexyl)adipate	0.0006
Di(2-ethylhexyl)phthalate	0.0006
Dinoseb	0.0002
Diquat	0.0004
2,4-D	0.0001
Endothall	0.009
Endrin	0.00001
Ethylene dibromide (EDB)	0.00001
Glyphosate	0.006
Heptachlor	0.00004
Heptachlor epoxide	0.00002
Hexachlorobenzene	0.0001
Hexachlorocyclopentadiene	0.0001
Lindane	0.00002
Methoxychlor	0.0001
Oxamyl	0.002
Picloram	0.0001
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl)	0.0001
Pentachlorophenol	0.00004
Simazine	0.00007
Toxaphene	0.001
2,3,7,8-TCDD (Dioxin)	0.000000005
2,4,5-TP (Silvex)	0.0002

18. Laboratory Certification: Analysis under 179 NAC 3-006 must only be conducted by the Public Health Environmental Laboratory or other laboratories approved by the Director and certified by EPA or the Director. To receive certification to conduct analyses for the contaminants in 179 NAC 2-002.04B2 the laboratory must:

- a. Analyze Performance Evaluation samples which include those substances provided by EPA Environmental Monitoring and Support Laboratory or equivalent samples provided by the Director at least once a year by each method for which the laboratory desires certification.
- b. For each contaminant that has been included in the PE sample achieve quantitative results on the analyses that are within the following acceptance limits:

<u>Contaminant</u>	<u>Acceptance Limits (%)</u>
Alachlor	± 45.
Aldicarb	2 standard deviations

<u>Contaminant</u>	<u>Acceptance Limits (%)</u>
Aldicarb sulfoxide	2 standard deviations
Aldicarb sulfone	2 standard deviations
Atrazine	± 45.
Benzo[a]pyrene	2 standard deviations
Carbofuran	± 45.
Chlordane	± 45.
Dalapon	2 standard deviations
DBCP	± 40.
Di(2-ethylhexyl)adipate	2 standard deviations
Di(2-ethylhexyl)phthalate	2 standard deviations
Dinoseb	2 standard deviations
Diquat	2 standard deviations
EDB	± 40.
Endothall	2 standard deviations
Endrin	± 30.
Glyphosate	2 standard deviations
Heptachlor	± 45.
Heptachlor epoxide	± 45.
Hexachlorobenzene	2 standard deviations
Hexachlorocyclopentadiene	2 standard deviations
Lindane	± 45.
Methoxychlor	± 45.
Oxamyl	2 standard deviations
PCBs (as decachlorobiphenyl)	0-200.
Pentachlorophenol	± 50.
Picloram	2 standard deviations
Simazine	2 standard deviations
Toxaphene	± 45.
2,3,7,8-TCDD (Dioxin)	2 standard deviations
2,4-D	± 50.
2,4,5-TP (Silvex)	± 50.

19. All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the Director. The system must also comply with the initial sampling frequencies specified by the Director to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies must be conducted in accordance with the requirements in 179 NAC 3-007.

3-008 RADIOACTIVE CONTAMINANTS

3-008.01 Analysis

3-008.01A Analysis for the following contaminants listed in 40 CFR 141.25(a) which is hereby incorporated by reference (found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-25.pdf>) must be conducted to determine compliance with 179 NAC 2-002.04D (radioactivity) in accordance with the methods in ~~the following table~~ 40 CFR

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Human Services, Nebraska State Office Building, 301 Centennial Mall South, Lincoln, NE 68509. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800-426-4791.

¹ "Prescribed Procedures for Measurement of Radioactivity in Drinking Water," EPA 600/4-80-032, August 1980. Available at U.S. Department of Commerce, National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161 (Telephone 800-553-6847) PB 80-224744.

² "Radiochemistry Procedures Manual," EPA 520/5-84-006, December 1987. Available at NTIS, *ibid.* PB 84-245584.

³ "Standard Methods for the Examination of Water and Wastewater," 18th, 19th, or 20th Editions, 1992, 1995, 1998. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. Methods 7110B, 7500-Ra-B, 7500-Ra-C, 7500-Ra-D, 7500-U-B, 7500-Cs-B, 7500-I-B, 7500-I-C, 7500-I-D, 7500-Sr-B, 7500-³H-B are in the 17th, 18th, 19th, and 20th editions. Method 7110-C is in the 18th, 19th, and 20th editions. Method 7500-U-C Alpha spectrometry is only in the 18th, 19th, and 20th editions. Method 7120 is only in the 19th and 20th editions. Method 3125 is only in the 20th edition. Methods 7110-B-00, 7110-C-00, 7500-Ra-B-01, 7500-Ra-C-01, 7500-Ra-D-01, 7500-U-C-00, 7500-I-B-00, 7500-I-C-00, 7500-I-D-00, 7120-97, 7500-Sr-B-01, and 7500-³H-B-00 are available online at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

⁴ Natural uranium and thorium-230 are approved as gross alpha calibration standards for gross alpha with co-precipitation and evaporation methods; americium-241 is approved with co-precipitation methods.

⁵ If uranium (U) is determined by mass, a 0.67 pCi/μg of uranium conversion factor must be used. This conversion factor is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally occurring uranium.

3-008.01B For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the radioanalysis is defined in terms of a detection limit. The detection limit is that concentration which can be counted with a precision of plus or minus 100% at the 95% confidence level (1.96σ where σ is the standard deviation of the net counting rate of the sample).

3-008.01B1 To determine compliance with 179 NAC 2-002.04D1, 2-002.04D2, and 2-002.04D4, the detection limit must not exceed the concentrations listed in the following table:

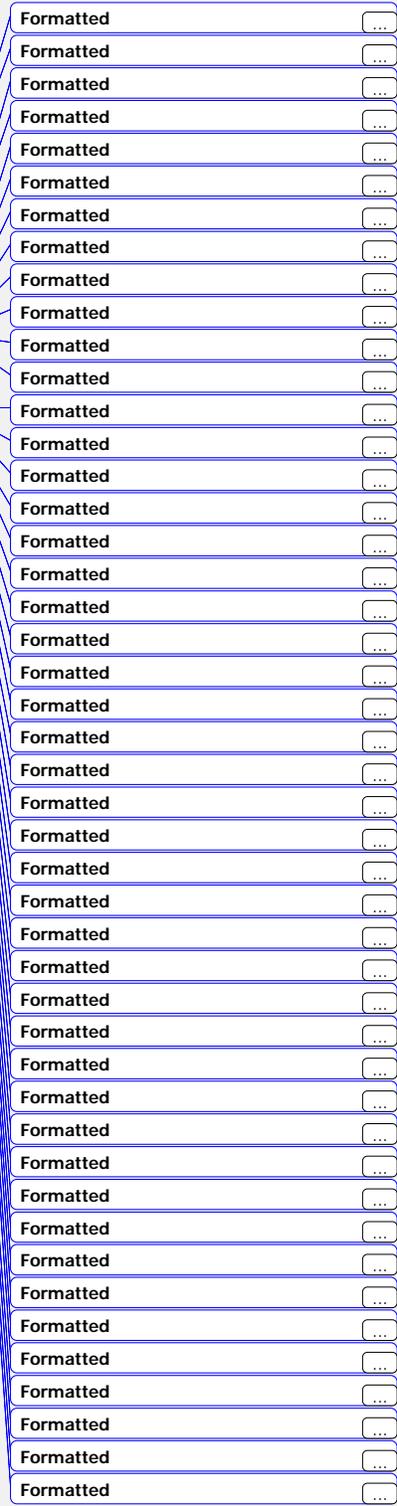
DETECTION LIMITS FOR GROSS ALPHA PARTICLE ACTIVITY, RADIUM-226, RADIUM-228, AND URANIUM

Contaminant	Detection Limit
Gross alpha particle activity	3 pCi/L
Radium 226	1 pCi/L
Radium 228	1 pCi/L
Uranium	1 μg/L

3-008.01B2 To determine compliance with 179 NAC 2-002.04D3 the detection limits must not exceed the concentrations listed in the following table.

DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMMITTERS

Radionuclide	Detection Limit
Tritium	1,000 pCi/L



Strontium-89	10 pCi/L
Strontium-90	2 pCi/L
Iodine-131	1 pCi/L
Cesium-134	10 pCi/L
Gross beta	4 pCi/L
Other radionuclides	1/10 of the applicable limit

3-008.01C To judge compliance with the maximum contaminant levels listed in 179 NAC 2-002.04, averages of data will be used and will be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

3-008.02 Monitoring Frequency and Compliance Requirements for Radionuclides in Community Water Systems

3-008.02A Monitoring and Compliance Requirements for Gross Alpha Particle Activity, Radium-226, Radium-228, and Uranium

3-008.02A1 Community water systems (CWSs) must conduct initial monitoring to determine compliance with 179 NAC 2-002.04D1, 2-002.04D2, and 2-002.04D4 by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particles and photon radioactivity in drinking water, "detection limit" is defined as in 179 NAC 3-008.01B.

3-008.02A1a Applicability and Sampling Location for Existing Community Water Systems or Sources: All existing CWSs using ground water, surface water, or systems using both ground and surface water (for the purpose of 179 NAC 3-008.02 hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the Director has designated a distribution system location, in accordance with 179 NAC 3-008.02A2 item 2.c.

3-008.02A1b Applicability and Sampling Location for New Community Water Systems or Sources: All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. CWSs must conduct more frequent monitoring when ordered by the Director in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

3-008.02A2 Initial Monitoring: Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

1. Systems without acceptable historical data, as defined below, must collect four consecutive quarterly samples at all sampling points before December 31, 2007.
2. Grandfathering of Data: The Director may allow historical monitoring data collected at a sampling point to satisfy the initial monitoring requirements for that sampling point, for the following situations:
 - a. To satisfy initial monitoring requirements, a community water system having only one entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.
 - b. To satisfy initial monitoring requirements, a community water system with multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.
 - c. To satisfy initial monitoring requirements, a community water system with appropriate historical data for a representative point in the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003, provided that the Director finds that the historical data satisfactorily demonstrate that each entry point to the distribution system is expected to be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points. The Director must make a written finding indicating how the data conforms to these requirements.
3. For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the Director may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.
4. If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Director.

3-008.02A3 Reduced Monitoring: The Director may allow community water systems to reduce the future frequency of monitoring from once every three years to one every six or nine years at each sampling point, based on the following criteria:

1. If the average of the initial monitoring results for each contaminant (i.e., gross alpha particle activity, uranium, radium-226 or radium-228) is

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below the detection limit specified in the table in 179 NAC 3-008.01B1, the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

2. For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below $\frac{1}{2}$ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below $\frac{1}{2}$ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.
3. For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above $\frac{1}{2}$ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-228 the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above $\frac{1}{2}$ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.
4. Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above $\frac{1}{2}$ the MCL, then the next monitoring period for the sampling point is three years).
5. If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the Director.

3-008.02A4 Compositing: To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a system may composite up to four consecutive quarterly samples from a single entry point if analysis ~~if is~~ done within a year of the first sample. The Director will treat analytical results from the composited sample as the average analytical result to determine compliance with the MCLs and the future monitoring frequency. If the analytical result from the composited sample is greater than $\frac{1}{2}$ the MCL, the Director may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.

3-008.02A5 A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle

activity does not exceed 5 pCi/L. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/L.

The gross alpha measurement must have a confidence interval of 95% (1.65σ , where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, $\frac{1}{2}$ the detection limit will be used to determine compliance and the future monitoring frequency.

3-008.02B Monitoring and Compliance Requirements for Beta Particle and Photon Radioactivity: To determine compliance with the maximum contaminant levels in 179 NAC 2-002.04D3 for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

1. Community Water Systems (Both Surface and Ground Water) Designated by the Director as Vulnerable Must Sample for Beta Particle and Photon Radioactivity: Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point) beginning within one quarter after being notified by the Director. Systems already designated by the Director must continue to sample until the Director reviews and either reaffirms or removes the designation.
 - a. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the Director may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in 179 NAC 3-008.02B item 1 during the reduced monitoring period.
 - b. For systems in the vicinity of a nuclear facility, the Director may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Director determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with 179 NAC 3-008.02B item 1.
2. Community water systems (both surface and ground water) designated by the Director as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning with one quarter after being notified by the Director. Systems already designated by the Director as

systems using waters contaminated by effluents from nuclear facilities must continue to sample until the Director reviews and either reaffirms or removes the designation.

- a. Quarterly monitoring for gross beta particle activity will be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.
 - b. For iodine-131, a composite of five consecutive daily samples must be analyzed once each quarter. As ordered by the Director, more frequent monitoring will be conducted when iodine-131 is identified in the finished water.
 - c. Annual monitoring for strontium-90 and tritium must be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.
 - d. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), the Director may reduce the frequency of monitoring at that sampling point to every three years. Systems must collect the same type of samples required in 179 NAC 3-008.02B item 2 during the reduced monitoring period.
 - e. For systems in the vicinity of a nuclear facility, the Director may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the Director determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with 179 NAC 3-008.02B item 2.
3. Community water systems designated by the Director to monitor for beta particle and photon radioactivity cannot apply to the Director for a waiver from the monitoring frequencies specified in 179 NAC 3-008.02B item 1 or 2.
 4. Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. Systems are allowed to subtract the potassium-40 beta particle activity value from the total gross beta particle activity value to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.
 5. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and

summed to determine compliance with 179 NAC 2-002.04D3 item 1 using the formula in 179 NAC 2-002.04D3 item 2. Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

6. Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in 179 NAC 3-008.02D3 beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of three monthly samples, that the MCL is being met. Systems that establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in 179 NAC 3-008.02B item 1.a. or 2.d.

3-008.02C General Monitoring and Compliance Requirements for Radionuclides

3-008.02C1 The Director may require more frequent monitoring than specified in 179 NAC 3-008.02A and 3-008.02B or may require confirmation samples at his/her discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

3-008.02C2 Each public water system must monitor at the time designated by the Director during each compliance period.

3-008.02C3 Compliance with 179 NAC 2-002.04D1 through 2-002.04D4 will be determined based on the analytical result(s) obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

3-008.02C3a For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point. If the average of any sampling point is greater than the MCL, then the system is out of compliance with the MCL.

3-008.02C3b For systems monitoring more than once per year, if any sample result will cause the running average to exceed the MCL at any sample point, the system is out of compliance with the MCL immediately.

3-008.02C3c Systems must include all samples taken and analyzed under the provisions of 179 NAC 3-008.02 in determining compliance, even if that number is greater than the minimum required.

3-008.02C3d If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.

3-008.02C3e If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226, and/or uranium. If the gross alpha particle activity result is less than detection, $\frac{1}{2}$ the detection limit will be used to calculate the annual average.

3-008.02C4 The Director has the discretion to delete results of obvious sampling or analytic errors.

3-008.02C5 If the MCL for radioactivity set forth in 179 NAC 2-002.D1 through 2-002.04D4 is exceeded, the owner of a community water system must give notice to the Director pursuant to 179 NAC 5-004 and the public as required by 179 NAC 4.

3-009 APPROVED LABORATORIES: The Department may enter into an agreement with any laboratory in accordance with the requirements of 179 NAC 20.

3-010 CONSECUTIVE SYSTEMS: When a public water system provides water to one or more other public water systems, the Director may modify the monitoring imposed by 179 NAC 3 to the extent that the inter-connection of the systems justifies treating them as one system for monitoring purposes.

3-011 ALTERNATE ANALYTICAL TECHNIQUES

3-011.01 With the written permission of the Director, concurred in by the Administrator of the U.S. EPA, an alternate analytical technique may be employed. An alternate technique is acceptable only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any MCL. In addition to the methods listed in this chapter, methods found in Alternative Testing Methods Approved for Analyses Under the Safe Drinking Water Act, Appendix A to Subpart C of 40 CFR Part 141, ~~2013, Attachment 4~~ which is incorporated herein by reference, and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-part141-subpartC-appA.pdf> may be used as specified. The use of the alternate analytical technique will not decrease the frequency of monitoring required by 179 NAC 3.

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3-012 CERTIFIED LABORATORIES

3-012.01 For the purpose of determining compliance with 179 NAC 3, 179 NAC 8, 179 NAC 12, 179 NAC 13, and 179 NAC 16, samples may be considered only if they have been analyzed by the Public Health Environmental Laboratory or a laboratory certified by the Department, except that measurements for alkalinity, calcium, conductivity, disinfectant residual, orthophosphate, pH, silica, temperature and turbidity may be performed by any Grade I, Grade II, Grade III, or Grade IV licensed water operator or an individual who has been trained to take these samples. If a licensed operator does not take the sample, Attachment ~~3-1~~ to 179 NAC 3, which is incorporated herein by reference, must be completed and sent to the Department.

3-012.02 The Director may take samples and use the results from such samples to determine compliance by a supplier of water with the applicable requirements of 179 NAC 3.

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¹ Native/labeled.
² Analysis of this pollutant is approved only for the Centralized Waste Treatment industry.
³ Analysis of this pollutant is approved only for the Centralized Waste Treatment and Landfills industries.

TABLE 6—ACID EXTRACTABLE COMPOUND CHARACTERISTIC M/Z'S

Compound	Labeled Ana-log	Primary m/z ¹
p-cresol ²	d ₅	108/116

m/z = mass to charge ratio.
¹ Native/labeled.
² Analysis of this pollutant is approved only for the Centralized Waste Treatment and Landfills industries.

TABLE 7—ACCERTANCE CRITERIA FOR PERFORMANCE TESTS

EGD No.	Compound	Acceptance criteria			Calibration verification sec. 12.5 µg/mL	On-going accuracy sec. 12.7 R (µg/L)
		Initial precision and accuracy section 8.2 (µg/L)		Labeled compound recovery sec. 8.3 and 14.2 P (percent)		
		s (µg/L)	X			
758	acetophenone ¹	34	44-167		85-115	45-162
658	acetophenone-d ₅ ¹	51	28-254	45-162	85-115	22-264
757	aniline ²	32	30-71		85-115	33-154
657	aniline-d ₇ ²	71	15-278	33-154	85-115	12-344
771	o-cresol ¹	40	31-226		85-115	35-196
671	o-cresol-d ₇ ¹	23	30-146	35-196	85-115	31-142
1744	p-cresol ²	59	54-140		85-115	37-203
1644	p-cresol-d ₅ ²	22	11-618	37-203	85-115	16-415
578	2,3-dichloroaniline ¹	13	40-160		85-115	44-144
1330	pyridine ²	28	10-421		83-117	18-238
1230	pyridine-d ₅ ²	ns	7-392	19-238	85-115	4-621

s = Standard deviation of four recovery measurements.
X = Average recovery for four recovery measurements.
EGD = Effluent Guidelines Division.
ns = no specification; limit is outside the range that can be measured reliably.
¹ Analysis of this pollutant is approved only for the Centralized Waste Treatment industry.
² Analysis of this pollutant is approved only for the Centralized Waste Treatment and Landfills industries.

[49 FR 43261, Oct. 26, 1994; 50 FR 692, 695, Jan. 4, 1985, as amended at 51 FR 23702, June 30, 1986; 62 FR 48405, Sept. 15, 1997; 65 FR 3044, Jan. 19, 2000; 65 FR 81295, 81298, Dec. 22, 2000]

APPENDIX B TO PART 136—DEFINITION AND PROCEDURE FOR THE DETERMINATION OF THE METHOD DETECTION LIMIT—REVISION 1.11

Definition

The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero and is determined from analysis of a sample in a given matrix containing the analyte.

Scope and Application

This procedure is designed for applicability to a wide variety of sample types ranging from reagent (blank) water containing analyte to wastewater containing analyte. The MDL for an analytical procedure may vary as a function of sample type. The procedure requires a complete, specific, and well defined analytical method. It is essential that all sample processing steps of the ana-

lytical method be included in the determination of the method detection limit.

The MDL obtained by this procedure is used to judge the significance of a single measurement of a future sample.

The MDL procedure was designed for applicability to a broad variety of physical and chemical methods. To accomplish this, the procedure was made device- or instrument-independent.

Procedure

1. Make an estimate of the detection limit using one of the following:

(a) The concentration value that corresponds to an instrument signal/noise in the range of 2.5 to 5.

(b) The concentration equivalent of three times the standard deviation of replicate instrumental measurements of the analyte in reagent water.

(c) That region of the standard curve where there is a significant change in sensitivity, i.e., a break in the slope of the standard curve.

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(d) Instrumental limitations.

It is recognized that the experience of the analyst is important to this process. However, the analyst must include the above considerations in the initial estimate of the detection limit.

2. Prepare reagent (blank) water that is as free of analyte as possible. Reagent or interference free water is defined as a water sample in which analyte and interferent concentrations are not detected at the method detection limit of each analyte of interest. Interferences are defined as systematic errors in the measured analytical signal of an established procedure caused by the presence of interfering species (interferent). The interferent concentration is presupposed to be normally distributed in representative samples of a given matrix.

3. (a) If the MDL is to be determined in reagent (blank) water, prepare a laboratory standard (analyte in reagent water) at a concentration which is at least equal to or in the same concentration range as the estimated method detection limit. (Recommend between 1 and 5 times the estimated method detection limit.) Proceed to Step 4.

(b) If the MDL is to be determined in another sample matrix, analyze the sample. If the measured level of the analyte is in the recommended range of one to five times the estimated detection limit, proceed to Step 4.

If the measured level of analyte is less than the estimated detection limit, add a known amount of analyte to bring the level of analyte between one and five times the estimated detection limit.

If the measured level of analyte is greater than five times the estimated detection limit, there are two options.

(1) Obtain another sample with a lower level of analyte in the same matrix if possible.

(2) The sample may be used as is for determining the method detection limit if the analyte level does not exceed 10 times the MDL of the analyte in reagent water. The variance of the analytical method changes as the analyte concentration increases from the MDL, hence the MDL determined under

these circumstances may not truly reflect method variance at lower analyte concentrations.

4. (a) Take a minimum of seven aliquots of the sample to be used to calculate the method detection limit and process each through the entire analytical method. Make all computations according to the defined method with final results in the method reporting units. If a blank measurement is required to calculate the measured level of analyte, obtain a separate blank measurement for each sample aliquot analyzed. The average blank measurement is subtracted from the respective sample measurements.

(b) It may be economically and technically desirable to evaluate the estimated method detection limit before proceeding with 4a. This will: (1) Prevent repeating this entire procedure when the costs of analyses are high and (2) insure that the procedure is being conducted at the correct concentration. It is quite possible that an inflated MDL will be calculated from data obtained at many times the real MDL even though the level of analyte is less than five times the calculated method detection limit. To insure that the estimate of the method detection limit is a good estimate, it is necessary to determine that a lower concentration of analyte will not result in a significantly lower method detection limit. Take two aliquots of the sample to be used to calculate the method detection limit and process each through the entire method, including blank measurements as described above in 4a. Evaluate these data:

(1) If these measurements indicate the sample is in desirable range for determination of the MDL, take five additional aliquots and proceed. Use all seven measurements for calculation of the MDL.

(2) If these measurements indicate the sample is not in correct range, reestimate the MDL, obtain new sample as in 3 and repeat either 4a or 4b.

5. Calculate the variance (S²) and standard deviation (S) of the replicate measurements, as follows:

$$s^2 = \frac{1}{n-1} \left[\sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i \right)^2}{n} \right]$$
$$s = (s^2)^{\frac{1}{2}}$$

where:

X_i; i=1 to n, are the analytical results in the final method reporting units obtained from

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the n sample aliquots and Σ refers to the sum of the X values from i=1 to n.
 6. (a) Compute the MDL as follows:

$$MDL = T_{(n-1, 1-\alpha-0.99)} (S)$$

where:

MDL = the method detection limit
 $t_{(n-1, 1-\alpha-0.99)}$ = the students' t value appropriate for a 99% confidence level and a standard deviation estimate with n-1 degrees of freedom. See Table.

S = standard deviation of the replicate analyses.

(b) The 95% confidence interval estimates for the MDL derived in 6a are computed according to the following equations derived from percentiles of the chi square over degrees of freedom distribution (χ^2/df).
 LCL = 0.64 MDL
 UCL = 2.20 MDL

where: LCL and UCL are the lower and upper 95% confidence limits respectively based on seven aliquots.

7. Optional iterative procedure to verify the reasonableness of the estimate of the MDL and subsequent MDL determinations.

(a) If this is the initial attempt to compute MDL based on the estimate of MDL formulated in Step 1, take the MDL as calculated in Step 6, spike the matrix at this calculated MDL and proceed through the procedure starting with Step 4.

(b) If this is the second or later iteration of the MDL calculation, use S^2 from the current MDL calculation and S^2 from the previous MDL calculation to compute the F-ratio. The F-ratio is calculated by substituting the larger S^2 into the numerator S^2_A and the other into the denominator S^2_B . The computed F-ratio is then compared with the F-ratio found in the table which is 3.05 as follows: if $S^2_A/S^2_B < 3.05$, then compute the pooled standard deviation by the following equation:

$$S_{\text{pooled}} = \left[\frac{6S^2_A + 6S^2_B}{12} \right]^{1/2}$$

if $S^2_A/S^2_B > 3.05$, respoke at the most recent calculated MDL and process the samples through the procedure starting with Step 4. If the most recent calculated MDL does not permit qualitative identification when samples are spiked at that level, report the MDL as a concentration between the current and previous MDL which permits qualitative identification.

(c) Use the S_{pooled} as calculated in 7b to compute The final MDL according to the following equation:

$$MDL = 2.681 (S_{\text{pooled}})$$

where 2.681 is equal to $t_{(12, 1-\alpha-0.99)}$.

(d) The 95% confidence limits for MDL derived in 7c are computed according to the following equations derived from percentiles of the chi squared over degrees of freedom distribution.

$$LCL = 0.72 \text{ MDL}$$

$$UCL = 1.65 \text{ MDL}$$

where LCL and UCL are the lower and upper 95% confidence limits respectively based on 14 aliquots.

TABLES OF STUDENTS' T VALUES AT THE 99 PERCENT CONFIDENCE LEVEL

Number of replicates	Degrees of freedom (n-1)	$t_{(n-1, 99)}$
7	6	3.143

TABLES OF STUDENTS' T VALUES AT THE 99 PERCENT CONFIDENCE LEVEL—Continued

Number of replicates	Degrees of freedom (n-1)	$t_{(n-1, 99)}$
8	7	2.998
9	8	2.896
10	9	2.821
11	10	2.764
16	15	2.602
21	20	2.528
26	25	2.485
31	30	2.457
61	60	2.390
∞	∞	2.326

Reporting

The analytical method used must be specifically identified by number or title and the MDL for each analyte expressed in the appropriate method reporting units. If the analytical method permits options which affect the method detection limit, these conditions must be specified with the MDL value. The sample matrix used to determine the MDL must also be identified with MDL value. Report the mean analyte level with the MDL and indicate if the MDL procedure was iterated. If a laboratory standard or a sample that contained a known amount analyte was used for this determination, also report the mean recovery.

~~179 NAC 3 Attachment 4 DELETE~~

Pt. 136, App. C

40 CFR Ch. I (7-1-10 Edition)

If the level of analyte in the sample was below the determined MDL or exceeds 10 times the MDL of the analyte in reagent water, do not report a value for the MDL.

[49 FR 43430, Oct. 26, 1984; 50 FR 694, 696, Jan. 4, 1985, as amended at 51 FR 23703, June 30, 1986]

~~APPENDIX C TO PART 136—INDUCTIVELY COUPLED PLASMA—ATOMIC EMISSION SPECTROMETRIC METHOD FOR TRACE ELEMENT ANALYSIS OF WATER AND WASTES METHOD 200.7~~

~~1. Scope and Application~~

~~1.1 This method may be used for the determination of dissolved, suspended, or total elements in drinking water, surface water, and domestic and industrial wastewaters.~~

~~1.2 Dissolved elements are determined in filtered and acidified samples. Appropriate steps must be taken in all analyses to ensure that potential interferences are taken into account. This is especially true when dissolved solids exceed 1500 mg/L. (See Section 5.)~~

~~1.3 Total elements are determined after appropriate digestion procedures are performed. Since digestion techniques increase the dissolved solids content of the samples, appropriate steps must be taken to correct for potential interference effects. (See Section 5.)~~

~~1.4 Table 1 lists elements for which this method applies along with recommended wavelengths and typical estimated instrumental detection limits using conventional pneumatic nebulization. Actual working detection limits are sample dependent and as the sample matrix varies, these concentrations may also vary. In time, other elements may be added as more information becomes available and as required.~~

~~1.5 Because of the differences between various makes and models of satisfactory instruments, no detailed instrumental operating instructions can be provided. Instead, the analyst is referred to the instruction provided by the manufacturer of the particular instrument.~~

~~2. Summary of Method~~

~~2.1 The method describes a technique for the simultaneous or sequential multielement determination of trace elements in solution. The basis of the method is the measurement of atomic emission by an optical spectroscopic technique. Samples are nebulized and the aerosol that is produced is transported to the plasma torch where excitation occurs. Characteristic atomic-line emission spectra are produced by a radio-frequency inductively coupled plasma (ICP). The spectra are dispersed by a grating spectrometer and the intensities of the lines are~~

~~monitored by photomultiplier tubes. The photocurrents from the photomultiplier tubes are processed and controlled by a computer system. A background correction technique is required to compensate for variable background contribution to the determination of trace elements. Background must be measured adjacent to analyte lines on samples during analysis. The position selected for the background intensity measurement, on either or both sides of the analytical line, will be determined by the complexity of the spectrum adjacent to the analyte line. The position used must be free of spectral interference and reflect the same change in background intensity as occurs at the analyte wavelength measured. Background correction is not required in cases of line broadening where a background correction measurement would actually degrade the analytical result. The possibility of additional interferences named in 5.1 (and tests for their presence as described in 5.2) should also be recognized and appropriate corrections made.~~

~~3. Definitions~~

~~3.1 Dissolved—Those elements which will pass through a 0.45 µm membrane filter.~~

~~3.2 Suspended—Those elements which are retained by a 0.45 µm membrane filter.~~

~~3.3 Total—The concentration determined on an unfiltered sample following vigorous digestion (Section 9.3) or the sum of the dissolved plus suspended concentrations. (Section 9.1 plus 9.2.)~~

~~3.4 Total recoverable—The concentration determined on an unfiltered sample following treatment with hot, dilute mineral acid (Section 9.4.)~~

~~3.5 Instrumental detection limit—The concentration equivalent to a signal, due to the analyte, which is equal to three times the standard deviation of a series of ten replicate measurements of a reagent blank signal at the same wavelength.~~

~~3.6 Sensitivity—The slope of the analytical curve, i.e., functional relationship between emission intensity and concentration.~~

~~3.7 Instrument check standard—A multielement standard of known concentrations prepared by the analyst to monitor and verify instrument performance on a daily basis. (See 7.6.1.)~~

~~3.8 Interference check sample—A solution containing both interfering and analyte elements of known concentration that can be used to verify background and interelement correction factors. (See 7.6.2.)~~

~~3.9 Quality control sample—A solution obtained from an outside source having known concentration values to be used to verify the calibration standards. (See 7.6.3.)~~

~~3.10 Calibration standards—A series of known standard solutions used by the analyst for calibration of the instrument (i.e., preparation of the analytical curve). (See 7.4.)~~

179 NAC 3 Attachment 2 DELETE ATTACHMENT

METHOD #: 340.1 Approved for NPDES and SDWA (Ed. Rev. 1974, 1978)

TITLE: Fluoride, Total (Colorimetric, SPADNS with Bellack Distillation)

ANALYTE: CAS # F Fluoride 7782-41-4

INSTRUMENTATION: Spectrophotometer

STORET No. Total 00951 Dissolved 00950

1.0 Scope and Application

- 1.1 This method is applicable to the measurement of fluoride in drinking, surface, and saline waters, domestic and industrial wastes.
- 1.2 The method covers the range from 0.1 to about 1.4 mg/L F. This range may be extended to 1000 mg/L using the Fluoride Ion Selective Electrode Method (340.2) after distillation.

2.0 Summary of Method

- 2.1 Following distillation to remove interferences, the sample is treated with the SPADNS reagent. The loss of color resulting from the reaction of fluoride with the zirconyl- SPADNS dye is a function of the fluoride concentration.

3.0 Comments

- 3.1 The SPADNS reagent is more tolerant of interfering materials than other accepted fluoride reagents. Reference to Table 414:1, p 388, Standard Methods for the Examination of Waters and Wastewaters, 14th Edition, will help the analyst decide if distillation is required. The addition of the highly colored SPADNS reagent must be done with utmost accuracy because the fluoride concentration is measured as a difference of absorbance in the blank and the sample. A small error in reagent addition is the most prominent source of error in this test.
- 3.2 Care must be taken to avoid overheating the flask above the level of the solution. This is done by maintaining an even flame entirely under the boiling flask.

4.0 Apparatus

- 4.1 Distillation apparatus: A 1-liter round-bottom, long-necked pyrex boiling flask, connecting tube, efficient condenser, thermometer adapter and thermometer reading to 200°C. All connections should be ground glass. Any apparatus equivalent to that shown in Figure 1 is acceptable.
- 4.2 Colorimeter: One of the following

- 4.2.1 Spectrophotometer for use at 570 nm providing a light path of at least 1 cm.
- 4.2.2 Filter photometer equipped with a greenish yellow filter having maximum transmittance at 550 to 580 nm and a light path of at least 1 cm.

5.0 Reagents

- 5.1 Sulfuric acid, H₂SO₄, conc. ^{2 4}
- 5.2 Silver sulfate, Ag₂SO₄ crystals. ^{2 4}
- 5.3 Stock fluoride solution: Dissolve 0.221 g anhydrous sodium fluoride, NaF, in distilled water in a 1-liter volumetric flask and dilute to the mark with distilled water; 1.00 mL = 0.1 mg F.
- 5.4 Standard fluoride solution: Place 100 mL stock fluoride solution (5.3) in a 1 liter volumetric flask and dilute to the mark with distilled water; 1.00 mL = 0.010 mg F.
- 5.5 SPADNS solution: Dissolve 0.958 g SPADNS, sodium 2-(parasulfophenylazo)-1,8-dihydroxy-3,6-naphthalene disulfonate, in distilled water in a 500 mL volumetric flask and dilute to the mark. Stable indefinitely if protected from direct sunlight.
- 5.6 Zirconyl-acid reagent: Dissolve 0.133 g zirconyl chloride octahydrate, ZrOCl₂·8H₂O in approximately 25 mL distilled water in a 500 mL volumetric ^{2 2} flask. Add 350 mL conc HCl and dilute to the mark with distilled water.
- 5.7 Acid-zirconyl-SPADNS reagent: Mix equal volumes of SPADNS solution (5.5) and zirconyl-acid reagent (5.6). The combined reagent is stable for at least 2 years.
- 5.8 Reference solution: Add 10 mL SPADNS solution (5.5) to 100 mL distilled water. Dilute 7 mL conc HCl to 10 mL and add to the dilute SPADNS solution. This solution is used for zeroing the spectrophotometer or photometer. It is stable and may be used indefinitely.
- 5.9 Sodium arsenite solution: Dissolve 5.0 g NaAsO₂ in distilled water in a 1-liter ² volumetric flask and dilute to the mark with distilled water (CAUTION: Toxic-avoid ingestion).

6.0 Procedure

- 6.1 Preliminary distillation
 - 6.1.1 Place 400 mL distilled water in the distilling flask.
 - 6.1.2 Carefully add 200 mL conc. H₂SO₄ and swirl until contents are ^{2 4} homogeneous.
 - 6.1.3 Add 25 to 35 glass beads, connect the apparatus (Figure 1 making sure all joints are tight).
 - 6.1.4 Heat slowly at first, then as rapidly as the efficiency of the condenser will permit (distillate must be cool) until the temperature of the flask contents reaches exactly 180°C. Discard the distillate. This process removes fluoride contamination and adjusts the acid-water ratio for subsequent distillations.
 - 6.1.5 Cool to 120°C or below.

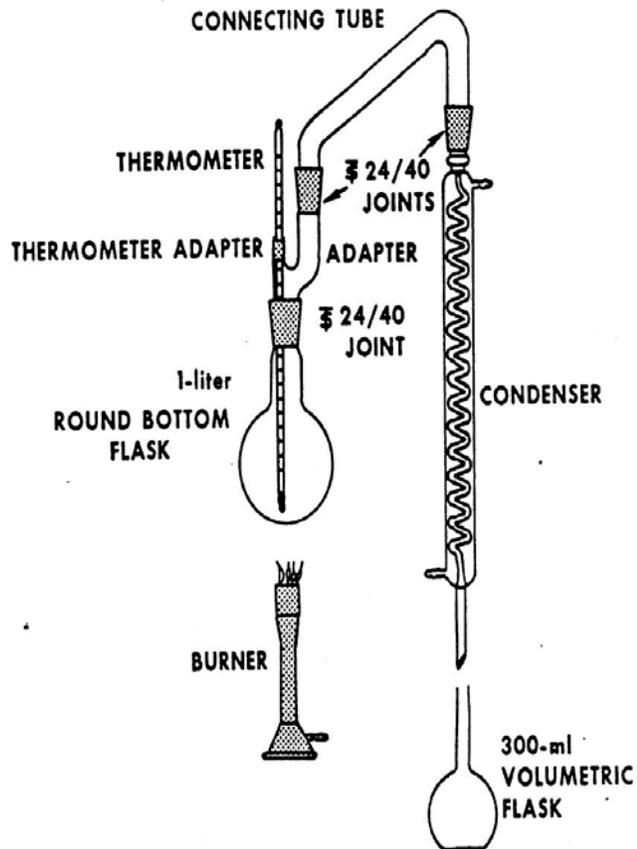


FIGURE 1 DIRECT DISTILLATION APPARATUS FOR FLUORIDE.

- 6.1.6 Add 300 mL sample, mix thoroughly, distill as in 6.1.4 until temperature reaches 180°C. Do not heat above 180°C to prevent sulfate carryover.
- 6.1.7 Add Ag SO (5.2) at a rate of 5 mg/mg Cl when high chloride samples ^{2 4} are distilled.
- 6.1.8 Use the sulfuric acid solution in the flask repeatedly until the contaminants from the samples accumulate to such an extent that recovery is affected or interferences appear in the distillate. Check periodically by distilling standard fluoride samples.
- 6.1.9 High fluoride samples may require that the still be flushed by using distilled water and combining distillates.
- 6.2 Colorimetric Determination
 - 6.2.1 Prepare fluoride standards in the range 0 to 1.40 mg/L by diluting appropriate quantities of standard fluoride solution (5.4) to 50 mL with distilled water.
 - 6.2.2 Pipet 5.00 mL each of SPADNS solution (5.5) and zirconyl-acid reagent (5.6) or 10.00 mL of the mixed acid-zirconyl-SPADNS reagent (5.7) to each standard and mix well.
 - 6.2.3 Set photometer to zero with reference solution (5.8) and immediately obtain absorbance readings of standards.
 - 6.2.4 Plot absorbance versus concentration. Prepare a new standard curve whenever fresh reagent is made.
 - 6.2.5 If residual chlorine is present pretreat the sample with 1 drop (0.05 ml) NaAsO₂ solution (5.9) per 0.1 mg residual chlorine mix. Sodium ₂ arsenite concentrations of 1300 mg/L produce an of 0.1 mg/L at 1.0 mg/L F.
 - 6.2.6 Use a 50 mL sample or a portion diluted to 50 mL. Adjust the temperature of the sample to that used for the standard curve.
 - 6.2.7 Perform step 6.2.2 and 6.2.3.

7.0 Calculations

- 7.1 Read the concentration in the 50 mL sample using the standard curve (6.2.4)
- 7.2 Calculate as follows:

$$\text{mg/L F} = \frac{\text{mg F} \times 1,000}{\text{mL sample}}$$

- 7.3 When a sample (mL sample) is diluted to a volume (B) and then a portion (C) is analyzed, use:

$$\text{mg/L F} = \frac{\text{mg F} \times 1,000}{\text{m/L sample}} \times \frac{\text{B}}{\text{C}}$$

8.0 Precision and Accuracy

- 8.1 On a sample containing 0.83 mg/L F with no interferences, 53 analysts using the Bellack distillation and the SPADNS reagent obtained a mean of 0.81 mg/L F with a standard deviation of ± 0.089 mg/L.
- 8.2 On a sample containing 0.57 mg/L F (with 200 mg/L SO and 10 mg/L Al as 4 interferences) 53 analysts using the Bellack distillation obtained a mean of 0.60 mg/L F with a standard deviation of ± 0.103 mg/L.
- 8.3 On a sample containing 0.68 mg/L F (with 200 mg/L SO , 2 mg/L Al and 2.5 4 mg/L [Na(PO)] as interferences), 53 analysts using the Bellack distillation 3 6 obtained a mean of 0.72 mg/L F with a standard deviation of ± 0.092 mg/L. (Analytical Reference Service, Sample 11 I-B water, Fluoride, August, 1961.)

Bibliography

1. Standard Methods for the Examination of Water and Wastewater, p. 389-390 (Method No.414A, Preliminary Distillation Step) and p. 393-394 (Method 414C SPADNS) 14th Edition, (1975).
2. Annual Book of ASTM Standards, Part 31, "Water", Standard D 1179-72, Method A, p. 310 (1976).

METHOD #: 340.2 Approved for NPDES and SDWA (Editorial Rev.1974)
TITLE: Fluoride (Potentiometric, Ion Selective Electrode)
ANALYTE: CAS # F Fluoride 7782-41-4
INSTRUMENTATION: ISE
STORET No: Total 00951
 Dissolved 00950

1.0 Scope and Application

- 1.1 This method is applicable to the measurement of fluoride in drinking, surface and saline waters, domestic and industrial wastes.
- 1.2 Concentration of fluoride from 0.1 up to 1000 mg/liter may be measured.
- 1.3 For Total or Total Dissolved Fluoride, the Bellack distillation is required for NPDES monitoring but is not required for SDWA monitoring.

2.0 Summary of Method

- 2.1 The fluoride is determined potentiometrically using a fluoride electrode in conjunction with a standard single junction sleeve-type reference electrode and a pH meter having an, expanded millivolt scale or a selective ion meter having a direct concentration scale for fluoride.
- 2.2 The fluoride electrode consists of a lanthanum fluoride crystal across which a potential is developed by fluoride ions. The cell may be represented by Ag/Ag Cl, Cl (0.3), F (0.001) LaF/test solution/SCE/. --

3.0 Interferences

- 3.1 Extremes of pH interfere; sample pH should be between 5 and 9. Polyvalent cations of Si, Fe and Al interfere by forming complexes with fluoride. The degree of interference depends upon the concentration of the complexing cations, the concentration of fluoride and the pH of the sample. The addition of a pH 5.0 buffer (described below) containing a strong chelating agent preferentially complexes aluminum (the most common interference), silicon and iron and eliminates the pH problem.

4.0 Sampling Handling and Preservation

- 4.1 No special requirements.

5.0 Apparatus

- 5.1 Electrometer (pH meter), with expanded mv scale, or a selective ion meter such as the Orion 400 Series.
- 5.2 Fluoride Ion Activity Electrode, such as Orion No. 94-09 . (1)
- 5.3 Reference electrode, single junction, sleeve-type, such as Orion No. 90-01, Beckman No. 40454, or Corning No. 476010.

5.4 Magnetic Mixer, Teflon-coated stirring bar.

6.0 Reagents

- 6.1 Buffer solution, pH 5.0-5.5: To approximately 500 mL of distilled water in a 1 liter beaker add 57 mL of glacial acetic acid, 58 g of sodium chloride and 4 g of CDTA . Stir to dissolve and cool to room temperature. Adjust pH of (2) solution to between 5.0 and 5.5 with 5 N sodium hydroxide (about 150 mL will be required). Transfer solution to a 1 liter volumetric flask and dilute to the mark with distilled water. For work with brines, additional NaCl should be added to raise the chloride level to twice the highest expected level of chloride in the sample.
- 6.2 Sodium fluoride, stock solution: 1.0 mL = 0.1 mg F. Dissolve 0.2210 g of sodium fluoride in distilled water and dilute to 1 liter in a volumetric flask. Store in chemical-resistant glass or polyethylene.
- 6.3 Sodium fluoride, standard solution: 1.0 mL = 0.01 mg F. Dilute 100.0 mL of sodium fluoride stock solution (6.2) to 1000 mL with distilled water.
- 6.4 Sodium hydroxide, 5N: Dissolve 200 g sodium hydroxide in distilled water, cool and dilute to 1 liter.

7.0 Calibration

- 7.1 Prepare a series of standards using the fluoride standard solution (6.3) in the range of 0 to 2.00 mg/L by diluting appropriate volumes to 50.0 mL. The following series may be used:

Millimeters of Standard (1.0 mL = 0.01 mg/F)	Concentration when Diluted to 50 ml, mg F/liter
0.00	0.00
1.00	0.20
2.00	0.40
3.00	0.60
4.00	0.80
5.00	1.00
6.00	1.20
8.00	1.60
10.00	2.00

- 7.2 Calibration of Electrometer: Proceed as described in (8.1). Using semilogarithmic graph paper, plot the concentration of fluoride in mg/liter on the log axis vs. the electrode potential developed in the standard on the linear axis, starting with the lowest concentration at the bottom of the scale.
Calibration of a selective ion meter: Follow the directions of the manufacturer for the operation of the instrument.

8.0 Procedure

- 8.1 Place 50.0 mL of sample or standard solution and 50.0 mL of buffer (See Note) in a 150 mL beaker. Place on a magnetic stirrer and mix at medium speed. Immerse the electrodes in the solution and observe the meter reading while mixing. The electrodes must remain in the solution for at least three minutes or until the reading has stabilized. At concentrations under 0.5 mg/liter F, it may require as long as five minutes to reach a stable meter reading; high concentrations stabilize more quickly. If a pH meter is used, record the potential measurement for each unknown sample and convert the potential reading to the fluoride ion concentration of the unknown using the standard curve. If a selective ion meter is used, read the fluoride level in the unknown sample directly in mg/L on the fluoride scale.

NOTE: For industrial waste samples, this amount of buffer may not be adequate. Analyst should check pH first. If highly basic (> 9), add 1 N HCl to adjust pH to 8.3.

9.0 Precision and Accuracy

- 9.1 A synthetic sample prepared by the Analytical Reference Service, PHS, containing 0.85 mg/L fluoride and no interferences was analyzed by 111 analysts; a mean of 0.84 mg/L with a standard deviation of ± 0.03 was obtained.
- 9.2 On the same study, a synthetic sample containing 0.75 mg/L fluoride, 2.5 mg/L polyphosphate and 300 mg/L alkalinity, was analyzed by the same 111 analysts; a mean of 0.75 mg/L fluoride with a standard deviation of ± 0.036 was obtained.

Bibliography

1. Patent No. 3,431,182 (March 4, 1969).
2. CDTA is the abbreviated designation of 1,2-cyclohexylene dinitrilo tetraacetic acid. (The monohydrate form may also be used.) Eastman Kodak 15411, Mallinckrodt 2357, Sigma D 1383, Tridom-Fluka 32869-32870 or equivalent.
3. Standard Methods for the Examination of Water and Wastewaters, p 389, Method No. 414A, Preliminary Distillation Step (Bellack), and p 391, Method No. 414B, Electrode Method, 14th Edition (1975).
4. Annual Book of ASTM Standards, Part 31, "Water", Standard D1179-72, Method B, p 312 (1976).

METHOD #: 340.3 Approved for NPDES (Issued 1971)
TITLE: Fluoride (Colorimetric, Automated Complexone)
ANALYTE: CAS # F Fluoride 7782-41-4
INSTRUMENTATION: Autoanalyzer
STORET No. Total 00951
Dissolved 00950

1.0 Scope and Application

- 1.1 This method is applicable to drinking, surface and saline waters, domestic and industrial wastes. The applicable range of the method is 0.05 to 1.5 mg F/L. Twelve samples per hour can be analyzed.
- 1.2 For Total or Total Dissolved Fluoride, the Bellack Distillation must be performed on the samples prior to analysis by the complexone method.

2.0 Summary of Method

- 2.1 Fluoride ion reacts with the red cerous chelate of alizarin complexone. It is unlike other fluoride procedures in that a positive color is developed as contrasted to a bleaching action in previous methods.

3.0 Sample Handling and Preservation

- 3.1 No special requirements.

4.0 Interferences

- 4.1 Method is free from most anionic and cationic interferences, except aluminum, which forms an extremely stable fluoro compound, AlF_3 . This is overcome by treatment with 8-hydroxyquinoline to complex the aluminum and by subsequent extraction with chloroform. At aluminum levels below 0.2 mg/L, the extraction procedure is not required.

5.0 Apparatus

- 5.1 Technicon AutoAnalyzer Unit consisting of:
 - 5.1.1 Sampler I.
 - 5.1.2 Manifold.
 - 5.1.3 Proportioning pump.
 - 5.1.4 Continuous filter.
 - 5.1.5 Colorimeter equipped with 15 mm tubular flow cell and 650 filters.
 - 5.1.6 Recorder equipped with range expander.

6.0 Reagents

- 6.1 Sodium acetate solution: Dissolve 272 g (2 moles) of sodium acetate in distilled water and dilute to 1 liter.
- 6.2 Acetic acid-8-hydroxyquinoline solution: Dissolve 6 g of 8-hydroxyquinoline in 34 mL of conc. acetic acid, and dilute to 1 liter with distilled water.
- 6.3 Chloroform: Analytical reagent grade.
- 6.4 Ammonium acetate solution (6.7%): Dissolve 67 g of ammonium acetate in distilled water and dilute to 1 liter.
- 6.5 Hydrochloric acid (2 N): Dilute 172 mL of conc. HCl to 1 liter
- 6.6 Lanthanum alizarin fluoride blue solution : Dissolve 0.18 g of alizarin fluoride (1) blue in a solution containing 0.5 mL of conc. ammonium hydroxide and 15 mL of 6.7% ammonium acetate (6.4). Add a solution that contains 41 g of anhydrous sodium carbonate and 70 mL of glacial acetic acid in 300 mL of distilled water. Add 250 mL of acetone. Dissolve 0.2 g of lanthanum oxide in 12.5 mL of 2 N hydrochloric acid (6.5) and mix with above solution. Dilute to 1 liter.
- 6.7 Stock solution: Dissolve 2.210 g of sodium fluoride in 100 mL of distilled water and dilute to 1 liter in a volumetric flask. 1.0 mL = 1.0 mg F.
- 6.8 Standard Solution: Dilute 10.0 mL of stock solution to 1 liter in a volumetric flask. 1.0 mL = 0.01 mg F.
 - 6.8.1 Using standard solution, prepare the following standards in 100 mL volumetric flask:

mg F/L	mL Standard Solution/100 mL
0.05	0.5
0.10	1.0
0.20	2.0
0.40	4.0
0.60	6.0
0.80	8.0
1.00	10.0
1.20	12.0
1.50	15.0

7.0 Procedure

- 7.1 Set up manifold as shown in Figure 1.
- 7.2 Allow both colorimeter and recorder to warm up for 30 minutes. Run a baseline with all reagents, feeding distilled water through the sample line. Adjust dark current and operative opening on colorimeter to obtain stable baseline.
- 7.3 Place distilled water wash tubes in alternate openings in Sampler and set sample timing at 2.5 minutes.
- 7.4 Arrange fluoride standards in Sampler in order of decreasing concentration. Complete loading of Sampler tray with unknown samples.
- 7.5 Switch sample line from distilled water to Sampler and begin analysis.

8.0 Calculation

- 8.1 Prepare standard curve by plotting peak heights of processed fluoride standards against concentration values. Compute concentration of samples by comparing sample peak heights with standard curve.

9.0 Precision and Accuracy

- 9.1 In a single laboratory (EMSL), using surface water samples at concentrations of 0.06, 0.15, and 1.08 mg F/L, the standard deviation was ± 0.018 .
- 9.2 In a single laboratory (EMSL), using surface water samples at concentrations of 0.14 and 1.25 mg F/L, recoveries were 89% and 102%, respectively.

Bibliography

1. J.T. Baker Laboratory Chemical No. J 112 or equivalent.
2. Greenhaigh, R., and Riley, J. P., "The Determination of Fluorides in Natural Waters, with Particular Reference to Sea Water". *Anal. Chim. Acta*, 25, 179 (1961).
3. Chan, K. M., and Riley, J. P., "The Automatic Determination of Fluoride in Sea Water and Other Natural Water". *Anal. Chim. Acta*, 35, 365 (1966).
4. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p 614, Method 603, (1975).

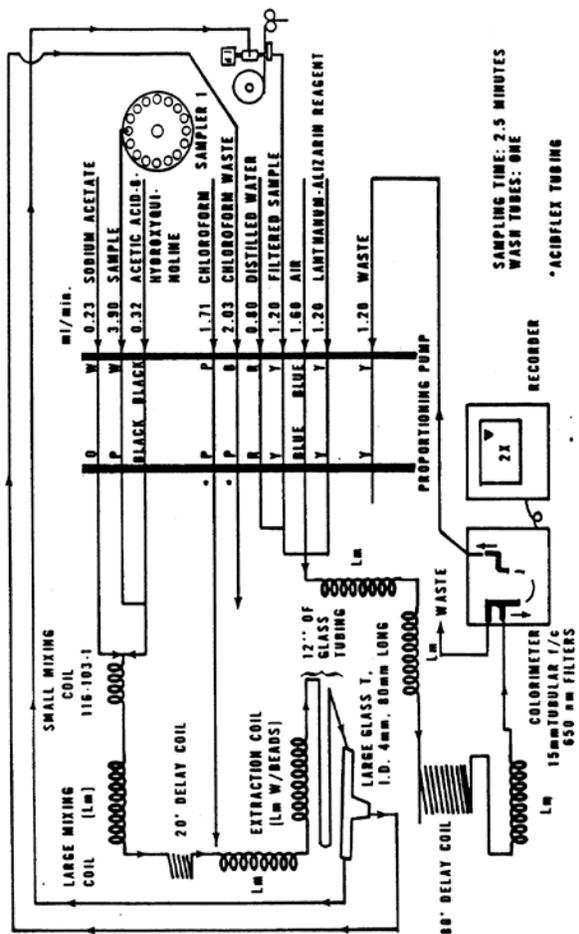


FIGURE 1. FLUORIDE MANIFOLD AA-1

179 NAC 3 ATTACHMENT 3-1

Sampling Training For Individuals Other Than Licensed Operators

PWS System or Community Name: _____

Name of individual taking samples: _____

Parameter(s) sampled routinely by the above individual:

Trainer and Title: _____

Training material used: _____

Handouts given to the above individual:

I certify that on _____ I personally provided the necessary sampling
(Date)

training to assure quality data and approve the above individual as qualified to perform the
above sampling tasks.

X _____
(Signature of Trainer) (License Number)

I certify that I did receive said training and I understand how to properly sample the above
parameters.

X _____
(Signature of Approved Sampling Individual)

When the above-named trained individual no longer takes the samples the individual has been
trained to take, I will inform the Division of Public Health of the Nebraska Department of Health
and Human Services, Field Services Program Manager at (402) 471-0521 within seven days.
Acknowledged by System Owner or Operator in Charge:

X _____ Date: _____
(Signature)

(Keep a copy for your records and submit original within seven days to DHHS, Public Water Program at
P. O. Box 95026, Lincoln, NE 68509-5026)

~~179 NAC 3 ATTACHMENT 4 DELETE ATTACHMENT~~

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Appendix A to Subpart C of Part 141 - Alternative Testing Methods Approved for Analyses Under the Safe Drinking Water

Act. Only the editions stated in the following table are approved.

Alternative testing methods for contaminants listed at 40 CFR 141.21(f)(3)			
Organism	Methodology	SM 21 st Edition ¹	Other
Total Coliforms	Total Coliform Fermentation Technique	9221 A, B	
	Total Coliform Membrane Filter Technique	9222 A, B, C	
	Presence-Absence (P-A) Coliform Test	9221 D	
	ONPG-MUG Test	9223	
	Colitag TM		Modified Colitag TM ¹³

Alternative testing methods for contaminants listed at 40 CFR 141.21(f)(6)					
Organism	Methodology	SM 20 th Edition ⁶	SM 21 st Edition ¹	SM Online ³	Other
<i>E. coli</i>	ONPG-MUG Test	9223 B	9223 B	9223 B-97	Modified Colitag TM ¹³

Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Alkalinity	Titrimetric		2320 B			
Antimony	Hydride – Atomic Absorption				D 3697-07	
	Atomic Absorption; Furnace		3113 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²				

Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Arsenic	Atomic Absorption; Furnace		3113 B		D 2972-08 C	
	Hydride Atomic Absorption		3114 B		D 2972-08 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Barium	Inductively Coupled Plasma		3120 B			
	Atomic Absorption; Direct		3111 D			
	Atomic Absorption; Furnace		3113 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Beryllium	Inductively Coupled Plasma		3120 B			
	Atomic Absorption; Furnace		3113 B		D 3645-08 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Cadmium	Atomic Absorption; Furnace		3113 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				

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Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Calcium	EDTA titrimetric		3500-Ca B		D 511-09 A	
	Atomic Absorption; Direct Aspiration		3111 B		D 511-09 B	
	Inductively Coupled Plasma		3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Chromium	Inductively Coupled Plasma		3120 B			
	Atomic Absorption; Furnace		3113 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Copper	Atomic Absorption; Furnace		3113 B		D 1688-07 C	
	Atomic Absorption; Direct Aspiration		3111 B		D 1688-07 A	
	Inductively Coupled Plasma		3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Conductivity	Conductance		2510 B			

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Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Cyanide	Manual Distillation followed by Spectrophotometric, Amenable		4500-CN G		D2036-06 A	
	Spectrophotometric Manual		4500-CN E		D2036-06 B	
	Selective Electrode		4500-CN F		D2036-06 A	
	Gas Chromatography/Mass Spectrometry Headspace					ME355.01 ⁷
	Ion Chromatography			4110 B		
Fluoride	Manual Distillation; Colorimetric SPADNS		4500-F B, D			
	Manual Electrode		4500-F C		D1179-04 B	
	Automated Alizarin		4500-F E			
Lead	Atomic Absorption; Furnace		3113 B		D 3559-08 D	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Magnesium	Atomic Absorption		3111 B		D 511-09 B	
	Inductively Coupled Plasma		3120 B			
	Complexation Titrimetric Methods		3500-Mg B		D 511-09 A	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Mercury	Manual, Cold Vapor		3112 B			

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Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Nickel	Inductively Coupled Plasma		3120 B			
	Atomic Absorption; Direct		3111 B			
	Atomic Absorption; Furnace		3113 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Nitrate	Ion Chromatography		4110 B			
	Automated Cadmium Reduction		4500-NO ₃ ⁻ F			
	Manual Cadmium Reduction		4500-NO ₃ ⁻ E			
	Ion Selective Electrode		4500-NO ₃ ⁻ D			
	Reduction/Colorimetric					Systea Easy (1-Reagent) ⁵
Nitrite	Ion Chromatography		4110 B			
	Automated Cadmium Reduction		4500-NO ₃ ⁻ F			
	Manual Cadmium Reduction		4500-NO ₃ ⁻ E			
	Spectrophotometric		4500-NO ₂ ⁻ B			
	Reduction/Colorimetric					Systea Easy (1-Reagent) ⁵

Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Orthophosphate	Ion Chromatography		4110 B			
	Colorimetric, ascorbic acid, single reagent		4500-P E	4500-P E-99		
	Colorimetric, Automated, Ascorbic Acid		4500-P F	4500-P F-99		
pH	Electrometric		4500-H ⁺ B			
Selenium	Hydride-Atomic Absorption		3114 B		D 3859-08 A	
	Atomic Absorption; Furnace		3113 B		D 3859-08 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Silica	Colorimetric				D859-05	
	Molybdosilicate		4500-SiO ₂ C			
	Heteropoly blue		4500-SiO ₂ D			
	Automated for Molybdate-reactive Silica		4500-SiO ₂ E			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
	Inductively Coupled Plasma			3120 B		

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Alternative testing methods for contaminants listed at 40 CFR 141.23 (k)(1)						
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³	ASTM ⁴	Other
Sodium	Atomic Absorption; Direct Aspiration		3111 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2				
Temperature	Thermometric		2550			

Alternative testing methods for contaminants listed at 40 CFR 141.24 (e)(1)				
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³
Benzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3⁹		
Carbon tetrachloride	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Chlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,2-Dichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,4-Dichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,2-Dichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
cis-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Trans-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Dichloromethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,2-Dichloropropane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Ethylbenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Styrene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Tetrachloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,1,1-Trichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		

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Alternative testing methods for contaminants listed at 40 CFR 141.24 (e)(1)				
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³
Trichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Toluene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,2,4-Trichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,1-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,1,2-Trichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Vinyl chloride	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Xylenes (total)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B-04
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴	6640 B	6640 B-01
Dibromochloropropane (DBCP)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Ethyl dibromide (EDB)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Oxamyl	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B-04
Total Trihalomethanes	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		

Alternative testing methods for contaminants listed at 40 CFR 141.25(a)			
Contaminant	Methodology	SM 21 st Edition ¹	ASTM ⁴
Naturally Occurring:			
Gross alpha and beta	Evaporation	7110 B	
Gross alpha	Coprecipitation	7110 C	
Radium 226	Radon emanation	7500-Ra C	D3454-05
	Radiochemical	7500-Ra B	D2460-07

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Alternative testing methods for contaminants listed at 40 CFR 141.24 (e)(1)				
Contaminant	Methodology	EPA Method	SM 21 st Edition ¹	SM Online ³
Trichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Toluene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,2,4-Trichlorobenzene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,1-Dichloroethylene	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
1,1,2-Trichloroethane	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Vinyl chloride	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Xylenes (total)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B-04
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴	6640 B	6640 B-01
Dibromochloropropane (DBCP)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Ethyl dibromide (EDB)	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		
Oxamyl	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection		6610 B	6610 B-04
Total Trihalomethanes	Purge & Trap/Gas Chromatography/Mass Spectrometry	524.3		

Alternative testing methods for contaminants listed at 40 CFR 141.25(a)			
Contaminant	Methodology	SM 21 st Edition ¹	ASTM ⁴
Naturally Occurring:			
Gross alpha and beta	Evaporation	7110 B	
Gross alpha	Coprecipitation	7110 C	
Radium 226	Radon emanation	7500-Ra C	D3454-05
	Radiochemical	7500-Ra B	D2460-07

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Alternative testing methods for contaminants listed at 40 CFR 141.25(a)			
Contaminant	Methodology	SM 21 st Edition ¹	ASTM ⁴
Radium 228	Radiochemical	7500-Ra D	
Uranium	Radiochemical	7500-U B	
	ICP-MS		D5673-05
	Alpha spectrometry	7500-U C	
	Laser Phosphorimetry		D5174-07
Man-Made:			
Radioactive Cesium	Radiochemical	7500-Cs B	
	Gamma Ray Spectrometry	7120	D3649-06
Radioactive Iodine	Radiochemical	7500-I B	D3649-06
		7500-I C	
		7500-I D	
	Gamma Ray Spectrometry	7120	D4785-08
Radioactive Strontium 89, 90	Radiochemical	7500-Sr B	
Tritium	Liquid Scintillation	7500- ³ H B	D4107-08
Gamma Emitters	Gamma Ray Spectrometry	7120	D3649-06
		7500-Cs B	D4785-08
		7500-I B	

Alternative testing methods for contaminants listed at 40 CFR 141.74(a)(1)			
Organism	Methodology	SM 21 st Edition ¹	Other
Total Coliform	Total Coliform Fermentation Technique	9221 A, B, C	
	Total Coliform Membrane Filter Technique	9222 A, B, C	
	ONPG-MUG Test	9223	
Fecal Coliforms	Fecal Coliform Procedure	9221 E	

Alternative testing methods for contaminants listed at 40 CFR 141.74(a)(1)			
Organism	Methodology	SM 21 st Edition ¹	Other
	Fecal Coliform Filter Procedure	9222 D	
Heterotrophic bacteria	Pour Plate Method	9215 B	
Turbidity	Nephelometric Method	2130 B	
	Laser Nephelometry (on-line)		Mitchell M5271 ¹⁰
	LED Nephelometry (on-line)		Mitchell M5331 ¹¹
	LED Nephelometry (on-line)		AMI Turbiwell ¹⁵
	LED Nephelometry (portable)		Orion AQ4500 ¹²

Alternative testing methods for disinfectant residuals listed at 40 CFR 141.74(a)(2)				
Residual	Methodology	SM 21 st Edition ¹	ASTM ⁴	Other
Free Chlorine	Amperometric Titration	4500-C1 D	D 1253-08	
	DPD Ferrous Titrimetric	4500-C1 F		
	DPD Colorimetric	4500-C1 G		
	Syringaldazine (FACTS)	4500-C1 H		
	On-line Chlorine Analyzer			EPA 334.0 ¹⁶
	Amperometric Sensor			ChloroSense ¹⁷
Total Chlorine	Amperometric Titration	4500-C1 D	D 1253-08	
	Amperometric Titration (Low level measurement)	4500-C1 E		
	DPD Ferrous Titrimetric	4500-C1 F		
	DPD Colorimetric	4500-C1 G		
	Iodometric Electrode	4500-C1 I		
	On-line Chlorine Analyzer			EPA 334.0 ¹⁶

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Alternative testing methods for disinfectant residuals listed at 40 CFR 141.74(a)(2)				
Residual	Methodology	SM 21 st Edition ¹	ASTM ⁴	Other
	Amperometric Sensor			ChloroSense ¹⁷
Chlorine	Amperometric Titration	4500-ClO ₂ C		
Dioxide	Amperometric Titration	4500-ClO ₂ E		
Ozone	Indigo Method	4500-O ₃ B		

Alternative testing methods for contaminants listed at 40 CFR 141.131(b)(1)				
Contaminant	Methodology	EPA Method	ASTM ⁴	SM 21 st Edition ¹
TTHM	P&T/GC/MS	524.3 ⁹		
HAA5	LLE (diazomethane)/GC/ECD			6251 B
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴		
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0 ^{14*}		
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴		
	Chemically Suppressed Ion Chromatography		D 6581-08 A	
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B	
Chlorite	Chemically Suppressed Ion Chromatography		D 6581-08 A	
	Electrolytically Suppressed Ion Chromatography		D 6581-08 B	
Chlorite – daily monitoring as prescribed in 40 CFR 141.132(b)(2)(i)(A)	Amperometric Titration			4500-ClO ₂ E

Alternative testing methods for disinfectant residuals listed at 40 CFR 141.131(c)(1)				
Residual	Methodology	SM 21 st Edition ¹	ASTM ⁴	Other

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Alternative testing methods for disinfectant residuals listed at 40 CFR 141.131(c)(1)				
Residual	Methodology	SM 21 st Edition ¹	ASTM ⁴	Other
Free Chlorine	Amperometric Titration	4500-C1 D	D 1253-08	
	DPD Ferrous Titrimetric	4500-C1 F		
	DPD Colorimetric	4500-C1 G		
	Syringaldazine (FACTS)	4500-C1 H		
	Amperometric Sensor			ChloroSense ¹⁷
	On-line Chlorine Analyzer			EPA 334.0 ¹⁶
Combined Chlorine	Amperometric Titration	4500-C1 D	D 1253-08	
	DPD Ferrous Titrimetric	4500-C1 F		
	DPD Colorimetric	4500-C1 G		
Total Chlorine	Amperometric Titration	4500-C1 D	D 1253-08	
	Low level Amperometric Titration	4500-C1 E		
	DPD Ferrous Titrimetric	4500-C1 F		
	DPD Colorimetric	4500-C1 G		
	Iodometric Electrode	4500-C1 I		
	Amperometric Sensor			ChloroSense ¹⁷
	On-line Chlorine Analyzer			EPA 334.0 ¹⁶
	Chlorine Dioxide	Amperometric Method II	4500-C1 O ₂ E	

Alternative testing methods for disinfectant residuals listed at 40 CFR 141.131(c)(2), if approved by the State		
Residual	Methodology	Method
Free Chlorine	Test Strips	Method D99-003 ⁵

Alternative testing methods for parameters listed at 40 CFR 141.131(d)			
Parameter	Methodology	SM 21 st Edition ¹	EPA

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Alternative testing methods for parameters listed at 40 CFR 141.131(d)			
Parameter	Methodology	SM 21 st Edition ¹	EPA
Total Organic Carbon (TOC)	High Temperature Combustion	5310 B	415.3, Rev 1.2 ¹⁹
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	415.3, Rev 1.2
	Wet Oxidation	5310 D	415.3, Rev 1.2
Specific Ultraviolet Absorbance (SUVA)	Calculation using DOC and UV ₂₅₄ data		415.3, Rev 1.2
Dissolved Organic Carbon (DOC)	High Temperature Combustion	5310 B	415.3, Rev 1.2
	Persulfate-Ultraviolet or Heated Persulfate Oxidation	5310 C	415.3, Rev 1.2
	Wet Oxidation	5310 D	415.3, Rev 1.2
Ultraviolet absorption at 254 nm (UV ₂₅₄)	Spectrophotometry	5910 B	415.3, Rev 1.2

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Alternative testing methods with MRL ≤ 0.0010 mg/L for monitoring listed at 40 CFR 141.132(b)(3)(ii)(B)		
Contaminant	Methodology	EPA Method
Bromate	Two-Dimensional Ion Chromatography (IC)	302.0 ¹⁸
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹⁴

Alternative testing methods for contaminants listed at 40 CFR 141.402(c)(2)					
Organism	Methodology	SM 20 th Edition ⁶	SM 21 st Edition ¹	SM Online ³	Other
<i>E. coli</i>	Colilert		9223 B	9223 B-97	
	Colisure		9223 B	9223 B-97	
	Colilert-18	9223 B	9223 B	9223 B-97	
	Readycult®				Readycult® ²⁰

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Alternative testing methods for contaminants listed at 40 CFR 141.402(c)(2)					
Organism	Methodology	SM 20 th Edition ⁶	SM 21 st Edition ¹	SM Online ³	Other
	Colitag				Modified Colitag™ ¹³
	Chromocult®				Chromocult® ²¹
Enterococci	Multiple-Tube Technique			9230 B-04	

Alternative testing methods for contaminants listed at 40 CFR 141.704(b)		
Organism	Methodology	SM 20 th Edition ⁶
<i>E. coli</i>	Membrane Filtration, Two Step	9222 D/9222 G

Alternative testing methods for contaminants listed at 40 CFR 143.4(b)					
Contaminant	Methodology	EPA Method	ASTM ⁴	SM 21 st Edition ¹	SM Online ³
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2 ²			
	Atomic Absorption; Direct			3111 D	
	Atomic Absorption; Furnace			3113 B	
	Inductively Coupled Plasma			3120 B	
Chloride	Silver Nitrate Titration		D 512-04 B	4500-Cl ⁻ B	
	Ion Chromatography			4110 B	
	Potentiometric Titration			4500-Cl ⁻ D	
Color	Visual Comparison			2120 B	
Foaming Agents	Methylene Blue Active Substances (MBAS)			5540 C	
Iron	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2			
	Atomic Absorption; Direct			3111 B	

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Alternative testing methods for contaminants listed at 40 CFR 143.4(b)					
Contaminant	Methodology	EPA Method	ASTM ⁴	SM 21 st Edition ¹	SM Online ³
	Atomic Absorption; Furnace			3113 B	
	Inductively Coupled Plasma			3120 B	
Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2			
	Atomic Absorption; Direct			3111 B	
	Atomic Absorption; Furnace			3113 B	
	Inductively Coupled Plasma			3120 B	
Odor	Threshold Odor Test			2150 B	
Silver	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2			
	Atomic Absorption; Direct			3111 B	
	Atomic Absorption; Furnace			3113 B	
	Inductively Coupled Plasma			3120 B	
Sulfate	Ion Chromatography			4110 B	
	Gravimetric with ignition of residue			4500-SO ₄ ⁻² C	4500-SO ₄ ⁻² C-97
	Gravimetric with drying of residue			4500-SO ₄ ⁻² D	4500-SO ₄ ⁻² D-97
	Turbidimetric method ⁵		D 516-07	4500-SO ₄ ⁻² E	4500-SO ₄ ⁻² E-97
	Automated methylthymol blue method			4500-SO ₄ ⁻² F	4500-SO ₄ ⁻² F-97
Total Dissolved Solids	Total Dissolved Solids Dried at 180 deg C			2540 C	
Zinc	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP-AES)	200.5, Revision 4.2			
	Atomic Absorption; Direct Aspiration			3111 B	
	Inductively Coupled Plasma			3120 B	

¹ Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.

² EPA Method 200.5, Revision 4.2. "Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry." 2003. EPA/600/R-06/115. (Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.)

³ Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

⁴ Available from ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or <http://astm.org>. The methods listed are the only alternative versions that may be used.

⁵ Method D99-003, Revision 3.0. "Free Chlorine Species (HOCl and OCl⁻) by Test Strip," November 21, 2003. Available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730.

⁶ Standard Methods for the Examination of Water and Wastewater, 20th edition (1998). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.

⁷ Method ME355.01, Revision 1.0. "Determination of Cyanide in Drinking Water by GC/MS Headspace," May 26, 2009. Available at <http://www.nemi.gov> or from James Eaton, H & E Testing Laboratory, 221 State Street, Augusta, ME 04333. (207) 287-2727.

⁸ Systea Easy (1-Reagent). "Systea Easy (1-Reagent) Nitrate Method," February 4, 2009. Available at <http://www.nemi.gov> or from Systea Scientific, LLC., 900 Jorie Blvd., Suite 35, Oak Brook, IL 60523.

⁹ EPA Method 524.3, Version 1.0. "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry," June 2009. EPA 815-B-09-009. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

¹⁰ Mitchell Method M5271, Revision 1.1. "Determination of Turbidity by Laser Nephelometry," March 5, 2009. Available at <http://www.nemi.gov> or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

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¹¹ Mitchell Method M5331, Revision 1.1. "Determination of Turbidity by LED Nephelometry," March 5, 2009. Available at <http://www.nemi.gov> or from Leck Mitchell, Ph.D., PE, 656 Independence Valley Dr., Grand Junction, CO 81507.

¹² Orion Method AQ4500, Revision 1.0. "Determination of Turbidity by LED Nephelometry," May 8, 2009. Available at <http://www.nemi.gov> or from Thermo Scientific, 166 Cummings Center, Beverly, MA 01915, <http://www.thermo.com>.

¹³ Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water (ATP D05-0035)," August 28, 2009. Available at <http://www.nemi.gov> or from CPI International, 5580 Skylane Boulevard, Santa Rosa, CA 95403.

¹⁴ EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009. EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

¹⁵ AMI Turbiwell. "Continuous Measurement of Turbidity Using a SWAN AMI Turbiwell Turbidimeter," August 2009. Available at <http://www.nemi.gov> or from Markus Bernasconi, SWAN Analytische Instrumente AG, Studbachstrasse 13, CH-8340 Hinwil, Switzerland.

¹⁶ EPA Method 334.0. "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," September 2009. EPA 815-B-09-013. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

¹⁷ ChloroSense. "Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense," August 2009. Available at <http://www.nemi.gov> or from Palintest Ltd, 21 Kenton Lands Road, PO Box 18395, Erlanger, KY 41018.

¹⁸ EPA Method 302.0. "Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," September 2009. EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.

¹⁹ EPA 415.3, Revision 1.2. "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.

²⁰ ReadyCult® Method, "ReadyCult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," January, 2007. Version 1.1. Available from EMD Chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.

²¹ Chromocult® Method, "Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," November, 2000. Version 1.0. EMD Chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 4 PUBLIC NOTIFICATION OF DRINKING WATER VIOLATIONS

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 4 PUBLIC NOTIFICATION OF DRINKING WATER VIOLATIONS

4-001 SCOPE AND AUTHORITY: These regulations require the owner or operator of each public water system (community, non-transient non-community, and transient non-community water systems) to give notice for all violations of drinking water maximum contaminant levels (MCLs), maximum residual disinfectant levels (MRDLs), treatment techniques (TTs), monitoring requirements, testing procedures, and situations listed in Table 1 of 179 NAC 4. Appendix A of 179 NAC 4 identifies the tier assignment for each specific violation or situation requiring a public notice. The statutory authority for these regulations is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

TABLE 1 – VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A PUBLIC NOTICE

1. Drinking water violations:
 - a. Failure to comply with an applicable maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL).
 - b. Failure to comply with a prescribed treatment technique (TT).
 - c. Failure to perform water quality monitoring, as required by Title 179.
 - d. Failure to comply with testing procedures as prescribed by a drinking water regulation.
2. Variances and exemptions under 179 NAC 6:
 - a. Operation under a variance or an exemption.
 - b. Failure to comply with the requirements of any schedule that has been set under a variance or exemption.
3. Special public notices:
 - a. Occurrence of a waterborne disease outbreak or other waterborne emergency.
 - b. Exceedance of the nitrate MCL by non-community water systems (NCWSs), where granted permission by the Director under 179 NAC 2-002.04A1.
 - c. Exceedance of the secondary maximum contaminant level (SMCL) for fluoride.
 - d. Availability of unregulated contaminant monitoring data.
 - e. Other violations and situations determined by the Director to require a public notice under 179 NAC 4, not already listed in Appendix A of 179 NAC 4.

4-002 DEFINITIONS

Community water system means a public water system which serves at least 15 service connections used by year round residents or regularly serves 25 year-round residents.

Department means the Division of Public Health of the Department of Health and Human Services.

Director means the Director of Public Health of the Division of Public Health or his/her authorized representative.

Drinking water standards means the rules and regulations adopted pursuant to Neb. Rev. Stat. § 71-5302, which establish maximum levels for harmful materials which, in the judgement of the Director, may have an adverse effect on the health of persons and which apply only to public water systems.

Maximum contaminant level (MCL) means the maximum permissible level of a contaminant in water which is delivered to any user of a public water system.

Non-community water system means a public water system that is not a community water system. A non-community water system is either a "transient non-community water system" (TWS) or a "non-transient non-community water system" (NTNCWS).

Non-transient, non-community water system means a public water system that is not a community water system and that regularly serves at least 25 of the same individuals over six months per year.

Operator means the individual or individuals responsible for the continued performance of the water system or any part of such system, during assigned duty hours.

Owner means any person owning or operating a public water system.

Public water system means a system for providing the public with water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least 25 individuals daily at least 60 days per year. Public water system includes (a) any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system and (b) any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Public water system does not include a special irrigation district. A public water system is either a community water system or a non-community water system. Service connection does not include a connection to a system that delivers water by a constructed conveyance other than a pipe if (i) the water is used exclusively for purposes other than residential uses, consisting of drinking, bathing, cooking, and other similar uses, (ii) the Department determines that alternative water to achieve the equivalent level of public health protection provided by the Nebraska Safe Drinking Water Act and rules and regulations under the act is provided for residential or similar uses for drinking and cooking, or (iii) the Department determines that the water provided for residential or similar

uses for drinking, cooking, and bathing is centrally treated or treated at the point of entry by the provider, a pass-through entity, or the user to achieve the equivalent level of protection provided by the Nebraska Safe Drinking Water Act and the rules and regulations under the act.

Special irrigation district means an irrigation district in existence prior to May 18, 1994, that provides primarily agricultural service through a piped water system with only incidental residential or similar use if the system or the residential or similar users of the system comply with exclusion provisions of (ii) or (iii) found in 179 NAC 4-002 definition of Public Water System;

Treatment technique means the use of aeration, settling, filtration, or other physical process and/or the addition of any chemical or chemicals for the purpose of removing, deactivation, or adjusting the level of one or more contaminants present in the raw water supply source.

4-003 GENERAL REQUIREMENTS

4-003.01 Types of Public Notice: Public notice requirements are divided into three tiers, to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in Table 1 of 179 NAC 4 are determined by the tier to which it is assigned. Table 2 provides the definition of each tier. Appendix A to 179 NAC 4 identifies the tier assignment for each specific violation or situation.

TABLE 2 – DEFINITION OF PUBLIC NOTICE TIERS

Tier 1 Public Notice	Required for drinking water standards violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.
Tier 2 Public Notice	Required for all other drinking water standards violations and situations with potential to have serious adverse effects on human health.
Tier 3 Public Notice	Required for all other drinking water standards violations and situations not included in Tier 1 and Tier 2.

4-003.02 Who Must Be Notified

1. Each public water system must provide public notice to persons served by the water system, in accordance with 179 NAC 4. Public water systems that sell or otherwise provide drinking water to other public water systems (i.e., to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.
2. If a public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the Director may allow the system to limit distribution of the public notice to only persons served by that portion of the system that is out of

compliance. The Director must grant written permission to limit distribution of the notice.

3. A copy of the notice must also be sent to the Department in accordance with the requirements under 179 NAC 5-004.03.

4-004 TIER 1 PUBLIC NOTICE – FORM, MANNER AND FREQUENCY OF NOTICE

4-004.01 Violations or Situations Requiring Tier 1 Public Notice: Table 3 lists the violation categories and other situations requiring a Tier 1 public notice. Appendix A to 179 NAC 4 identifies the tier assignment for each specific violation or situation.

TABLE 3 – VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 1 PUBLIC NOTICE

1.	Violation of the MCL for total coliforms when fecal coliform or <i>E. coli</i> are present in the water distribution system (as specified in 179 NAC 2-002.04C2), or when the water system fails to test for fecal coliforms or <i>E. coli</i> when any repeat sample tests positive for coliform (as specified in 179 NAC 3-004.05);. <u>Violation of the MCL for <i>E. coli</i> (as specified in 179 NAC 2-002.04C3) ;</u>
2.	Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in 179 NAC 2-002.04A, or when the water system fails to take a confirmation sample within 24 hours of the system’s receipt of the first sample showing an exceedance of the nitrate or nitrite MCL, as specified in 179 NAC 3-005.06B;
3.	Exceedance of the nitrate MCL by non-community water systems, where permitted to exceed the MCL by the Director under 179 NAC 2-002.04A1, as required under 179 NAC 4-011;
4.	Violation of the MRDL for chlorine dioxide, as defined in 179 NAC 2-002.04F1 when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in 179 NAC 16-006.03 item 2.a.
5.	Violation of the Surface Water Treatment Rule (SWTR – 179 NAC 13) or Interim Enhanced Surface Water Treatment Rule (IESWTR – 179 NAC 17) or Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR – 179 NAC 19) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit (as identified in Appendix A), where the Director determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation.
6.	Occurrence of a waterborne disease outbreak, as defined in 179 NAC 2-001.02, or other waterborne emergency (such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination);
7.	Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the Director on a

	case-by-case basis.
8.	Detection of <i>E. coli</i> , enterococci, or coliphage in source water samples as specified in 179 NAC 8-005.01 and 8-005.02 (under the Ground Water Rule).

4-004.02 When Tier 1 Public Notice Is To Be Provided: Public water systems must:

1. Provide a public notice as soon as practical but no later than 24 hours after the system learns of the violation:
2. Initiate consultation with the Director as soon as practical, but no later than 24 hours after the public water system learns of the violation or situation, to determine additional public notice requirements; and
3. Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the Director. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.

4-004.03 Form and Manner of the Public Notice: Public water systems must provide the notice within 24 hours in a form and manner reasonably calculated to reach all persons served. The form and manner used by the public water system are to fit the specific situation, but must be designed to reach residential, transient, and non-transient users of the water system. In order to reach all persons served, water systems are to use, at a minimum, one or more of the following forms of delivery:

1. Appropriate broadcast media (such as radio and television);
2. Posting of the notice in conspicuous locations throughout the area served by the water system;
3. Hand delivery of the notice to persons served by the water system; or
4. Another delivery method approved in writing by the Director.

4-005 TIER 2 PUBLIC NOTICE – FORM, MANNER, AND FREQUENCY OF NOTICE

4-005.01 Violations or Situations Requiring a Tier 2 Public Notice: Table 4 lists the violation categories and other situations requiring a Tier 2 public notice. Appendix A to 179 NAC 4 identifies the tier assignment for each specific violation or situation.

TABLE 4 - VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 2 PUBLIC NOTICE

1.	All violations of the MCL, MRDL, and treatment technique requirements, except where a Tier 1 notice is required under 179 NAC 4-004 or where the Director determines that a Tier 1 notice is required;
2.	Violations of the monitoring and testing procedure requirements, where the Director determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation;

3.	Failure to comply with the terms and conditions of any variance or exemption in place; and
4.	Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer under 179 NAC 8-006.01.

4-005.02 When Tier 2 Public Notice Is To Be Provided

1. Public water systems must provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation. If the public notice is posted, the notice must remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved. The Director may, in appropriate circumstances, allow additional time for the initial notice of up to three months from the date the system learns of the violation. It is not appropriate for the Director to grant an extension to the 30-day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the Director must be in writing.
2. The public water system must repeat the notice every three months as long as the violation or situation persists, unless the Director determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstance may the repeat notice be given less frequently than once per year. It is not appropriate for the Director to allow less frequent repeat notice for an MCL or treatment technique violation under the Total Coliform Rule or 179 NAC 26 or a treatment technique violation under the Surface Water Treatment Rule or Interim Enhanced Surface Water Treatment Rule. It is also not appropriate for the Director to allow through his/her rules or policies across-the-board reductions in the repeat notice frequency for other ongoing violations requiring a Tier 2 repeat notice. Director determinations allowing repeat notices to be given less frequently than once every three months must be in writing.
3. For the turbidity violations specified in 179 NAC 4-005.02 item 3, public water systems must consult with the Director as soon as practical but no later than 24 hours after the public water system learns of the violation, to determine whether a Tier 1 public notice under 179 NAC 4-004.01 is required to protect public health. When consultation does not take place within the 24-hour period, the water system must distribute a Tier 1 notice of the violation within the next 24 hours (i.e., no later than 48 hours after the system learns of the violation), following the requirements under 179 NAC 4-004.02 and 4-004.03. Consultation with the Director is required for a violation of the SWTR (179 NAC 13), IESWTR (179 NAC 17) or LT1ESWTR (179 NAC 19) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit.

4-005.03 The Form and Manner of the Tier 2 Public Notice: Public water systems must provide the initial public notice and any repeat notices in a form and manner that is

reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situations and type of water system, but it must at a minimum meet the following requirements:

1. Unless directed otherwise by the Director in writing, community water systems must provide notice by:
 - a. Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and
 - b. Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in 179 NAC 4-005.03 item 1.a. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations.

2. Unless directed otherwise by the Director in writing, non-community water systems must provide notice by:
 - a. Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and
 - b. Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in 179 NAC 4-005.03 item 2.a. Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of e-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

4-006 TIER 3 PUBLIC NOTICE – FORM, MANNER, AND FREQUENCY OF NOTICE

4-006.01 Violations or Situations Requiring a Tier 3 Public Notice: Table 5 lists the violation categories and other situations requiring a Tier 3 public notice. Appendix A to 179 NAC 4 identifies the tier assignment for each specific violation or situation.

**TABLE 5 - VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 3
PUBLIC NOTICE**

1.	Monitoring violations under Title 179, except where a Tier 1 notice is required under 179 NAC 4-004.01 or where the Director determines that a Tier 2 notice is required;
2.	Failure to comply with a testing procedure established in Title 179, except where a Tier 1 notice is required under 179 NAC 4-004.01 or where the Director determines that a Tier 2 notice is required;
3.	Operation under a variance or an exemption granted under 179 NAC 6;
4.	Availability of unregulated contaminant monitoring results, as required under 179 NAC 4-009; and
5.	Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under 179 NAC 4-010; and
6.	<u>Reporting and Recordkeeping violations under 179 NAC 26.</u>

4-006.02 When Tier 3 Public Notice Is To Be Provided

1. Public water systems must provide the public notice not later than one year after the public water system learns of the violation or situation or begins operating under a variance or exemption. Following the initial notice, the public water system must repeat the notice annually, for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).
2. Instead of individual Tier 3 public notices, a public water system may use an annual report detailing all violations and situations that occurred during the previous 12 months, as long as the timing requirements of 179 NAC 4-006.02 item 1 are met.

4-006.03 The Form and Manner of the Tier 3 Public Notice: Public water systems must provide the initial notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

1. Unless directed otherwise by the Director in writing, community water systems must provide notice by:
 - a. Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

- b. Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in 179 NAC 4-006.03 item 1.a. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations.
2. Unless directed otherwise by the Director in writing, non-community water systems must provide notice by:
 - a. Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and
 - b. Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in 179 NAC 4-006.03 item 2.a. Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of e-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

4-006.04 Situations in Which the Consumer Confidence Report May Be Used To Meet the Tier 3 Public Notice Requirements: For community water systems, the Consumer Confidence Report (CCR) required under 179 NAC 14 may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:

1. The CCR is provided to persons served no later than 12 months after the system learns of the violation or situation as required under 179 NAC 4-006.02;
2. The Tier 3 notice contained in the CCR follows the content requirements under 179 NAC 4-007; and
3. The CCR is distributed following the delivery requirements under 179 NAC 4-006.03.

4-007 CONTENT OF THE PUBLIC NOTICE

4-007.01 Elements That Must Be Included in the Public Notice for Violations of Drinking Water Standards Violations or Other Situations Requiring Public Notice: When a public water system violates a drinking water standard or has a situation requiring public notification, each public notice must include the following elements:

1. A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);
2. When the violation or situation occurred;
3. Any potential adverse health effects from the violation or situation, including the standard language under 179 NAC 4-007.04 item 1 or 2, whichever is applicable;
4. The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;
5. Whether alternative water supplies should be used;
6. What actions consumers should take, including when they should seek medical help, if known;
7. What the system is doing to correct the violation or situation;
8. When the water system expects to return to compliance or resolve the situation;
9. The name, business address, and phone number of the water system owner, operator, or designee of the public water system as a source of additional information concerning the notice; and
10. A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under 179 NAC 4-007.04 item 3, where applicable.

4-007.02 Elements That Must Be Included in the Public Notice for Public Water Systems Operating under a Variance or Exemption

1. If a public water system has been granted a variance or an exemption, the public notice must contain:
 - a. An explanation of the reasons for the variance or exemption;
 - b. The date on which the variance or exemption was issued;
 - c. A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and
 - d. A notice of any opportunity for public input in the review of the variance or exemption.
2. If a public water system violates the conditions of a variance or exemption, the public notice must contain the ten elements listed in 179 NAC 4-007.01.

4-007.03 How the Public Notice Is To Be Presented

1. Each public notice required by 179 NAC 4-007:
 - a. Must be displayed in a conspicuous way when printed or posted;
 - b. Must not contain overly technical language or very small print;
 - c. Must not be formatted in a way that defeats the purpose of the notice;
 - d. Must not contain language that nullifies the purpose of the notice.

2. Each public notice required by 179 NAC 4-007 must comply with multilingual requirements, as follows:
 - a. For public water systems that have a population with 5% or more non-English speaking consumers, the public notice must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.

4-007.04 Standard Language Public Water Systems Must Include in Their Public Notice: Public water systems are required to include the following standard language in their public notice:

1. Standard Health Effects Language for MCL or MRDL Violations, Treatment Technique Violations, and Violations of the Condition of a Variance or Exemption: Public water systems must include in each public notice the health effects language specified in Appendix B to 179 NAC 4 corresponding to each MCL, MRDL, and treatment technique violation listed in Appendix A to 179 NAC 4, and for each violation of a condition of a variance or exemption.
2. Standard Language for Monitoring and Testing Procedure Violations: Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in Appendix A to 179 NAC 4:

We are required to monitor your drinking water for specific contaminants on a regular basis. Results of regular monitoring are an indicator of whether or not your drinking water meets health standards. During [compliance period], we “did not monitor or test” or “did not complete all monitoring or testing” for [contaminant(s)], and therefore cannot be sure of the quality of your drinking water during that time.

3. Standard Language To Encourage the Distribution of the Public Notice to All Persons Served: Public water systems must include in their notice the following language (where applicable):

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

4-008 NOTICE TO NEW BILLING UNITS OR NEW CUSTOMERS

4-008.01 Community Water Systems Requirement: Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

4-008.02 Non-Community Water Systems Requirement: Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

4-009 SPECIAL NOTICE OF THE AVAILABILITY OF UNREGULATED CONTAMINANT MONITORING RESULTS

4-009.01 When the Special Notice Is To Be Given: The owner or operator of a community water system or non-transient, non-community water system required to monitor under the Unregulated Contaminant Monitoring Rule must notify persons served by the system of the availability of the results of such sampling no later than 12 months after the monitoring results are known.

4-009.02 Form and Manner of the Special Notice: The form and manner of the public notice must follow the requirements for a Tier 3 public notice prescribed in 179 NAC 4-006.03 and 4-006.04 items 1 and 3. The notice must also identify a person and provide the telephone number to contact for information on the monitoring results.

4-010 SPECIAL NOTICE FOR EXCEEDANCE OF THE SMCL FOR FLUORIDE

4-010.01 When the Special Notice Is To Be Given: Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/L as specified in 179 NAC 2-002.04A (determined by the last single sample taken in accordance with 179 NAC 3-005), but do not exceed the maximum contaminant level (MCL) of 4 mg/L for fluoride (as specified in 179 NAC 2-002.04A) must provide the public notice in 179 NAC 4-010.03 to persons served. Public notice must be provided as soon as practical but no later than 12 months from the day the water system learns of the exceedance. A copy of the notice must also be sent to the Department and to all new billing units and new customers at the time service begins. The public water system must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven days (even if the exceedance is eliminated). On a case-by-case basis, the Director may require an initial notice sooner than 12 months and repeat notices more frequently than annually.

4-010.02 Form and Manner of the Special Notice: The form and manner of the public notice (including repeat notices) must follow the requirements for a Tier 3 public notice in 179 NAC 4-006.03 and 4-006.04 items 1 and 3.

4-010.03 Mandatory Language That Must Be Contained in the Special Notice: The notice must contain the following language, including the language necessary to fill in the blanks:

This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than two milligrams per liter (mg/L) of fluoride may develop cosmetic discoloration of

their permanent teeth (dental fluorosis). The drinking water provided by your community water system [name] has a fluoride concentration of [insert value] mg/L.

Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.

Drinking water containing more than 4 mg/L of fluoride (the Nebraska Department of Health and Human Services standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/L of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/L because of this cosmetic dental problem.

For more information, please call [name of water system contact] of [name of community water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1-877-867-3435.

4-011 SPECIAL NOTICE FOR NITRATE EXCEEDANCES ABOVE MCL BY NON-COMMUNITY WATER SYSTEMS (NCWSs), WHERE GRANTED PERMISSION BY THE DIRECTOR UNDER 179 NAC 2-002.04A1

4-011.01 When the Special Notice Is To Be Given: The owner or operator of a non-community water system granted permission by the Director under 179 NAC 2-002.04A1 to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under 179 NAC 4-004.01 and 4-004.02.

4-011.02 Form and Manner of the Special Notice: Non-community water systems granted permission by the Director to exceed the nitrate MCL under 179 NAC 2-002.04A1 must provide continuous posting of the fact that nitrate levels exceed 10 mg/L and the potential health effects of exposure, according to the requirements for Tier 1 notice delivery under 179 NAC 4-004.03 and the content requirements under 179 NAC 4-007.

4-012 SPECIAL NOTICE FOR REPEATED FAILURE TO CONDUCT MONITORING OF THE SOURCE WATER FOR *CRYPTOSPORIDIUM* AND FOR FAILURE TO DETERMINE BIN CLASSIFICATION OR MEAN *CRYPTOSPORIDIUM* LEVEL

4-012.01 When the special notice for repeated failure to monitor is to be given: The owner or operator of a community or non-community water system that is required to monitor source water under 179 NAC 25-004 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any three months of monitoring as specified in 179 NAC 25-004.03. The notice must be repeated as specified in 179 NAC 4-005.02.

4-012.02 When the special notice for failure to determine bin classification or mean *Cryptosporidium* level is to be given: The owner or operator of a community or non-community water system that is required to determine a bin classification under 179 NAC 25-013, or to determine mean *Cryptosporidium* level under 179 NAC 25-015, must notify

persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed to report the determination as specified in 179 NAC 25-013.05 or 25-015.01, respectively. The notice must be repeated as specified in 179 NAC 4-005.02. The notice is not required if the system is complying with a Department-approved schedule to address the violation.

4-012.03 Form and manner of the special notice: The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in 179 NAC 4-005.03. The public notice must be presented as required in 179 NAC 4-007.03.

4-012.04 Mandatory language that must be contained in the special notice: The notice must contain the following language, including the language necessary to fill in the blanks.

1. The special notice for repeated failure to conduct monitoring must contain the following language:

We are required to monitor the source of your drinking water for *Cryptosporidium*. Results of the monitoring are to be used to determine whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We are required to complete this monitoring and make this determination by (required bin determination date). We “did not monitor or test” or “did not complete all monitoring or testing” on schedule and, therefore, we may not be able to determine by the required date what treatment modifications, if any, must be made to ensure adequate *Cryptosporidium* removal. Missing this deadline may, in turn, jeopardize our ability to have the required treatment modifications, if any, completed by the deadline required, (date).

For more information, please call (name of water system contact) or (name of water system) at (phone number.)

2. The special notice for failure to determine bin classification or mean *Cryptosporidium* level must contain the following language:

We are required to monitor the source of your drinking water for *Cryptosporidium* in order to determine by (date) whether water treatment at the (treatment plant name) is sufficient to adequately remove *Cryptosporidium* from your drinking water. We have not made this determination by the required date. Our failure to do this may jeopardize our ability to have the required treatment modifications, if any, completed by the required deadline of (date). For more information, please call (name of water system contact) of (name of water system) at (phone number).

3. Each special notice must also include a description of what the system is doing to correct the violation and when the system expects to return to compliance or resolve the situation.

APPENDIX A TO 179 NAC 4 – DRINKING WATER STANDARDS VIOLATIONS REQUIRING PUBLIC NOTICE¹

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
	Tier of public notice required	Tier of public notice required
I. Violations of Drinking Water Standards ³		
A. Microbiological Contaminants		
1.a Total coliform bacteria*	2	3
1.b Total coliform (TT violations resulting from failure to perform assessments or corrective actions, monitoring violations and reporting violations)**	<u>2</u>	<u>3</u>
1.c Seasonal system failure to follow Department-approved start-up plan prior to serving water to the public or failure to provide certification to Department**	<u>2</u>	<u>3</u>
2.a Fecal coliform/E. coli*	1	⁴ 1,3
2.b E. coli (MCL, monitoring, and reporting violations)**	<u>1</u>	<u>3</u>
2.c E. coli (TT violations resulting from failure to perform level 2 assessments or corrective action)**	<u>2</u>	=
3. Turbidity MCL	2	3
4. Turbidity MCL (average of 2 days' samples >5 NTU)	⁵ 2,1	3
5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable turbidity level)	⁶ 2,1	3
6. Surface Water Treatment Rule violations, other than violations resulting from a single exceedance of maximum allowable turbidity level (TT)	2	3
7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from a single exceedance of maximum turbidity level (TT)	⁷ 2	3
8. Filter Backwash Recycling Rule (179 NAC 18) violations	2	3
9. Long Term 1 Enhanced Surface Water Treatment Rule (179 NAC 19) violations	2	3
10. Long Term 2 Enhanced Surface Water Treatment Rule (179 NAC 25) violations	2	¹⁷ 2,3
11. Ground Water Rule (179 NAC 8) violations	2	3
B. Inorganic Chemicals (IOCs)		

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
	Tier of public notice required	Tier of public notice required
1. Antimony	2	3
2. Arsenic	2	3
3. Asbestos (fibers>10 µm)	2	3
4. Barium	2	3
5. Beryllium	2	3
6. Cadmium	2	3
7. Chromium (total)	2	3
8. Cyanide	2	3
9. Fluoride	2	3
10. Mercury (inorganic)	2	3
11. Nitrate	1	⁸ 1, 3
12. Nitrite	1	⁸ 1, 3
13. Total Nitrate and Nitrite	1	3
14. Selenium	2	3
15. Thallium	2	3
C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L)		
1. Lead and Copper Rule (TT)	2	3
D. Synthetic Organic Chemicals (SOCs)		
1. 2,4-D	2	3
2. 2,4,5-TP (Silvex)	2	3
3. Alachlor	2	3
4. Atrazine	2	3
5. Benzo(a)pyrene (PAHs)	2	3
6. Carbofuran	2	3
7. Chlordane	2	3
8. Dalapon	2	3
9. Di (2-ethylhexyl) adipate	2	3
10. Di (2-ethylhexyl) phthalate	2	3
11. Dibromochloropropane	2	3
12. Dinoseb	2	3
13. Dioxin (2,3,7,8-TCDD)	2	3
14. Diquat	2	3
15. Endothall	2	3
16. Endrin	2	3
17. Ethylene dibromide	2	3
18. Glyphosate	2	3
19. Heptachlor	2	3
20. Heptachlor epoxide	2	3
21. Hexachlorobenzene	2	3
22. Hexachlorocyclopentadiene	2	3

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
	Tier of public notice required	Tier of public notice required
23. Lindane	2	3
24. Methoxychlor	2	3
25. Oxamyl (Vydate)	2	3
26. Pentachlorophenol	2	3
27. Picloram	2	3
28. Polychlorinated biphenyls (PCBs)	2	3
29. Simazine	2	3
30. Toxaphene	2	3
E. Volatile Organic Chemicals (VOCs)		
1. Benzene	2	3
2. Carbon tetrachloride	2	3
3. Chlorobenzene (monochlorobenzene)	2	3
4. o-Dichlorobenzene	2	3
5. p-Dichlorobenzene	2	3
6. 1,2-Dichloroethane	2	3
7. 1,1-Dichloroethylene	2	3
8. cis-1,2-Dichloroethylene	2	3
9. trans-1,2-Dichloroethylene	2	3
10. Dichloromethane	2	3
11. 1,2-Dichloropropane	2	3
12. Ethylbenzene	2	3
13. Styrene	2	3
14. Tetrachloroethylene	2	3
15. Toluene	2	3
16. 1,2,4-Trichlorobenzene	2	3
17. 1,1,1-Trichloroethane	2	3
18. 1,1,2-Trichloroethane	2	3
19. Trichloroethylene	2	3
20. Vinyl chloride	2	3
21. Xylenes (total)	2	3
F. Radioactive Contaminants		
1. Beta/photon emitters	2	3
2. Alpha emitters	2	3
3. Combined radium (226 & 228)	2	3
4. Uranium	⁹²	¹⁰³

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
	Tier of public notice required	Tier of public notice required
G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). The Director sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs). ¹¹		
1. Total trihalomethanes (TTHMs)	2	3
2. Haloacetic Acids (HAA5)	2	3
3. Bromate	2	3
4. Chlorite	2	3
5. Chlorine (MRDL)	2	3
6. Chloramine (MRDL)	2	3
7. Chlorine dioxide (MRDL), where any 2 consecutive daily samples at entrance to distribution system only are above MRDL	2	^{12,3}
8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL	^{13,1}	1
9. Control of DBP precursors – TOC (TT)	2	3
10. Benchmarking and disinfection profiling	N/A	3
11. Development of monitoring plan	N/A	3
H. Other Treatment Techniques		
1. Acrylamide (TT)	2	N/A
2. Epichlorohydrin (TT)	2	N/A
II. Unregulated Contaminant Monitoring: ¹⁴		
A. Unregulated contaminants	N/A	3
B. Nickel	N/A	3
III. Public Notification for Variances and Exemptions:		
A. Operation under a variance or exemption	3	N/A
B. Violation of conditions of a variance or exemption	2	N/A
IV. Other Situations Requiring Public Notification:		
A. Fluoride secondary maximum contaminant level (SMCL) exceedance	3	N/A
B. Exceedance of nitrate MCL for non-community systems, as allowed by Director	1	N/A
C. Availability of unregulated contaminant	3	N/A

Contaminant	MCL/MRDL/TT violations ²	Monitoring & testing procedure violations
	Tier of public notice required	Tier of public notice required
monitoring data		
D. Waterborne disease outbreak	1	N/A
E. Other waterborne emergency ¹⁵	1	N/A
F. Source Water Sample Positive for GWR Fecal Indicators: <i>E. coli</i> , enterococci, or coliphage	1	N/A
G. Other situations as determined by the Director	¹⁶ 1,2,3	N/A

Appendix A – Endnotes

* Until March 31, 2016.

** Beginning April 1, 2016.

¹ Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the Director. The Director may, at his/her option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under 179 NAC 4-004005.01 and 4-005006.01.

² MCL – Maximum contaminant level, MRDL – Maximum residual disinfectant level, TT – Treatment technique.

³ The term “Violations of Drinking Water Standards” is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.

⁴ Failure to test for fecal coliform or *E. coli* is a Tier 1 violation if testing is not done after any repeat sample tests positive for coliform. All other total coliform monitoring and testing procedure violations are Tier 3.

⁵ Systems that violate the turbidity MCL of 5 NTU based on an average of measurements over two consecutive days must consult with the Director within 24 hours after learning of the violation. Based on this consultation, the Director may subsequently decide to elevate the violation to Tier 1. If a system does not make contact with the Director in the 24-hour period, the violation is automatically elevated to Tier 1.

⁶ Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR) or the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) are required to consult with the Director within 24 hours after learning of the violation. Based on this consultation, the Director may subsequently decide to elevate the violation to Tier 1. If a system does not make contact with the Director in the 24-hour period, the violation is automatically elevated to Tier 1.

⁷ The Surface Water Treatment Rule (SWTR) (179 NAC 13) remains in effect for systems serving at least 10,000 individuals; the Interim Enhanced Surface Water Treatment Rule (179 NAC 17) adds additional requirements and does not in many cases supersede the SWTR.

⁸ Failure to take a confirmation sample within 24 hours for nitrate or nitrite after an initial sample exceeds the MCL is a Tier 1 violation. Other monitoring violations for nitrate are Tier 3.

⁹ The uranium MCL Tier 2 violation citations are effective December 8, 2003 for all community water systems.

¹⁰ The uranium Tier 3 violation citations are effective December 8, 2003 for all community water systems.

¹¹ Community and non-transient non-community water systems using surface water or ground water under the direct influence of surface water as a source and serving ≥ 10,000 individuals must comply with new DBP MCLs, disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other community and non-transient non-community systems must meet the MCLs and MRDLs beginning January 1, 2004. Transient non-community systems using surface water or ground water

under the direct influence of surface water as a source and serving 10,000 or more individuals and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Transient non-community systems serving fewer than 10,000 individuals and using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

¹² Failure to monitor for chlorine dioxide at the entrance to the distribution system the day after exceeding the MRDL at the entrance to the distribution system is a Tier 2 violation.

¹³ If any daily sample taken at the entrance to the distribution system exceeds the MRDL for chlorine dioxide and one or more samples taken in the distribution system the next day exceed the MRDL, Tier 1 notification is required. Failure to take the required samples in the distribution system after the MRDL is exceeded at the entry point also triggers Tier 1 notification.

¹⁴ Some water systems must monitor for certain unregulated contaminants.

¹⁵ Other waterborne emergencies require a Tier 1 public notice under 179 NAC 4-004.01 for situations that do not meet the definition of a waterborne disease outbreak given in 179 NAC 2-001.02 but that still have the potential to have serious adverse effects on health as a result of short-term exposure. These could include outbreaks not related to treatment deficiencies, as well as situations that have the potential to cause outbreaks, such as failures or significant interruption in water treatment processes, natural disasters that disrupt the water supply or distribution system, chemical spills, or unexpected loading of possible pathogens into the source water.

¹⁶ The Director may place other situations in any tier he/she believes appropriate, based on threat to public health

¹⁷ Failure to collect three or more samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice as specified in 179 NAC 4-012. All other monitoring and testing procedure violations are Tier 3.

**APPENDIX B TO 179 NAC 4 – STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION
DRINKING WATER STANDARDS**

A. Microbiological Contaminants

Contaminant	MCLG¹ mg/L	MCL² mg/L	Standard health effects language for public notification
1a. Total coliform*	Zero	See footnote ³	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/ <i>E. coli</i> *	Zero	Zero	Fecal coliforms and <i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1c. Fecal indicators (GWR): i. <i>E. coli</i> ii. enterococci iii. coliphage	Zero None None	TT TT TT	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1d. Ground Water Rule (GWR) TT violations	None	TT	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
1e. 179 NAC 26 Coliform Assessment and/or Corrective Action Violations**	N/A	TT	<u>Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.]</u> <u>We failed to conduct the required assessment.</u> <u>We failed to correct all identified sanitary defects that were found during the assessment(s).</u>
1f. 179 NAC 26 <i>E. coli</i> Assessment and/or Corrective Action Violations**	N/A	TT	<u><i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for <i>E. coli</i>, indicating the need to look for potential problems in water treatment or distribution. When this</u>

			<p><u>occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.]</u></p> <p><u>We failed to conduct the required assessment.</u></p> <p><u>We failed to correct all identified sanitary defects that were found during the assessment that we conducted.</u></p>
1g. <u><i>E. Coli</i>**</u>	<u>Zero</u>	<p><u>In compliance unless one of the following conditions occurs:</u></p> <p><u>(1) The system has an <i>E. coli</i>-positive repeat sample following a total coliform-positive routine sample.</u></p> <p><u>(2) The system has a total coliform-positive repeat sample following an <i>E. coli</i>-positive routine sample.</u></p> <p><u>(3) The system fails to take all required repeat samples following an <i>E. coli</i>-positive routine sample.</u></p> <p><u>(4) The</u></p>	<p><u><i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.</u></p>

		<u>system fails to test for <i>E. coli</i> when any repeat sample tests positive for total coliform.</u>	
1h. <u>179 NAC 26 Seasonal System TT Violations**</u>	N/A	TT	<u>When this violation includes the failure to monitor for total coliforms or <i>E. coli</i> prior to serving water to the public, the mandatory language found at 4-007.04 item 2 must be used.</u> <u>When this violation includes failure to complete other actions, the appropriate elements found in 4-007.01 to describe the violation must be used.</u>
2a. Turbidity (MCL) ⁴	None	1 NTU ⁵ /5 NTU	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2b. Turbidity (SWTR TT) ⁶	None	TT ⁷	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2c. Turbidity (IESWTR TT and LT1ESWTR TT) ⁸	None	TT	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

B. Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and the Filter Backwash Recycling Rule (FBRR) violations

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
3. <i>Giardia lamblia</i> (SWTR/IESWTR/LT1ESWTR). 4. Viruses (SWTR/IESWTR/LT1ESWTR). 5. Heterotrophic plate count (HPC) bacteria ⁹ (SWTR/IESWTR/LT1ESWTR). 6. <i>Legionella</i> (SWTR/IESWTR/LT1ESWTR). 7. <i>Cryptosporidium</i> (IESWTR/FBRR/LT1ESWTR).	Zero	TT ¹⁰	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

C. Inorganic Chemicals (IOCs)

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
8. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9 Arsenic (Effective January 23, 2006)	0	0.010	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
10. Asbestos (10 µm)	7 MFL ¹¹	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.

Contaminant	MCLG¹ mg/L	MCL² mg/L	Standard health effects language for public notification
16. Fluoride	4.0	4.0	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth and occurs only in developing teeth before they erupt from the gums.
17. Mercury (inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
19. Nitrite	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
21. Selenium	0.05	0.05	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22. Thallium	0.0005	0.002	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.

D. Lead and Copper Rule

Contaminant	MCLG¹ mg/L	MCL² mg/L	Standard health effects language for public notification
23. Lead	Zero	TT ¹²	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
24. Copper	1.3	TT ¹³	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.

E. Synthetic Organic Chemicals (SOCs)

Contaminant	MCLG¹ mg/L	MCL² mg/L	Standard health effects language for public notification
25. 2,4-D	0.07	0.07	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5-TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
28. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
30. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
33. Di (2-ethylhexyl) adipate	0.4	0.4	Some people who drink water containing di (2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or reproductive difficulties.
34. Di (2-ethylhexyl) phthalate	Zero	0.006	Some people who drink water containing di (2-ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
37. Dioxin (2,3,7,8-TCDD)	Zero	3x10 ⁻⁸	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
45. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclopentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
47. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.

F. Volatile Organic Chemicals (VOCs)

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
55. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
56. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochlorobenzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
58. o-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
59. p-Dichlorobenzene	0.075	0.075	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. cis-1,2-Dichloroethylene	0.07	0.07	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
63. trans-1,2-Dichloroethylene	0.1	0.1	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
65. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
68. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
73. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
75. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

G. Radioactive Contaminants

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
76. Beta/photon emitters	Zero	4 mrem/yr ¹⁴	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
77. Alpha emitters	Zero	15 pCi/L ¹⁵	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium-226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium ¹⁶	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals:

Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). The Director sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs)¹⁷

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
80. Total trihalomethanes (TTHMs)	N/A	0.080 ^{18,19}	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
81. Haloacetic Acids (HAA)	N/A	0.060 ²⁰	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
82. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
83. Chlorite	0.08	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
84. Chlorine	4 (MRDLG) ²¹	4.0 (MRDL) ²²	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
86a. Chlorine dioxide, where any two consecutive daily samples taken at the entrance to the distribution system are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. <i>Add for public notification only:</i> The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system that delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
86b. Chlorine dioxide, where one or more distribution system samples are above the MRDL	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. <i>Add for public notification only:</i> The chlorine dioxide violations reported today include exceedances of the Department of Health and Human Services Regulation and Licensure standard within the distribution system that delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.
87. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.

I. Other Treatment Techniques

Contaminant	MCLG ¹ mg/L	MCL ² mg/L	Standard health effects language for public notification
88. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
89. Epichlorohydrin	Zero	TT	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

Appendix B – Endnotes

* Until March 31, 2016.

** Beginning April 1, 2016.

1. MCLG – Maximum contaminant level goal.
2. MCL – Maximum contaminant level.
3. For water systems analyzing at least 40 samples per month, no more than 5.0% of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.
4. There are various regulations that set turbidity standards for different types of systems, including the 1989 Surface Water Treatment Rule (179 NAC 13), the 1998 Interim Enhanced Surface Water Treatment Rule (179 NAC 17), and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule (179 NAC 19). The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 5 NTU for systems that are required to filter but have not yet installed filtration.
5. NTU – Nephelometric turbidity unit.
6. There are various regulations that set turbidity standards for different types of systems, including the 1989 Surface Water Treatment Rule (179 NAC 13), the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR 179 NAC 17), and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule (179 NAC 19). Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95% of the samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the Director.
7. TT – Treatment technique.
8. There are various regulations that set turbidity standards for different types of systems, including the 1989 Surface Water Treatment Rule (179 NAC 13) and the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR) (179 NAC 17), and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule LT1ESWTR (179 NAC 19). For systems subject to 179 NAC 17 (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95% of the monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the Director. For systems subject to the LT1ESWTR (systems serving fewer than 10,000 people, using surface water or ground water under the direct influence of surface water) that use

conventional filtration or direct filtration, after January 14, 2005 the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95% of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the LT1ESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the Director.

9. The bacteria detected by heterotrophic plate count (HPC) are not necessarily harmful. HPC is simply an alternative method of determining disinfectant residual levels. The number of such bacteria is an indicator of whether there is enough disinfectant in the distribution system.

10. SWTR, IESWTR, and LT1ESWTR treatment technique violations that involve turbidity exceedances may use the health effects language for turbidity instead.

11. Million fibers per liter.

12. Action Level = 0.015 mg/L

13. Action Level = 1.3 mg/L

14. Millirems per year

15. Picocuries per liter

16. The uranium MCL is effective December 8, 2003 for all community water systems.

17. Surface water systems and ground water systems under the direct influence of surface water (GWUDI) are regulated under 179 NAC 13. Surface water and GWUDI community and non-transient non-community systems serving $\geq 10,000$ individuals must comply with Title 179 NAC 16 DBP MCLs, and disinfectant maximum residual disinfectant levels MRDLs, beginning January 1, 2002. All other community and non-transient non-community systems must comply with 179 NAC 16 DBP MCLs and disinfectant MRDLs beginning January 1, 2004. Transient non-community systems using surface water or ground water under the direct influence of surface water as a source serving $\geq 10,000$ individuals and that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other transient non-community systems that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

18. Community and non-transient non-community systems must comply with Title 179 NAC 24 TTHM and HAA5 MCLs of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a locational running annual average) on the schedule in 179 NAC 24-003.

19. The MCL for total trihalomethanes is the sum of the concentrations of the individual trihalomethanes.

20. The MCL for haloacetic acids is the sum of the concentrations of the individual haloacetic acids.

21. MRDLG – Maximum residual disinfectant level goal.

22. MRDL – Maximum residual disinfectant level.

**APPENDIX C to 179 NAC 4 – LIST OF ACRONYMS USED IN PUBLIC NOTIFICATION
REGULATION**

CCR	Consumer Confidence Report
CWS	Community Water System
DBP	Disinfection Byproduct
GWR	Ground Water Rule
HPC	Heterotrophic Plate Count
IESWTR	Interim Enhanced Surface Water Treatment Rule
IOC	Inorganic Chemical
LCR	Lead and Copper Rule
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MRDL	Maximum Residual Disinfectant Level
NCWS	Non-Community Water System
NTNCWS	Non-Transient Non-Community Water System
NTU	Nephelometric Turbidity Unit
PN	Public Notification
PWS	Public Water System
SDWA	Safe Drinking Water Act
SMCL	Secondary Maximum Contaminant Level
SOC	Synthetic Organic Chemical
SWTR	Surface Water Treatment Rule
TCR	Total Coliform Rule
TT	Treatment Technique
TWS	Transient Non-Community Water System
VOC	Volatile Organic Chemical

TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 6 VARIANCES AND EXEMPTIONS

6-001 SCOPE AND AUTHORITY: These regulations establish the requirements for variances from drinking water standards, including small systems variances. They also establish the requirements for exemptions from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of a drinking water standard. The statutory authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

6-002 DEFINITIONS

Department means the Division of Public Health of the Department of Health and Human Services Regulation and Licensure.

Director means the Director of Regulation and Licensure Public Health or his/her authorized representative.

EPA means the U.S. Environmental Protection Agency.

6-003 CONDITIONS:

6-003.01 In accordance with the requirements of Neb. Rev. Stat. 71-5310 ~~The the~~ Director may grant variances or exemptions from certain provisions of the regulations under the Nebraska Safe Drinking Water Act, in compliance with 42 U.S.C. §300g-4 and 42 U.S.C. §300g-5 ~~as published on January 1, 2004 and 40 CFR 142 Subpart K of the Code of Federal Regulations (for small system variances), except that variances or exemptions from the MCLs for total coliforms and E. coli and variances from any of the treatment technique requirements of 179 NAC 13 may not be granted, as published on July 1, 2002.~~ These documents ~~are incorporated herein by reference and~~ are available for viewing at the Division of Public Health of the Department of Health and Human Services Regulation and Licensure, Public Health Assurance Division, 301 Centennial Mall South, Lincoln, NE 68509; or 42 U.S.C. §300g-4 and 42 U.S.C. §300g-5 are available online at <http://www.gpo.gov/fdsys/search/submitcitation.action?publication=USCODE> and 40 CFR 142 Subpart K of the Code of Federal Regulations is available at <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>.

6-003.02 The Director has stayed the effective date of this chapter relating to the total coliform MCL of 179 NAC 2-002.04C for systems that demonstrate to the Department that the violation of the total coliform MCL is due to a persistent growth of total coliforms in the distribution system rather than fecal or pathogenic contamination, a treatment lapse or deficiency, or a problem in the operation or maintenance of the distribution system. This is stayed until March 31, 2016, at which time the total coliform MCL is no longer effective.

6-003.03 Small system variances are not available for rules addressing microbial contaminants, which would include 179 NAC 8, 13, 17, 19, 25, and 26.

42 U.S.C. Section 300g-4 Variances

01/02/01

~~(TITLE 42 - THE PUBLIC HEALTH AND WELFARE
CHAPTER 6A - PUBLIC HEALTH SERVICE
SUBCHAPTER XII - SAFETY OF PUBLIC WATER SYSTEMS
Part B - Public Water Systems)~~

~~Notwithstanding any other provision of this part, variances from national primary drinking water regulations may be granted as follows:~~

~~(1)~~

~~(A)~~

~~A State which has primary enforcement responsibility for public water systems may grant one or more variances from an applicable national primary drinking water regulation to one or more public water systems within its jurisdiction which, because of characteristics of the raw water sources which are reasonably available to the systems, cannot meet the requirements respecting the maximum contaminant levels of such drinking water regulation. A variance may be issued to a system on condition that the system install the best technology, treatment techniques, or other means, which the Administrator finds are available (taking costs into consideration), and based upon an evaluation satisfactory to the State that indicates that alternative sources of water are not reasonably available to the system. The Administrator shall propose and promulgate his finding of the best available technology, treatment techniques or other means available for each contaminant for purposes of this subsection at the time he proposes and promulgates a maximum contaminant level for each such contaminant. The Administrator's finding of best available technology, treatment techniques or other means for purposes of this subsection may vary depending on the number of persons served by the system or for other physical conditions related to engineering feasibility and costs of compliance with maximum contaminant levels as considered appropriate by the Administrator. Before a State may grant a variance under this subparagraph, the State must find that the variance will not result in an unreasonable risk to health. If a State grants a public water system a variance under this subparagraph, the State shall prescribe at the the ^{1st} time the variance is granted, a schedule for-~~

~~(i)~~

~~compliance (including increments of progress) by the public water system with each containment level requirement with respect to which the variance was granted, and~~

~~(ii)~~

~~implementation by the public water system of such additional control measures as the State may require for each contaminant, subject to such contaminant level requirement, during the period ending on the date compliance with such requirement is required.~~

~~Before a schedule prescribed by a State pursuant to this subparagraph may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice. A schedule prescribed pursuant to this subparagraph for a public water system granted a variance shall require compliance by the system with each contaminant level requirement with respect to which the variance was granted as expeditiously as practicable (as the State may reasonably determine).~~

~~(B)~~

~~A State which has primary enforcement responsibility for public water systems may grant to one or more public water systems within its jurisdiction one or more variances from any provision of the national primary drinking water regulation which requires the use of a specified treatment technique with respect to a contaminant if the public water system applying for the variance demonstrates to the satisfaction of the State that such treatment technique is not necessary to protect the health of persons because of the nature of the raw water source of such system. A variance granted under this subparagraph shall be conditioned on such monitoring and other requirements as the Administrator may prescribe.~~

~~(C)~~

~~Before a variance proposed to be granted by a State under subparagraph (A) or (B) may take effect, such State shall provide notice and opportunity for public hearing on the proposed variance. A notice given pursuant to the preceding sentence may cover the granting of more than one variance and a hearing held pursuant to such notice shall include each of the variances covered by the notice. The State shall promptly notify the Administrator of all variances granted by it. Such notification shall contain the reason for the variance (and in the case of a variance under subparagraph (A), the basis for the finding required by that subparagraph before the granting of the variance) and documentation of the need for the variance.~~

~~(D)~~

~~Each public water system's variance granted by a State under subparagraph (A) shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to that subparagraph. The requirements of each schedule prescribed by a State pursuant to that subparagraph shall be enforceable by the State under its laws. Any requirement of a schedule on which a variance granted under that subparagraph is conditioned may be enforced under section 300g-3 of this title as if such requirement was part of a national primary drinking water regulation.~~

~~(E)~~

~~Each schedule prescribed by a State pursuant to subparagraph (A) shall be deemed approved by the Administrator unless the variance for which it was prescribed is revoked by the Administrator under subparagraph (G) or the schedule is revised by the Administrator under such subparagraph.~~

~~(F)~~

~~Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the variances granted under subparagraph (A) (and schedules prescribed pursuant thereto) and under subparagraph (B) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of variances and schedules as he deems necessary to carry out the purposes of this subchapter, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall~~

~~(i)~~

~~provide information respecting the location of data and other information respecting the variances to be reviewed (including data and other information concerning new scientific matters bearing on such variances), and~~

~~(ii)~~

~~advise of the opportunity to submit comments on the variances reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the~~

~~Federal Register the results of his review together with findings responsive to comments submitted in connection with such review.~~

~~(G)~~

~~(i)~~

~~If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting variances under subparagraph (A) or (B) or that in a substantial number of cases the State has failed to prescribe schedules in accordance with subparagraph (A), the Administrator shall notify the State of his findings. In determining if a State has abused its discretion in granting variances in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the variances and if the requirements applicable to the granting of the variances were complied with. A notice under this clause shall~~

~~(I)~~

~~identify each public water system with respect to which the finding was made,~~

~~(II)~~

~~specify the reasons for the finding, and~~

~~(III)~~

~~as appropriate, propose revocations of specific variances or propose revised schedules or other requirements for specific public water systems granted variances, or both.~~

~~(ii)~~

~~The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to clause (i) of this subparagraph. After a hearing on a notice pursuant to such clause, the Administrator shall~~

~~(I)~~

~~rescind the finding for which the notice was given and promptly notify the State of such rescission, or~~

~~(II)~~

~~promulgate (with such modifications as he deems appropriate) such variance revocations and revised schedules or other requirements proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to clause (i) of this subparagraph, the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.~~

~~(iii)~~

~~If a State is notified under clause (i) of this subparagraph of a finding of the Administrator made with respect to a variance granted a public water system within that State or to a schedule or other requirement for a variance and if, before a revocation of such variance or a revision of such schedule or other requirement promulgated by the Administrator takes effect, the State takes corrective action with respect to such variance or schedule or other requirement which the Administrator determines makes his finding inapplicable to such variance or schedule or other requirement, the Administrator shall rescind the application of his finding to that variance or schedule or other requirement. No variance revocation or revised schedule or other requirement may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule or other requirement was proposed.~~

~~(2)~~

~~If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to grant variances in such State as the State would have under paragraph (1) if it had primary enforcement responsibility.~~

~~(3)~~

~~The Administrator may grant a variance from any treatment technique requirement of a national primary drinking water regulation upon a showing by any person that an alternative treatment technique not included in such requirement is at least as efficient in lowering the level of the contaminant with respect to which such requirement was prescribed. A variance under this paragraph shall be conditioned on the use of the alternative treatment technique which is the basis of the variance.~~

~~(b) Enforcement of schedule or other requirement~~

~~Any schedule or other requirement on which a variance granted under paragraph (1)(B) or (2) of subsection (a) of this section is conditioned may be enforced under section 300g-3 of this title as if such schedule or other requirement was part of a national primary drinking water regulation.~~

~~(e)~~

~~Applications for variances; regulations: reasonable time for acting~~

~~If an application for a variance under subsection (a) of this section is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.~~

~~(d) "Treatment technique requirement" defined~~

~~For purposes of this section, the term "treatment technique requirement" means a requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 300f(1)(C)(ii) of this title) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 300g-1(b) of this title.~~

~~(e) Small system variances~~

~~(1) In general~~

~~A State exercising primary enforcement responsibility for public water systems under section 300g-2 of this title (or the Administrator in nonprimacy States) may grant a variance under this subsection for compliance with a requirement specifying a maximum contaminant level or treatment technique contained in a national primary drinking water regulation to—~~

~~(A)~~

~~public water systems serving 3,300 or fewer persons; and~~

~~(B)~~

~~with the approval of the Administrator pursuant to paragraph (9), public water systems serving more than 3,300 persons but fewer than 10,000 persons,~~

~~if the variance meets each requirement of this subsection.~~

~~(2) Availability of variances~~

~~A public water system may receive a variance pursuant to paragraph (1), if—~~

~~(A)~~

~~the Administrator has identified a variance technology under section 300g-1(b)(15) of this title that is applicable to the size and source water quality conditions of the public water system;~~

~~(B)~~

~~the public water system installs, operates, and maintains, in accordance with guidance or regulations issued by the Administrator, such treatment technology, treatment technique, or other means; and~~

~~(C)~~

~~the State in which the system is located determines that the conditions of paragraph (3) are met.~~

~~(3) Conditions for granting variances~~

~~A variance under this subsection shall be available only to a system—~~

~~(A)~~

~~that cannot afford to comply, in accordance with affordability criteria established by the Administrator (or the State in the case of a State that has primary enforcement responsibility under section 300g-2 of this title), with a national primary drinking water regulation, including compliance through—~~

~~(i)~~

~~treatment;~~

~~(ii)~~

~~alternative source of water supply; or~~

~~(iii)~~

~~restructuring or consolidation (unless the Administrator (or the State in the case of a State that has primary enforcement responsibility under section 300g-2 of this title) makes a written determination that restructuring or consolidation is not practicable); and~~

~~(B)~~

~~for which the Administrator (or the State in the case of a State that has primary enforcement responsibility under section 300g-2 of this title) determines that the terms of the variance ensure adequate protection of human health, considering the quality of the source water for the system and the removal efficiencies and expected useful life of the treatment technology required by the variance.~~

~~(4) Compliance schedules~~

~~A variance granted under this subsection shall require compliance with the conditions of the variance not later than 3 years after the date on which the variance is granted, except that the Administrator (or the State in the case of a State that has primary enforcement responsibility under section 300g-2 of this title) may allow up to 2 additional years to comply with a variance technology, secure an alternative source of water, restructure or consolidate if the Administrator (or the State) determines that additional time is necessary for capital improvements, or to allow for financial assistance provided pursuant to section 300j-12 of this title or any other Federal or State program.~~

~~(5) Duration of variances~~

~~The Administrator (or the State in the case of a State that has primary enforcement responsibility under section 300g-2 of this title) shall review each variance granted under this subsection not less often than every 5 years after the compliance date established in the variance to determine whether the system remains eligible for the variance and is conforming to each condition of the variance.~~

~~(6) Ineligibility for variances~~

~~A variance shall not be available under this subsection for -~~

~~(A)~~

~~any maximum contaminant level or treatment technique for a contaminant with respect to which a national primary drinking water regulation was promulgated prior to January 1, 1986; or~~

~~(B)~~

~~a national primary drinking water regulation for a microbial contaminant (including a bacterium, virus, or other organism) or an indicator or treatment technique for a microbial contaminant.~~

~~(7) Regulations and guidance~~

~~(A) In general~~

~~Not later than 2 years after August 6, 1996, and in consultation with the States, the Administrator shall promulgate regulations for variances to be granted under this subsection. The regulations shall, at a minimum, specify -~~

~~(i)~~

~~procedures to be used by the Administrator or a State to grant or deny variances, including requirements for notifying the Administrator and consumers of the public water system that a variance is proposed to be granted (including information regarding the contaminant and variance) and requirements for a public hearing on the variance before the variance is granted;~~

~~(ii)~~

~~requirements for the installation and proper operation of variance technology that is identified (pursuant to section 300g-1(b)(15) of this title) for small systems and the financial and technical capability to operate the treatment system, including operator training and certification;~~

~~(iii)~~

~~eligibility criteria for a variance for each national primary drinking water regulation, including requirements for the quality of the source water (pursuant to section 300g-1(b)(15)(A) of this title); and~~

~~(iv)~~

~~information requirements for variance applications.~~

~~(B) Affordability criteria~~

~~Not later than 18 months after August 6, 1996, the Administrator, in consultation with the States and the Rural Utilities Service of the Department of Agriculture, shall publish information to assist the States in developing affordability criteria. The affordability criteria shall be reviewed by the States not less often than every 5 years to determine if changes are needed to the criteria.~~

~~(8) Review by the Administrator~~

~~(A) In general~~

~~The Administrator shall periodically review the program of each State that has primary enforcement responsibility for public water systems under section 300g-2 of this title with respect to variances to determine whether the variances granted by the State comply with the requirements of this subsection. With respect to affordability, the determination of the Administrator shall be limited to whether the variances granted by the State comply with the affordability criteria developed by the State.~~

~~(B) Notice and publication~~

~~If the Administrator determines that variances granted by a State are not in compliance with affordability criteria developed by the State and the requirements of this subsection, the Administrator shall notify the State in writing of the deficiencies and make public the determination.~~

~~(9) Approval of variances~~

~~A State proposing to grant a variance under this subsection to a public water system serving more than 3,300 and fewer than 10,000 persons shall submit the variance to the Administrator for review and approval prior to the issuance of the variance. The Administrator shall approve the variance if it meets each of the requirements of this subsection. The Administrator shall approve or disapprove the variance within 90 days. If the Administrator disapproves a variance under this paragraph, the Administrator shall notify the State in writing of the reasons for disapproval and the variance may be resubmitted with modifications to address the objections stated by the Administrator.~~

~~(10) Objections to variances~~

~~(A) By the Administrator~~

~~The Administrator may review and object to any variance proposed to be granted by a State, if the objection is communicated to the State not later than 90 days after the State proposes to grant the variance. If the Administrator objects to the granting of a variance, the Administrator shall notify the State in writing of each basis for the objection and propose a modification to the variance to resolve the concerns of the Administrator. The State shall make the recommended modification or respond in writing to each objection. If the State issues the variance without resolving the concerns of the Administrator, the Administrator may overturn the State decision to grant the variance if the Administrator determines that the State decision does not comply with this subsection.~~

~~(B) Petition by consumers~~

~~Not later than 30 days after a State exercising primary enforcement responsibility for public water systems under section 300g-2 of this title proposes to grant a variance for a public water system, any person served by the system may petition the Administrator to object to the granting of a variance. The Administrator shall respond to the petition and determine whether to object to the variance under subparagraph (A) not later than 60 days after the receipt of the petition.~~

~~(C) Timing~~

~~No variance shall be granted by a State until the later of the following:~~

~~(i)~~

~~90 days after the State proposes to grant a variance.~~

~~(ii)~~

If the Administrator objects to the variance, the date on which the State makes the recommended modifications or responds in writing to each objection

Sec. 300g-5. Exemptions

(a) Requisite findings

A State which has primary enforcement responsibility may exempt any public water system within the State's jurisdiction from any requirement respecting a maximum contaminant level or any treatment technique requirement, or from both, of an applicable national primary drinking water regulation upon a finding that—

(1)

due to compelling factors (which may include economic factors, including qualification of the public water system as a system serving a disadvantaged community pursuant to section 300j-12(d) of this title), the public water system is unable to comply with such contaminant level or treatment technique requirement, or to implement measures to develop an alternative source of water supply;

(2)

the public water system was in operation on the effective date of such contaminant level or treatment technique requirement, or, for a system that was not in operation by that date, only if no reasonable alternative source of drinking water is available to such new system;

(3)

the granting of the exemption will not result in an unreasonable risk to health; ⁽¹⁾ and

(4)

management or restructuring changes (or both) cannot reasonably be made that will result in compliance with this subchapter or, if compliance cannot be achieved, improve the quality of the drinking water.

(b) Compliance schedule and implementation of control measures; notice and hearing; dates for compliance with schedule; compliance, enforcement; approval or revision of schedules and revocation of exemptions

(1)

If a State grants a public water system an exemption under subsection (a) of this section, the State shall prescribe, at the time the exemption is granted, a schedule for—

(A)

compliance (including increments of progress or measures to develop an alternative source of water supply) by the public water system with each contaminant level requirement or treatment technique requirement with respect to which the exemption was granted, and

(B)

implementation by the public water system of such control measures as the State may require for each contaminant, subject to such contaminant level requirement or treatment technique requirement, during the period ending on the date compliance with such requirement is required.

Before a schedule prescribed by a State pursuant to this subsection may take effect, the State shall provide notice and opportunity for a public hearing on the schedule. A notice given pursuant to the preceding sentence may cover the prescribing of more than one such schedule and a hearing held pursuant to such notice shall include each of the schedules covered by the notice.

(2)

(A)

A schedule prescribed pursuant to this subsection for a public water system granted an exemption under subsection (a) of this section shall require compliance by the system with each contaminant level and treatment technique requirement with respect to which the exemption was granted as expeditiously as practicable (as the State may reasonably determine) but not later than 3 years after the otherwise applicable compliance date established in section 300g-1(b)(10) of this title.

(B)

No exemption shall be granted unless the public water system establishes that—

(i)

~~the system cannot meet the standard without capital improvements which cannot be completed prior to the date established pursuant to section 300g-1(b)(10) of this title;~~

~~(ii)~~

~~in the case of a system which needs financial assistance for the necessary improvements, the system has entered into an agreement to obtain such financial assistance or assistance pursuant to section 300j-12 of this title, or any other Federal or State program is reasonably likely to be available within the period of the exemption; or~~

~~(iii)~~

~~the system has entered into an enforceable agreement to become a part of a regional public water system; and the system is taking all practicable steps to meet the standard.~~

~~(C)~~

~~In the case of a system which does not serve more than a population of 3,300 and which needs financial assistance for the necessary improvements, an exemption granted under clause (i) or (ii) of subparagraph (B) may be renewed for one or more additional 2-year periods, but not to exceed a total of 6 years, if the system establishes that it is taking all practicable steps to meet the requirements of subparagraph (B).~~

~~(D) Limitation.—~~

~~A public water system may not receive an exemption under this section if the system was granted a variance under section 300g-4(e) of this title.~~

~~(3)~~

~~Each public water system's exemption granted by a State under subsection (a) of this section shall be conditioned by the State upon compliance by the public water system with the schedule prescribed by the State pursuant to this subsection. The requirements of each schedule prescribed by a State pursuant to this subsection shall be enforceable by the State under its laws. Any requirement of a schedule on which an exemption granted under this section is conditioned may be enforced under section 300g-3 of this title as if such requirement was part of a national primary drinking water regulation.~~

~~(4)~~

~~Each schedule prescribed by a State pursuant to this subsection shall be deemed approved by the Administrator unless the exemption for which it was prescribed is revoked by the Administrator under subsection (d)(2) of this section or the schedule is revised by the Administrator under such subsection.~~

~~(c) Notice to Administrator; reasons for exemption~~

~~Each State which grants an exemption under subsection (a) of this section shall promptly notify the Administrator of the granting of such exemption. Such notification shall contain the reasons for the exemption (including the basis for the finding required by subsection (a)(3) of this section before the exemption may be granted) and document the need for the exemption.~~

~~(d) Review of exemptions and schedules; publication in Federal Register, notice and results of review; notice to State; considerations respecting abuse of discretion in granting exemptions or failing to prescribe schedules; State corrective action~~

~~(1)~~

~~Not later than 18 months after the effective date of the interim national primary drinking water regulations the Administrator shall complete a comprehensive review of the exemptions granted (and schedules prescribed pursuant thereto) by the States during the one-year period beginning on such effective date. The Administrator shall conduct such subsequent reviews of exemptions and schedules as he deems necessary to carry out the purposes of this subchapter, but each subsequent review shall be completed within each 3-year period following the completion of the first review under this subparagraph. Before conducting any review under this subparagraph, the Administrator shall publish notice of the proposed review in the Federal Register. Such notice shall~~

~~(A)~~

~~provide information respecting the location of data and other information respecting the exemptions to be reviewed (including data and other information concerning new scientific matters bearing on such exemptions), and~~

~~(B)~~

~~advise of the opportunity to submit comments on the exemptions reviewed and on the need for continuing them. Upon completion of any such review, the Administrator shall publish in the Federal Register the results of his review, together with findings responsive to comments submitted in connection with such review.~~

~~(2)~~

~~(A)~~

~~If the Administrator finds that a State has, in a substantial number of instances, abused its discretion in granting exemptions under subsection (a) of this section or failed to prescribe schedules in accordance with subsection (b) of this section, the Administrator shall notify the State of his findings. In determining if a State has abused its discretion in granting exemptions in a substantial number of instances, the Administrator shall consider the number of persons who are affected by the exemptions and if the requirements applicable to the granting of the exemptions were complied with. A notice under this subparagraph shall-~~

~~(i)~~

~~identify each exempt public water system with respect to which the finding was made,~~

~~(ii)~~

~~specify the reasons for the finding, and~~

~~(iii)~~

~~as appropriate, propose revocations of specific exemptions or propose revised schedules for specific exempt public water systems, or both.~~

~~(B)~~

~~The Administrator shall provide reasonable notice and public hearing on the provisions of each notice given pursuant to subparagraph (A). After a hearing on notice pursuant to subparagraph (A), the Administrator shall~~

~~(i)~~

~~rescind the finding for which the notice was given and promptly notify the State of such rescission, or~~

~~(ii)~~

~~promulgate (with such modifications as he deems appropriate) such exemption revocations and revised schedules proposed in such notice as he deems appropriate. Not later than 180 days after the date a notice is given pursuant to subparagraph (A), the Administrator shall complete the hearing on the notice and take the action required by the preceding sentence.~~

~~(C)~~

~~If a State is notified under subparagraph (A) of a finding of the Administrator made with respect to an exemption granted a public water system within that State or to a schedule prescribed pursuant to such an exemption and if before a revocation of such exemption or a revision of such schedule promulgated by the Administrator takes effect the State takes corrective action with respect to such exemption or schedule which the Administrator determines makes his finding inapplicable to such exemption or schedule, the Administrator shall rescind the application of his finding to that exemption or schedule. No exemption revocation or revised schedule may take effect before the expiration of 90 days following the date of the notice in which the revocation or revised schedule was proposed.~~

~~(e) "Treatment technique requirement" defined~~

~~For purposes of this section, the term "treatment technique requirement" means a requirement in a national primary drinking water regulation which specifies for a contaminant (in accordance with section 300f(1)(C)(ii) of this title) each treatment technique known to the Administrator which leads to a reduction in the level of such contaminant sufficient to satisfy the requirements of section 300g-1(b) of this title.~~

~~(f) Authority of Administrator in a State without primary enforcement responsibility~~

~~If a State does not have primary enforcement responsibility for public water systems, the Administrator shall have the same authority to exempt public water systems in such State from maximum contaminant level requirements and treatment technique requirements under the same conditions and in the same manner as the State would be authorized to grant exemptions under this section if it had primary enforcement responsibility.~~

~~(g) Applications for exemptions; regulations; reasonable time for acting~~

~~If an application for an exemption under this section is made, the State receiving the application or the Administrator, as the case may be, shall act upon such application within a reasonable period (as determined under regulations prescribed by the Administrator) after the date of its submission.~~

have primary enforcement responsibility.

§ 142.303 Which size public water systems can receive a small system variance?

(a) A State exercising primary enforcement responsibility for public water systems (or the Administrator for other systems) may grant a small system variance to public water systems serving 3,300 or fewer persons.

(b) With the approval of the Administrator pursuant to § 142.312, a State exercising primary enforcement responsibility for public water systems may grant a small system variance to public water systems serving more than 3,300 persons but fewer than 10,000 persons.

(c) In determining the number of persons served by the public water system, the State or Administrator must include persons served by consecutive systems. A small system variance granted to a public water system would also apply to any consecutive system served by it.

Subpart K—Variances for Small System

SOURCE: 63 FR 43848, Aug. 14, 1998, unless otherwise noted.

GENERAL PROVISIONS

§ 142.301 What is a small system variance?

Section 1415(e) of the Act authorizes the issuance of variances from the requirement to comply with a maximum contaminant level or treatment technique to systems serving fewer than 10,000 persons. The purpose of this subpart is to provide the procedures and criteria for obtaining these variances. The regulations in this subpart shall take effect on September 14, 1998.

§ 142.302 Who can issue a small system variance?

A small system variance under this subpart may only be issued by either:

- (a) A State that is exercising primary enforcement responsibility under Subpart B for public water systems under the State's jurisdiction; or
- (b) The Administrator, for a public water system in a State which does not

§ 142.304 For which of the regulatory requirements is a small system variance available?

(a) A small system variance is not available under this subpart for a national primary drinking water regulation for a microbial contaminant (including a bacterium, virus, or other organism) or an indicator or treatment technique for a microbial contaminant.

(b) A small system variance under this subpart is otherwise only available for compliance with a requirement specifying a maximum contaminant level or treatment technique for a contaminant with respect to which:

(1) a national primary drinking water regulation was promulgated on or after January 1, 1986; and

(2) the Administrator has published a small system variance technology pursuant to Section 1412(b)(15) of the Act.

NOTE TO PARAGRAPH (B)(1): Small system variances are not available for public water systems above the pre-1986 maximum contaminant level even if subsequently revised. If the Agency revises a pre-1986 maximum contaminant level and makes it more stringent, then a variance would be available for that contaminant, but only up to the pre-1986 maximum contaminant level.

§ 142.305 When can a small system variance be granted by a State?

No small system variance can be granted by a State until the later of the following:

- (a) 90 days after the State proposes to grant the small system variance;
- (b) If a State is proposing to grant a small system variance to a public water system serving 3,300 or fewer persons and the Administrator objects to the small system variance, the date on which the State makes the recommended modifications or responds in writing to each objection; or
- (c) If a State is proposing to grant a small system variance to a public water system serving a population more than 3,300 and fewer than 10,000 persons, the date the Administrator approves the small system variance. The Administrator must approve or disapprove the variance within 90 days after it is submitted to the Administrator for review.

~~REVIEW OF SMALL SYSTEM VARIANCE APPLICATION~~

§ 142.306 What are the responsibilities of the public water system, State and the Administrator in ensuring that sufficient information is available and for evaluation of a small system variance application?

- (a) A public water system requesting a small system variance must provide accurate and correct information to the State or the Administrator to issue a small system variance in accordance with this subpart. A State may assist a public water system in compiling information required for the State or the Administrator to issue a small system variance in accordance with this subpart.
- (b) Based upon an application for a small system variance and other information, and before a small system variance may be proposed under this subpart, the State or the Administrator must find and document the following:
 - (1) The public water system is eligible for a small system variance pursuant to §§ 142.303 (i.e., the system serves a population of fewer than 10,000 persons) and 142.304 (i.e., the contaminant for which the small system variance is

sought is not excluded from variance eligibility);

(2) The public water system cannot afford to comply, in accordance with the affordability criteria established by the State (or by the Administrator in States which do not have primary enforcement responsibility), with the national primary drinking water regulation for which a small system variance is sought, including by:

- (i) Treatment;
 - (ii) Alternative sources of water supply;
 - (iii) Restructuring or consolidation changes, including ownership change and/or physical consolidation with another public water system; or
 - (iv) Obtaining financial assistance pursuant to Section 1452 of the Act or any other Federal or State program;
- (3) The public water system meets the source water quality requirements for installing the small system variance technology developed pursuant to guidance published under section 1412(b)(15) of the Act;
- (4) The public water system is financially and technically capable of installing, operating and maintaining the applicable small system variance technology; and
- (5) The terms and conditions of the small system variance, as developed through compliance with § 142.307, ensure adequate protection of human health, considering the following:
- (i) The quality of the source water for the public water system; and
 - (ii) Removal efficiencies and expected useful life of the small system variance technology.

§ 142.307 What terms and conditions must be included in a small system variance?

- (a) A State or the Administrator must clearly specify enforceable terms and conditions of a small system variance.
- (b) The terms and conditions of a small system variance issued under this subpart must include, at a minimum, the following requirements:
 - (1) Proper and effective installation, operation and maintenance of the applicable small system variance technology in accordance with guidance

published by the Administrator pursuant to section 1412(b)(15) of the Act, taking into consideration any relevant source water characteristics and any other site specific conditions that may affect proper and effective operation and maintenance of the technology;

(2) Monitoring requirements, for the contaminant for which a small system variance is sought, as specified in 40 CFR part 141; and

(3) Any other terms or conditions that are necessary to ensure adequate protection of public health, which may include:

(i) Public education requirements; and

(ii) Source water protection requirements.

(c) The State or the Administrator must establish a schedule for the public water system to comply with the terms and conditions of the small system variance which must include, at a minimum, the following requirements:

(1) Increments of progress, such as milestone dates for the public water system to apply for financial assistance and begin capital improvements;

(2) Quarterly reporting to the State or Administrator of the public water system's compliance with the terms and conditions of the small system variance;

(3) Schedule for the State or the Administrator to review the small system variance under paragraph (d) of this section; and

(4) Compliance with the terms and conditions of the small system variance as soon as practicable but not later than 3 years after the date on which the small system variance is granted. The Administrator or State may allow up to 2 additional years if the Administrator or State determines that additional time is necessary for the public water system to:

(i) Complete necessary capital improvements to comply with the small system variance technology, secure an alternative source of water, or restructure or consolidate; or

(ii) Obtain financial assistance provided pursuant to section 1452 of the Act or any other Federal or State program.

(d) The State or the Administrator must review each small system vari-

ance granted not less often than every 5 years after the compliance date established in the small system variance to determine whether the public water system continues to meet the eligibility criteria and remains eligible for the small system variance and is complying with the terms and conditions of the small system variance. If the public water system would no longer be eligible for a small system variance, the State or the Administrator must determine whether continuing the variance is in the public interest. If the State or the Administrator finds that continuing the variance is not in the public interest, the variance must be withdrawn.

PUBLIC PARTICIPATION

§ 142.308 What public notice is required before a State or the Administrator proposes to issue a small system variance?

(a) At least fifteen (15) days before the date of proposal, and at least thirty (30) days prior to a public meeting to discuss the proposed small system variance, the State, Administrator, or public water system as directed by the State or Administrator, must provide notice to all persons served by the public water system. For billed customers, identified in paragraph (a)(1) of this section, this notice must include the information listed in paragraph (c) of this section. For other persons regularly served by the system, identified in paragraph (a)(2) of this section, the notice shall include the information identified in paragraph (d) of this section. Notice must be provided to all persons served by:

(1) Direct mail or other home delivery to billed customers or other service connections; and

(2) Any other method reasonably calculated to notify, in a brief and concise manner, other persons regularly served by the system. Such methods may include publication in a local newspaper, posting in public places or delivery to community organizations.

(b) At the time of proposal, the State must publish a notice in the State equivalent to the FEDERAL REGISTER or a newspaper or newspapers of wide circulation in the State, or, in the case of the Administrator, in the FEDERAL

REGISTER. This notice shall include the information listed in paragraph (c) of this section.

(c) The notice in paragraphs (a)(1) and (b) of this section must include, at a minimum, the following:

- (1) Identification of the contaminant[s] for which a small system variance is sought;
 - (2) A brief statement of the health effects associated with the contaminant[s] for which a small system variance is sought using language in Appendix C of Part 141 Subpart O of this chapter;
 - (3) The address and telephone number at which interested persons may obtain further information concerning the contaminant and the small system variance;
 - (4) A brief summary, in easily understandable terms, of the terms and conditions of the small system variance;
 - (5) A description of the consumer petition process under § 142.310 and information on contacting the EPA Regional Office;
 - (6) a brief statement announcing the public meeting required under § 142.309(a), including a statement of the purpose of the meeting, information regarding the time and location for the meeting, and the address and telephone number at which interested persons may obtain further information concerning the meeting; and
 - (7) In communities with a large proportion of non-English speaking residents, as determined by the primary agency, information in the appropriate language regarding the content and importance of the notice.
- (d) The notice in paragraph (a)(2) of this section must provide sufficient information to alert readers to the proposed variance and direct them where to receive additional information.
- (e) At its option, the State or the Administrator may choose to issue separate notices or additional notices related to the proposed small system variance, provided that the requirements in paragraphs (a) through (d) of this section are satisfied.
- (f) Prior to promulgating the final variance, the State or the Administrator must respond in writing to all significant public comments received

relating to the small system variance. Response to public comment and any other documentation supporting the issuance of a variance must be made available to the public after final promulgation.

§ 142.309 What are the public meeting requirements associated with the proposal of a small system variance?

- (a) A State or the Administrator must provide for at least one (1) public meeting on the small system variance no later than 15 days after the small system variance is proposed.
- (b) At the time of the public meeting, the State or Administrator must prepare and make publicly available, in addition to the information listed in § 142.308(c), either:
 - (1) The proposed small system variance, if the public meeting occurs after proposal of the small system variance;
 - or
 - (2) A draft of the proposed small system variance, if the public meeting occurs prior to proposal of the proposed small system variance.
- (c) Notice of the public meeting must be provided in the manner required under § 142.308 at least 30 days in advance of the public meeting. This notice must be provided by the State, the Administrator, or the public water system as directed by the State or Administrator.

§ 142.310 How can a person served by the public water system obtain EPA review of a State proposed small system variance?

- (a) Any person served by the public water system may petition the Administrator to object to the granting of a small system variance within 30 days after a State proposes to grant a small system variance for a public water system.
- (b) The Administrator must respond to a petition filed by any person served by the public water system and determine whether to object to the small system variance under § 142.311, no later than 60 days after the receipt of the petition.

EPA REVIEW AND APPROVAL OF SMALL
SYSTEM VARIANCES**§ 142.311 What procedures allow the Administrator to object to a proposed small system variance or overturn a granted small system variance for a public water system serving 3,300 or fewer persons?**

(a) At the time a State proposes to grant a small system variance under this subpart, the State must submit to the Administrator the proposed small system variance and all supporting information, including any written public comments received prior to proposal.

(b) The Administrator may review and object to any proposed small system variance within 90 days of receipt of the proposed small system variance. The Administrator must notify the State in writing of each basis for the objection and propose a modification to the small system variance to resolve the concerns of the Administrator. The State must make the recommended modification, respond in writing to each objection, or withdraw the proposal to grant the small system variance.

(c) If the State issues the small system variance without resolving the concerns of the Administrator, the Administrator may overturn the State decision to grant the variance if the Administrator determines that the State decision does not comply with the Act or this rule.

§ 142.312 What EPA action is necessary when a State proposes to grant a small system variance to a public water system serving a population of more than 3,300 and fewer than 10,000 persons?

(a) At the time a State proposes to grant a small system variance to a public water system serving a population of more than 3,300 and fewer than 10,000 persons, the State must submit the proposed small system variance and all supporting information, including public comments received prior to proposal, to the Administrator.

(b) The Administrator must approve or disapprove the small system variance within 90 days of receipt of the proposed small system variance and

supporting information. The Administrator must approve the small system variance if it meets each requirement within the Act and this rule.

(c) If the Administrator disapproves the small system variance, the Administrator must notify the State in writing of the reasons for disapproval and the small system variance does not become effective. The State may resubmit the small system variance for review and approval with modifications to address the objections stated by the Administrator.

~~§ 142.313 How will the Administrator review a State's program under this subpart?~~

(a) ~~The Administrator must periodically review each State program under this subpart to determine whether small system variances granted by the State comply with the requirements of the Act, this rule and the affordability criteria developed by the State.~~

(b) ~~If the Administrator determines that small system variances granted by a State are not in compliance with the requirements of the Act, this rule or the affordability criteria developed by the State, the Administrator shall notify the State in writing of the deficiencies and make public the determinations.~~

(c) ~~The Administrator's review will be based in part on quarterly reports prepared by the States pursuant to § 142.15(a)(1) relating to violations of increments of progress or other violated terms or conditions of small system variances.~~

TITLE 179 PUBLIC WATER SYSTEMS
CHAPTER 8 GROUND WATER RULE

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 8 GROUND WATER RULE

8-001 SCOPE AND AUTHORITY: This rule applies to all public water systems that use ground water, except that it does not apply to public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water (GWUDI) prior to treatment under 179 NAC 13. The authority is found in Neb. Rev. Stat. §§71-5301 to 71-5313.

8-002 DEFINITIONS

Consecutive System means a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direction connection or through the distribution system of one or more consecutive systems.

Department means the Division of Public Health of the Department of Health and Human Services.

EPA means the United States Environmental Protection Agency.

Ground Water System, for this chapter, means any public water system meeting the applicability statement in 179 NAC 8-001, including consecutive systems receiving finished ground water.

GWUDI means ground water under the direct influence of surface water.

Hydrogeologic Sensitivity Assessment, for this chapter, means a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.

Significant deficiency means a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system found during a sanitary survey that the Department determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

Wholesale system means a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

8-003 GENERAL REQUIREMENTS: Systems subject to 179 NAC 8 must comply with the following requirements:

1. Sanitary survey information requirements for all ground water systems as described in 179 NAC 8-004.
2. Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99% (4-log) treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in 179 NAC 8-005.
3. Treatment technique requirements, described in 179 NAC 8-006, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under 179 NAC 8-005, or that have significant deficiencies that are identified by the Department. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this chapter must implement one or more of the following corrective action options:
 - A. Correct all significant deficiencies;
 - B. Provide an alternate source of water;
 - C. Eliminate the source of contamination; or
 - D. Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer.
4. Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in 179 NAC 8-006.02.
5. If requested by the Department, ground water systems must provide the Department with any existing information that will enable the Department to perform a hydrogeologic sensitivity assessment.

8-004 SANITARY SURVEYS FOR GROUND WATER SYSTEMS

8-004.01 Ground water systems must provide the Department, at the Department's request, any existing information that will enable the Department to conduct a sanitary survey.

8-004.02 For purposes of this chapter, a "sanitary survey," as conducted by the Department, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.

8-004.03 The sanitary survey must include an evaluation of the applicable components listed below:

1. Source,
2. Treatment,
3. Distribution system,
4. Finished water storage,
5. Pumps, pump facilities, and controls,
6. Monitoring, reporting, and data verification,
7. System management and operation, and
8. Operator compliance with Department requirements.

8-005 GROUND WATER SOURCE MICROBIAL MONITORING AND ANALYTICAL METHODS

8-005.01 Triggered Source Water Monitoring

8-005.01A General Requirements: A ground water system must conduct triggered source water monitoring if the conditions identified in items 1 and either 2 or 3 below exist:

1. The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and either
2. The system is notified that a sample collected under 179 NAC 3-004.01 is total coliform-positive and the sample is not invalidated under 179 NAC 3-004.03 until March 31, 2016, or-
3. The system is notified that a sample collected under 179 NAC 26-006 through 179 NAC 26-009 is total coliform-positive and the sample is not invalidated under 179 NAC 26-005.03 beginning April 1, 2016.

8-005.01B Sampling Requirements: A ground water system must collect, within 24 hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under 179 NAC 3-004.01 until March 31, 2016, or collected under 179 NAC 26-006 through 26-009 beginning April 1, 2016 except as provided in 179 NAC 8-005.01B2.

8-005.01B1 The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.

8-005.01B2 If approved by the Department, systems with more than one ground water source may meet the requirements of 179 NAC 8-005.01B by sampling a representative ground water source or sources. If directed by the

Department, systems must submit for Department approval a triggered source water monitoring plan that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under 179 NAC 3-004.01 until March 31, 2016, or under 179 NAC 26-005 beginning April 1, 2016, and that the system intends to use for representative sampling under this paragraph.

8-005.01B3 Until March 31, 2016, a A ground water system serving 1,000 people or fewer may use a repeat sample collected from a ground water source to meet both the requirements of 179 NAC 3-004.02 and the monitoring requirements of 179 NAC 8-005.01B for that ground water source only if the Department approves the use of *E. coli* as a fecal indicator for source water monitoring under 179 NAC 8-005.01. If the repeat sample collected from the ground water source is *E. coli* positive, the system must comply with 179 NAC 8-005.01C.

8-005.01B4 Beginning April 1, 2016, a ground water system serving 1,000 or fewer people may use a repeat sample collected from a ground water source to meet both the requirements of 179 NAC 26 and to satisfy the monitoring requirements of 179 NAC 8-005.01B for that ground water source only if the Department approves the use of *E. coli* as a fecal indicator for source water monitoring under 179 NAC 8-005.01 and approves the use of a single sample for meeting both the triggered source water monitoring requirements in 179 NAC 8-005.01 and the repeat monitoring requirements in 179 NAC 26-010. If the repeat sample collected from the ground water source is *E. coli*-positive, the system must comply with 179 NAC 8-005.01C.

8-005.01C Additional Requirements: If the Department does not require corrective action under 179 NAC 8-006.01B for a fecal indicator-positive source water sample collected under 8-005.01B that is not invalidated under 179 NAC 8-005.04, the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.

8-005.01D Consecutive and Wholesale Systems

8-005.01D1 In addition to the other requirements of 179 NAC 8-005.01 a consecutive ground water system that has a total coliform-positive sample collected under 179 NAC 3-004.01 until March 31, 2016, or under 179 NAC 26-006 through 179 NAC 26-009 beginning April 1, 2016, must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.

8-005.01D2 In addition to the other requirements of 179 NAC 8-005.01, a wholesale ground water system must comply with the following:

1. A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under 179 NAC 3-004.01 until March 31, 2016, or collected under 179 NAC 26-006 through 179 NAC 26-009 beginning April 1, 2016, is total coliform-positive must, within 24 hours of being notified, collect a sample from its

ground water source(s) under 179 NAC 8-005.01B and analyze it for a fecal indicator under 179 NAC 8-005.03.

2. If the sample collected under 179 NAC 8-005.01D2 item 1 is fecal indicator-positive, the wholesale ground water system must notify all consecutive systems served by that ground water source of the fecal indicator source water positive within 24 hours of being notified of the ground water source sample monitoring result and must meet the requirements of 179 NAC 8-005.01C.

8-005.01E Exceptions to the Triggered Source Water Monitoring Requirements: A ground water system is not required to comply with the source water monitoring requirements of 179 NAC 8-005.01 if either of the following conditions exists:

1. The Department determines, and documents in writing, that the total coliform-positive sample collected under 179 NAC 3-004.01 until March 31, 2016, or under 179 NAC 26-006 through 179 NAC 26-009 beginning April 1, 2016 is caused by a distribution system deficiency; or
2. The total coliform-positive sample collected under 179 NAC 3-004.01 until March 31, 2016, or under 179 NAC 26-006 through 179 NAC 26-009 beginning April 1, 2016, is collected at a location that meets Department criteria for distribution system conditions that will cause total coliform-positive samples.

8-005.02 Assessment Source Water Monitoring: If directed by the Department, ground water systems must conduct assessment source water monitoring that meets Department-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under 179 NAC 8-005.01B to meet the requirements of 179 NAC 8-005.02. Department-determined assessment source water monitoring requirements may include:

1. Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public,
2. Collection of samples from each well unless the system obtains written Department approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting,
3. Collection of a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used,
4. Analysis of all ground water source samples using one of the analytical methods ~~listed~~ incorporated in 179 NAC 8-005.03B for the presence of *E. coli*, enterococci, or coliphage,

5. Collection of ground water source samples at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment, and
6. Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the Department approves an alternate sampling location that is representative of the water quality of that well.

8-005.03 Analytical Methods

8-005.03A A ground water system subject to the source water monitoring requirements of 179 NAC 8-005.01 must collect a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.

8-005.03B A ground water system must analyze all ground water source samples collected under 179 NAC 8-005.01 using one of the analytical methods listed in ~~the following table~~ 40 CFR 141.402(c)(2) which is incorporated herein by reference and can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-part141-subpartS.pdf> or the equivalent as determined by EPA for the presence of *E. coli*, enterococci, or coliphage:

ANALYTICAL METHODS FOR SOURCE WATER MONITORING

Fecal indicator⁴	Methodology	Method citation	SM Online¹³	Other
<i>E. coli</i>	Colilert ³	9223 B. ^{2,12,}	9223 B-97	
	Colisure ³	9223 B. ^{2,12,}	9223 B-97	
	Colilert-18	9223 B ^{2,12}	9223 B-97	
	Membrane Filter—Method with MI Agar	EPA Method 1604. ⁴		
	m-ColiBlue24 Test ⁵			
	E*Colite Test ⁶			
	EC-MUG ⁷	9221 F. ²		
	NA-MUG ⁷	9222G. ²		
	Readycult®			Readycult® ¹⁴
	Colitag			Modified Colitag™ ¹⁵
	Chromocult®		Chromocult® ¹⁶	
Enterococci	Multiple Tube Technique	9230B. ²	9230 B-04	
	Membrane Filter Technique	9230C ²		
	Membrane Filter Technique	EPA Method 1600. ⁸		
	Enterolert ⁹			
Coliphage	Two-Step Enrichment Presence-Absence Procedure	EPA Method 1601. ¹⁰		
	Single Agar Layer Procedure	EPA Method 1602. ¹¹		

~~Analyses must be conducted in accordance with the documents listed below. Copies of the documents may be obtained from the sources listed below. These methods are incorporated herein by reference and are available for viewing at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509. Copies may be obtained from the addresses listed below.~~

- ~~1 The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but is not required to hold samples below 10°C during transit.~~
- ~~2 Methods are described in *Standard Methods for the Examination of Water and Wastewater* 20th edition (1998) and copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005-2605.~~

- ~~3~~ Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092.
- ~~4~~ EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium); September 2002, EPA 821-R-02-024. Method is available at <http://www.epa.gov/nerlcwww/1604sp02.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.
- ~~5~~ A description of the m-ColiBlue24 Test, "Total Coliforms and *E. coli* Membrane Filtration Method with m-ColiBlue24@ Broth," Method No. 10029 Revision 2, August 17, 1999, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.
- ~~6~~ A description of the E*Colite Test, "Charm E*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water, January 9, 1998, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843-1032 or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.
- ~~7~~ EC MUG (Method 9221F) or NA MUG (Method 9222G) can be used for *E. coli* testing step as described in 179 NAC 3-004.06E item 1 or 2 after use of Standard Methods 9221-B, 9221-D., 9222-B, or 9222-C.
- ~~8~~ EPA Method 1600: Enterococci in Water by Membrane Filtration Using Membrane-Enterococcus Indoxyl- β -D-Glucoside Agar (mEI) EPA 821-R-02-022 (September 2002) is an approved variation of Standard Method 9230C. The method is available at <http://www.epa.gov/nerlcwww/1600sp02.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460. The holding time and temperature for ground water samples are specified in footnote 1 above, rather than as specified in Section 8 of EPA Method 1600.
- ~~9~~ Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article "Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters," by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881-3884.
- ~~10~~ EPA Method 1601: Male-specific (F+) and Somatic Coliphage in Water by Two-step Enrichment Procedure; April 2001, EPA 821-R-01-030. Method is available at <http://www.epa.gov/nerlcwww/1601ap01.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.
- ~~11~~ EPA Method 1602: Male-specific (F+) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure; April 2001, EPA 821-R-01-029. Method is available at <http://www.epa.gov/nerlcwww.1602ap01.pdf> or from EPA's Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.
- ~~12~~ Methods are described in *Standard Methods for the Examination of Water and Wastewater* 21st edition (2005) and copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005-2605.
- ~~13~~ Standard Methods Online are available at <http://www.standardmethods.org>.
- ~~14~~ ReadyCult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," January, 2007. Version 1.1 Available from EMD Chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.
- ~~15~~ Modified Colitag™ Method. "Modified Colitag™ Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water (ATP D05-0035)," ATP D05-0035," August 28, 2009. Available at <http://www.nemi.gov> or from GPI International, 5580 Skylane Boulevard, Santa Rosa, CA 95403.
- ~~16~~ Chromocult® Method, "Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters," November 2000. Version 1.0. EMD Chemicals (affiliate of Merck KGaA, Darmstadt, Germany), 480 S. Democrat Road, Gibbstown, NJ 08027-1297.

8-005.04 Invalidation of a Fecal Indicator-Positive Ground Water Source Sample

8-005.04A A ground water system may obtain Department invalidation of a fecal indicator-positive ground water source sample collected under 179 NAC 8-005.01 only under the following conditions:

1. The system provides the Department with written notice from the laboratory that improper sample analysis occurred; or
2. The Department determines and documents in writing that there is substantial evidence that a fecal indicator-positive ground water source sample is not related to source water quality.

8-005.04B If the Department invalidates a fecal indicator-positive ground water source sample, the ground water system must collect another source water sample under 179 NAC 8-005.01 within 24 hours of being notified by the Department of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods incorporated in 179 NAC 8-005.03. The Department may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the Department must specify how much time the system has to collect the sample.

8-005.05 Sampling Location

8-005.05A Any ground water source sample required under 179 NAC 8-005.01 must be collected at a location prior to any treatment of the ground water source unless the Department approves a sampling location after treatment.

8-005.05B If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a Department-approved location to meet the requirements of 179 NAC 8-005.01 if the sample is representative of the water quality of that well.

8-005.06 New Sources: If directed by the Department, a ground water system that places a new ground water source into service must conduct assessment source water monitoring under 179 NAC 8-005.02. If directed by the Department, the system must begin monitoring before the ground water source is used to provide water to the public.

8-005.07 Public Notification: A ground water system with a ground water source sample collected under 179 NAC 8-005.01 or 8-005.02 that is fecal indicator-positive and that is not invalidated under 179 NAC 8-005.04, including consecutive systems served by the ground water source, must conduct public notification under 179 NAC 4-004.

8-005.08 Monitoring Violations: Failure to meet the requirements of 179 NAC 8-005.01 through 8-005.06 is a monitoring violation and requires the ground water system to provide public notification under 179 NAC 4-006.

8-006 TREATMENT TECHNIQUE REQUIREMENTS FOR GROUND WATER SYSTEMS

8-006.01 Ground Water Systems with Significant Deficiencies or Source Water Fecal Contamination

8-006.01A The treatment technique requirements of 179 NAC 8-006 must be met by ground water systems when the Department identifies a significant deficiency or when a ground water source sample collected under 179 NAC 8-005.01C is fecal indicator-positive.

8-006.01B If directed by the Department, a ground water system with a ground water source sample collected under 179 NAC 8-005.01B, 8-005.01D, or 8-005.02 that is fecal indicator-positive must comply with the treatment technique requirements of 179 NAC 8-006.

8-006.01C When the Department identifies a significant deficiency at a surface water or ground water under the direct influence of surface water public water system that uses both ground water and surface water or ground water under the direct influence of surface water, the system must comply with provisions of this paragraph except in cases where the Department determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or ground water under the direct influence of surface water.

8-006.01D Unless the Department directs the ground water system to implement a specific corrective action, the ground water system must consult with the Department regarding the appropriate corrective action within 30 days of receiving written notice from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under 179 NAC 8-005.01C was found to be fecal indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under 179 NAC 8-005.01B, 8-005.01D, or 8-005.02 requires corrective action. For the purposes of this chapter, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the Department determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

8-006.01E Within 120 days (or earlier if directed by the Department) of receiving written notification from the Department of a significant deficiency, written notice from a laboratory that a ground water source sample collected under 179 NAC 8-005.01C was found to be fecal indicator-positive, or direction from the Department that a fecal indicator-positive sample collected under 179 NAC 8-005.01B, 8-005.01D, or 8-005.02 requires corrective action, the ground water system must either:

1. Have completed corrective action in accordance with applicable Department plan review processes or other Department guidance or direction, if any, including Department-specified interim measures; or

2. Be in compliance with a Department-approved corrective action plan and schedule subject to the following conditions:
 - a. Any subsequent modifications to a Department-approved corrective action plan and schedule must also be approved by the Department.
 - b. If the Department specifies interim measures for protection of the public health pending Department approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the Department.

8-006.01F Corrective Action Alternatives: Ground water systems that meet the conditions of 179 NAC 8-006.01A or 8-006.01B must implement one or more of the following corrective action alternatives:

1. Correct all significant deficiencies;
2. Provide an alternate source of water;
3. Eliminate the source of contamination; or
4. Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of a 4-log virus inactivation and removal) before or at the first customer for the ground water source.

8-006.01G Special Notice to the Public of Significant Deficiencies or Source Water Fecal Contamination

8-006.01G1 In addition to the applicable public notification requirements of 179 NAC 4-004, a community ground water system that receives notice from the Department of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the Department under 179 NAC 8-005.04 must inform the public served by the water system under 179 NAC 14-004.08A item 6 of the fecal indicator-positive source sample or of any significant deficiency that has not been corrected. The system must continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the Department to be corrected under 179 NAC 8-006.01E.

8-006.01G2 In addition to the applicable public notification requirements of 179 NAC 4-004, a non-community ground water system that receives notice from the Department of a significant deficiency must inform the public served by the water system in a manner approved by the Department of any significant deficiency that has not been corrected within 12 months of being notified by the Department, or earlier if directed by the Department. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:

1. The nature of the significant deficiency and the date the significant deficiency was identified by the Department.

2. The Department-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and
3. For systems that have a population with 5% or more non-English speaking consumers, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.

8-006.01G3 If directed by the Department, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of correction under 179 NAC 8-006.01G2.

8-006.02 Compliance Monitoring

8-006.02A Existing Ground Water Sources: A ground water system that is not required to meet the source water monitoring requirements of this chapter for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer must conduct compliance monitoring as required under 179 NAC 8-006.02C. If the system discontinues 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source, it must conduct ground water source monitoring as required under 179 NAC 8-005.

8-006.02B New Ground Water Sources: A ground water system that places a ground water source in service after [the effective date of these regulations], that is not required to meet the source water monitoring requirements of this chapter because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with the following requirements:

1. The system must notify the Department in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the Department must include engineering, operational, or other information that the Department requests to evaluate the submission.
2. The system must conduct compliance monitoring as required under 179 NAC 8-006.02C within 30 days of placing the source in service.
3. The system must conduct ground water source monitoring under 179 NAC 8-005 if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus

inactivation and removal) before or at the first customer for the ground water source.

8-006.02C Monitoring Requirements: A ground water system subject to the requirements of 179 NAC 8-006.01, 8-006.02A, or 8-006.02B must monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:

1. Chemical Disinfection

a. Ground water systems serving greater than 3,300 people: A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods ~~specified~~ incorporated by reference in 179 NAC 13-007.01B at a location approved by the Department and must record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. If there is a failure in the continuous monitoring equipment, the ground water system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

b. Ground water systems serving 3,300 or fewer people: A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods ~~specified~~ incorporated by reference in 179 NAC 13-007.01B at a location approved by the Department and record the residual disinfection concentration each day that water from the ground water source is served to the public. The ground water system must maintain the Department-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the Department. If any daily grab sample measurement falls below the Department-determined residual disinfectant concentration, the ground water system must take follow-up samples every four hours until the residual disinfectant concentration is restored to the Department-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of 179 NAC 8-006.02C item 1.a.

2. Membrane Filtration: A ground water system that uses membrane filtration to meet the requirements of this chapter must monitor the membrane filtration process in accordance with all Department-specified monitoring requirements and must operate the membrane filtration in accordance with all Department-specified compliance requirements. A ground water system that uses

membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

- a. The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;
 - b. The membrane process is operated in accordance with Department-specified compliance requirements; and
 - c. The integrity of the membrane is intact.
3. Alternative Treatment: A ground water system that uses a Department-approved alternative treatment to meet the requirements of this chapter by providing at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer must:
- a. Monitor the alternative treatment in accordance with all Department – specified monitoring requirements; and
 - b. Operate the alternative treatment in accordance with all compliance requirements that the Department determines to be necessary to achieve at least 4-log treatment of viruses.

8-006.03 Discontinuing Treatment: A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the Department determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring ~~and analytical methods~~ requirements of 179 NAC 8-005 and the analytical methods incorporated by reference in 179 NAC 8-005.

8-006.04 Failure to meet the monitoring requirements of 179 NAC 8-006.02 is a monitoring violation and requires the ground water system to provide public notification under 179 NAC 4-006.

8-007 TREATMENT TECHNIQUE VIOLATIONS FOR GROUND WATER SYSTEMS

8-007.01 A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of receiving written notice from the Department of the significant deficiency, the system:

1. Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department specified interim actions and measures, or
2. Is not in compliance with a Department-approved corrective action plan and schedule.

8-007.02 Unless the Department invalidates a fecal indicator-positive ground water source sample under 179 NAC 8-005.04, a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the Department) of meeting the conditions of 179 NAC 8-006.01A or 8-006.01B, the system:

1. Does not complete corrective action in accordance with any applicable Department plan review processes or other Department guidance and direction, including Department-specified interim measures, or
2. Is not in compliance with a Department-approved corrective action plan and schedule.

8-007.03 A ground water system subject to the requirements of 179 NAC 8-006.02C that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a Department-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

8-007.04 Ground water systems must give public notification under 179 NAC 4-005 for the treatment technique violations specified in 179 NAC 8-007.01 through 8-007.03.

8-008 REPORTING AND RECORDKEEPING FOR GROUND WATER SYSTEMS

8-008.01 Reporting: In addition to the requirements of 179 NAC 5-004, a ground water system regulated under this chapter must provide the following information to the Department:

1. A ground water system conducting compliance monitoring under 179 NAC 8-006.02 must notify the Department any time the system fails to meet any Department-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the Department as soon as possible, but in no case later than the end of the next business day.
2. After completing any corrective action under 179 NAC 8-006.01, a ground water system must notify the Department within 30 days of completion of the corrective action.
3. If a ground water system subject to the requirements of 179 NAC 8-005.01 does not conduct source water monitoring under 179 NAC 8-005.01E item 2, the system must provide documentation to the Department within 30 days of the total coliform positive sample that it met the Department criteria.

8-008.02 Recordkeeping: In addition to the requirements of 179 NAC 5-005, a ground water system regulated under this chapter must maintain the following information in its records:

1. Documentation of corrective actions. Documentation must be kept for a period of not less than ten years.
2. Documentation of notice to the public as required under 179 NAC 8-006.01G. Documentation must be kept for a period of not less than three years.
3. Records of decisions under 179 NAC 8-005.01E item 2 and records of invalidation of fecal indicator-positive ground water source samples under 179 NAC 8-005.04. Documentation must be kept for a period of not less than five years.
4. For consecutive systems, documentation of notification to the wholesale system(s) of total-coliform positive samples that are not invalidated under 179 NAC 3-004.03 until March 31, 2016, or under 179 NAC 26-005 beginning April 1, 2016. Documentation must be kept for a period of not less than five years.
5. For systems, including wholesale systems, that are required to perform compliance monitoring under 179 NAC 8-006.02:
 - a. Records of the Department-specified minimum disinfectant residual. Documentation must be kept for a period of not less than ten years.
 - b. Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the Department-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation must be kept for a period of not less than five years.
 - c. Records of Department-specified compliance requirements for membrane filtration and of parameters specified by the Department for Department-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation must be kept for a period of not less than five years.

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CHAPTER 13 SURFACE WATER TREATMENT

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 13 SURFACE WATER TREATMENT

13-001 SCOPE AND AUTHORITY: These regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, and turbidity. The authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

13-002 DEFINITIONS

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

CT or CT_{calc} means the product of “residual disinfectant concentration” (C) in milligrams per liter determined before or at the first customer, and the corresponding “disinfectant contact time” (T) in minutes, i.e., “C” x “T”.

CT_(99.9) means the CT value required for 99.9% (3-log) inactivation of *Giardia lamblia* cysts. CT_(99.9) for a variety of disinfectants and conditions appear in Tables 13.1 to 13.8 of 179 NAC 13-007.02C.

Department means the Division of Public Health of the Department of Health and Human Services.

Diatomaceous earth filtration means a process resulting in substantial particulate removal in which

1. A precoat cake of diatomaceous earth filter media is deposited on a support membrane (septum), and
2. 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.

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

Director means the Director of Public Health of the Division of Public Health or his/her authorized representative.

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

Disinfection 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.

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

Flocculation means a process to enhance agglomeration or collection of smaller floc particles into larger, more easily settleable particles through hydraulic or mechanical means.

Ground water under the direct influence of surface water (GWUDI) means any water beneath the surface of the ground with significant occurrence of insects or other macroorganisms, algae, or large-diameter pathogens such as *Giardia lamblia* or *Cryptosporidium*, or significant and relatively rapid shifts in water characteristics such as turbidity, temperature, conductivity, or pH which closely correlate to climatological or surface water conditions. Direct influence must be determined for individual sources in accordance with criteria established by the Director. The Director determination of direct influence may be based on site-specific measurements of water quality and/or documentation of well construction characteristics and geology with field evaluation as described in 179 NAC 13 Attachment 2 which is hereby incorporated by reference.

Halogen means one of the chemical elements chlorine, bromine, or iodine.

Inactivation ratio means the ratio of CT to $CT_{(99.9)}$, i.e., CT divided by $CT_{(99.9)}$.

Legionella means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

Sedimentation means a process for removal of solids before filtration by gravity or separation.

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

Surface water means all water which is open to the atmosphere and subject to surface runoff.

Surface water system means a water system utilizing surface water as the source of water.

Treatment technique means the use of aeration, settling, filtration, or other physical process and/or the addition of any chemical or chemicals for the purpose of removing, deactivation, or adjusting the level of one or more contaminants present in the raw water source.

Trihalomethane (THM) means one of a family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

Total trihalomethanes (TTHMs) means the sum of the concentration in milligrams per liter of the trihalomethane compounds [trichloromethane (chloroform), dibromochloromethane, bromodichloromethane, and tribromomethane (bromoform)], rounded to two significant figures.

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

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 as determined by the Director.

13-003 GENERAL REQUIREMENTS

13-003.01 Each public water system with a surface water source or a ground water source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

1. At least 99.9% (3-log) removal and/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
2. At least 99.99% (4-log) removal and/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.

13-003.02 Each ground water source providing water to a public system will be examined to determine whether or not it is under the direct influence of surface water. The examination will be performed in accordance with the protocol described in Attachment 2 to 179 NAC 13.

13-003.02A Each ground water source for a community water system must have been examined no later than June 19, 1994.

13-003.02B Each ground water source for a non-community system must have been examined by June 19, 1999.

13-003.02C If the Director determines that a ground water source is under the direct influence of surface water, s/he will so indicate in writing to the owner of the public water system.

13-003.03 A public water system using surface water as a source must include filtration which meets the requirements of 179 NAC 13-006.

13-003.04 A public water system using a ground water source under the direct influence of surface water is considered to be in compliance with the requirements of 179 NAC 13-003 if:

1. It meets the requirements for avoiding filtration in 179 NAC 13-004 and meets the disinfection requirements in 179 NAC 13-005; or
2. It meets the filtration requirements in 179 NAC 13-006 and the disinfection requirements in 179 NAC 13-005.

13-003.05 Additional Requirements for Systems Serving at Least 10,000 People: In addition to complying with the requirements in 179 NAC 13, systems serving at least 10,000 people must also comply with the requirements in 179 NAC 17.

13-003.06 Additional Requirements for Systems Serving Fewer Than 10,000 People: In addition to complying with the requirements in 179 NAC 13, systems serving fewer than 10,000 people must also comply with the requirements in 179 NAC 19.

13-004 CRITERIA FOR AVOIDING FILTRATION: A public water system that uses a ground water source under the direct influence of surface water must meet all of the conditions of 179 NAC 13-004.01 and 13-004.02 and is subject to 179 NAC 13-004.03 beginning 18 months after the Director determines that it is under the direct influence of surface water. Within 18 months of the failure of a system using a ground water source under the direct influence of surface water to meet any one of the requirements of 179 NAC 13-004.01 to 13-004.06 the system owner must have installed filtration and meet the criteria for filtered systems specified in 179 NAC 13-006.

13-004.01 Source Water Quality Conditions

13-004.01A The fecal coliform concentration must be equal to or less than 20 per 100 ml or the total coliform concentration must be equal to or less than 100 per 100 ml (measured by the Department Laboratory or an approved laboratory pursuant to 179 NAC 3-009) in representative samples of the source water immediately prior to the first or only point of disinfection application in at least 90% of the measurements made for the six 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 must be met.

13-004.01B The turbidity level cannot exceed 5 NTU (measured as specified in 179 NAC 13-007.01A and 13-007.02B) in representative samples of the source water immediately prior to the first or only point of disinfectant application unless:

1. The Director determines that any such event was caused by circumstances that were unusual and unpredictable; and
2. As a result of any such event, there have not been more than two events in the past 12 months the system served water to the public, or more than five 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.

13-004.02 Site-Specific Conditions

13-004.02A The public water system must meet the requirements of 179 NAC 13-005.01A 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 Director determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

13-004.02B The public water system must meet the requirements of 179 NAC 13-005.01B at all times the system serves water to the public.

13-004.02C The public water system must meet the requirements of 179 NAC 13-005.01C at all times the system serves water to the public unless the Director determines that any such failure was caused by circumstances that were unusual and unpredictable.

13-004.02D The public water system must meet the requirements of 179 NAC 13-005.01D on an ongoing basis unless the Director determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

13-004.02E The public water system owner must ~~develop and implement a wellhead protection program sufficient to exclude potential sources of microbiological contamination within a one year time of travel from the well or well field. A wellhead protection program must consist of the following:~~

1. ~~A Wellhead Protection Area Delineation: The area delineated must be based on a one year time of travel and must be determined by use of a computer model acceptable to the Department or by the following formula:~~

$$T = 3.14nbL^2 \text{ divided by } Q$$

~~Where~~ ~~T = Time of Travel (days)~~
~~L = Distance from the well (feet)~~
~~n = Effective porosity (assumed to be 0.2 unless supporting evidence indicates otherwise)~~
~~b = Aquifer thickness (feet)~~
~~Q = Pumping rate (cubic feet per day)~~

- ~~2. Identification of all sources of microbiological contamination within the delineated area.~~
- ~~3. Management of all sources identified in 179 NAC 13-004.02E item 2 to prevent contamination from the sources. comply with the maximum contaminant level (MCL) for total coliforms in 179 NAC 2-002.04C1 and 2-002.04C2 and the MCL for *E. coli* in 179 NAC 2-002.04C3 at least 11 months of the 12 previous 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.~~

~~13-004.03 The public water system must be subject to an annual on-site inspection to assess the wellhead protection program specified in 179 NAC 13-004.02E and the disinfection treatment process. Either the Director or a party approved by the Director must conduct the on-site inspection. The inspection must be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding of public health principles and waterborne diseases. A report of the on-site inspection must be prepared every year and indicate to the Director's satisfaction that the disinfection treatment process is adequately designed and maintained. The on-site inspection must include:~~

- ~~1. A review of the effectiveness of the wellhead protection program required by 179 NAC 13-004.02E;~~
- ~~2. A review of the physical condition of the well and the extent of protection provided;~~
- ~~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.~~

13-004.04 The public water system must not have been identified as a source of a waterborne disease outbreak, or if it has been so identified, the system must have been modified sufficiently to prevent another such occurrence, as determined by the Director.

13-004.05 The public water system must comply with the maximum contaminant level (MCL), for total coliforms in 179 NAC 2-002.04C at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the Director determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

13-004.06 The public water system was required to comply with the requirements for trihalomethanes in 179 NAC 2-002.04B1 and 179 NAC 3-006 until December 31, 2001. After December 31, 2001, the system must comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide in 179 NAC 16.

13-004.07 A system that fails to meet any one of the criteria in 179 NAC 13-004.01 and 13-004.02, and/or for which filtration is required, and fails to install filtration is in violation of a treatment technique requirement.

13-004.08 A system that has not installed filtration is in violation of a treatment technique requirement if:

1. The turbidity level (measured as specified in 179 NAC 13-007.01A) 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.

13-005 DISINFECTION: A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment specified in 179 NAC 13-005.01 beginning 18 months after the Director determines that the ground water source is under the direct influence of surface water. If filtration is required in accordance with 179 NAC 13-006, the system must comply with any interim disinfection requirements the Director deems necessary before filtration is installed. A system that uses a surface water source and provides filtration treatment must provide the disinfection treatment specified in 179 NAC 13-005.02 beginning June 29, 1993, or beginning when filtration is installed, whichever is later. A system that uses a ground water source under the direct influence of surface water and provides filtration treatment must provide disinfection treatment as specified in 179 NAC 13-005.02 by June 29, 1993, or beginning when filtration is installed, whichever is later. Failure to meet any requirement of 179 NAC 13-005 is a treatment technique violation.

13-005.01 Disinfection Requirements for Public Water Systems That Do Not Provide Filtration: Each public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment as follows:

13-005.01A The disinfection treatment must 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 public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in 179 NAC 13-007.02D and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other than chlorine, the system owner may demonstrate to the Director that CT_(99.9) values other than those specified in Tables 13.7 and 13.8 in 179 NAC 13-007.02C or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by 179 NAC 13-005.

13-005.01B The disinfection system must have either redundant components, including an 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 delivery of water to the distribution system whenever there is less than 0.2 milligrams (mg) per liter of residual disinfectant concentration in the water. If the Director determines that automatic shut-off would cause unreasonable risk to health or interference with fire protection, the system must have the above redundant components.

13-005.01C The residual disinfectant concentration in the water entering the distribution system, measured as specified in 179 NAC 13-007.01B and 13-007.02E cannot be less than 0.2 mg per liter for more than four hours.

13-005.01D Residual Disinfectant Concentration

13-005.01D1 The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide as specified in 179 NAC 13-007.01B and 13-007.02F must be detectable, as defined in Attachment 1 which is hereby incorporated by reference, in at least 95% of the samples each month for any two consecutive months that the system serves water to the public. Thus, the value "V" in the following formula cannot exceed 5% in one month for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

Where:

- a = number of instances where 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 the residual disinfectant concentration is measured but not detected and where the HPC is greater than 500 ml;
- e = number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500 per ml; and
- V = percent of samples with undetectable residual disinfectant concentration.

13-005.01D2 If the Director determines, based on site-specific considerations, that a system does not have the means for having a sample transported and analyzed for heterotrophic plate count (HPC) by the Department Laboratory or an approved laboratory under the requisite time and temperature conditions required of the laboratory and that the system is providing adequate disinfection in the distribution system, the requirements of 179 NAC 13-005.01D1 do not apply to that system.

13-005.02 Disinfection Requirements for Public Water Systems Which Provide Filtration: Each public water system that provides filtration treatment must provide disinfection treatment as follows:

13-005.02A The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9% (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99% (4-log) inactivation and/or removal of viruses, as determined by the Director.

13-005.02B The residual disinfectant concentration in the water entering the distribution system, measured as specified in 179 NAC 13-007.01B and 13-007.03B cannot be less than 0.2 mg per liter for more than four hours.

13-005.02C The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in 179 NAC 13-007.01B and 13-007.03B must be detectable, as defined in Attachment 1 in at least 95% of the samples each month, for any two consecutive months that the system serves water to the public. Thus, the value "V" in the following formula cannot exceed 5% in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

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 greater than 500 per ml;
- e = number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500 per ml; and
- V = percent of samples with undetectable residual disinfectant concentration.

If the Director determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by the Department Laboratory or an approved laboratory under the requisite time and temperature conditions required of the laboratory and that the system is providing adequate disinfection in the distribution system, the requirements of 179 NAC 13-005.02C do not apply.

13-006 FILTRATION: A public water system that uses a surface water source must provide treatment consisting of both disinfection, as specified in 179 NAC 13-005.02 and filtration treatment which complies with the requirements of 179 NAC 13-006.01 to 13-006.04 by June 29, 1993. A public water system that uses a ground source which is under the direct influence of surface water and does not meet all the criteria in 179 NAC 13-004 for avoiding filtration, must provide treatment consisting of both disinfection, as specified in 179 NAC 13-005.02 and filtration which complies with the requirements of 179 NAC 13-006.01 to 13-006.04 within 18 months of the failure to meet any one of the criteria for avoiding filtration in 179 NAC 13-004. Failure to meet any requirement of 179 NAC 13-006 is a treatment technique violation.

13-006.01 Conventional Filtration Treatment or Direct Filtration

13-006.01A For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95% of the measurements taken each month, measured as specified in 179 NAC 13-007.01A and 13-007.03A, except that if the Director determines that the system is capable of achieving at least 99.9% removal and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95% of the measurements taken each month, the Director may substitute this higher turbidity limit for that system. However, in no case may the Director approve a turbidity limit that allows more than 1 NTU in more than 5% of the samples taken each month, measured as specified in 179 NAC 13-007.01A and 13-007.03A.

13-006.01B The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in 179 NAC 13-007.01A and 13-007.03A.

13-006.01C Beginning January 1, 2002, systems serving at least 10,000 people must meet the turbidity requirements in 179 NAC 17-006.01.

13-006.01D Beginning January 14, 2005, systems serving fewer than 10,000 people must meet the turbidity requirements in 179 NAC 19-009.01 through 19-009.04.

13-006.02 Slow Sand Filtration

13-006.02A For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95% of the measurements taken each month, measured as specified in 179 NAC 13-007.01A and 13-007.03A, except that if the Director determines there is no significant interference with disinfection at a higher turbidity level, the Director may substitute this higher turbidity limit for that system.

13-006.02B The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in 179 NAC 13-007.01A and 13-007.03A.

13-006.03 Diatomaceous Earth Filtration

13-006.03A For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95% of the measurements taken each month, measured as specified in 179 NAC 13-007.01A and 13-007.03A.

13-006.03B The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in 179 NAC 13-007.01A to 13-007.03A.

13-006.04 Other Filtration Technologies: A public water system may use a filtration technology not listed in 179 NAC 13-006.01 to 13-006.03 if it demonstrates to the Director using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of 179 NAC 13-005.02, consistently achieves 99.9% removal and/or inactivation of *Giardia lamblia* cysts and 99.99% removal and/or inactivation of viruses. For a system that makes this demonstration, the requirements of 179 NAC 13-006.02 apply. Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements for other filtration technologies in 179 NAC 17-005.02. Beginning January 14, 2005, systems serving fewer than 10,000 people must meet the requirements for other filtration technologies in 179 NAC 19-009.01 through 19-009.04.

13-007 ANALYTICAL AND MONITORING REQUIREMENTS

13-007.01 Analytical Requirements: Only the analytical method(s) specified in 179 NAC 13-007 can be used to demonstrate compliance with the requirements of 179 NAC 13-004, 13-005, and 13-006. Measurements for pH, temperature, turbidity, and residual disinfectant concentrations must be conducted by a Grade I, II, III, or IV operator or a person who has been trained to take the samples. Attachment 4 (which is hereby incorporated by reference), which states that the person taking the samples has been trained to take them, must be completed, dated, and signed by the person doing the training (a Grade I, II, III, or IV licensed water operator) as well as the person trained. That form must be sent to the Department. Measurements for total coliforms, fecal coliforms, and heterotrophic plate count (HPC) must be conducted by the Department Laboratory or an approved laboratory as required in 179 NAC 3-009. Until laboratory certification criteria are developed for the analysis of fecal coliforms and HPC, any laboratory certified for total coliforms analysis by the Department or EPA is deemed certified for fecal coliforms and HPC analysis.

13-007.01A Public water systems must conduct analysis of pH and temperature in accordance with one of the methods listed found in 179 NAC 3-005.11A. Public water systems must conduct analysis of total coliforms, fecal coliforms, heterotrophic bacteria, and turbidity in accordance with one of the following analytical methods found in 40 CFR 141.74(a)(1) which is incorporated herein by reference and can be found at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-74.pdf> or an equivalent method approved by EPA and by using analytical test procedures contained in *Technical Notes on Drinking Water Methods*, EPA-600/R-94-173, October 1994, which is available at NTIS PB95-104766.

Organism	Methodology	Citation⁴
Total Coliforms ²	Total Coliform Fermentation Technique ^{3,4,5}	9221A, B, C
	Total Coliform Membrane Filter Technique ⁶	9222A, B, C
	ONPG-MUG Test ⁷	9223
Fecal Coliforms ²	Fecal Coliform Procedure ⁸	9221E
	Fecal Coliform Filter Procedure	9222D
Heterotrophic bacteria ²	Pour Plate Method	9215B
	SimPlate ¹¹	
Turbidity ¹³	Nephelometric Method	2130B
	Nephelometric Method	180.1 ⁹
	Great Lakes Instruments	Method 2 ¹⁰
	Hach Filter Trak	10133 ¹²

———— The procedures must be done in accordance with the documents listed below which are hereby incorporated by reference. Copies of the documents may be obtained from the sources listed below or the documents may be viewed at the Public Health Division of the Nebraska Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.

¹Except where noted, all methods refer to *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998). American Public Health Association, 1015 Fifteenth Street NW, Washington, D.C. 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 2130 B-01, 9215 B-00, 9221 A, B, C, E-99, 9222 A, B, C, D-97, and 9223 B-97. Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method

~~was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.~~

~~²The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10°C during transit.~~

~~³Lactose broth, as commercially available, may be used in lieu of lauryl triptose broth, if the system conducts at least 25 parallel tests between this medium and lauryl triptose broth using the water normally tested, and this comparison demonstrates that the false-positive rate and false-negative rate for total coliforms, using lactose broth, is less than 10%.~~

~~⁴Media should cover inverted tubes at least one-half to two-thirds after the sample is added.~~

~~⁵No requirement exists to run the completed phase on 10% of all total coliform-positive confirmed tubes.~~

~~⁶MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et al., 1993, Appl. Environ. Microbiol. 59:3534-3544. Also available from the Office of Water Resource Center (RC-4100T), 1200 Pennsylvania Avenue, NE, Washington, D.C. 20460, EPA 600/J-99/225. Verification of colonies is not required.~~

~~⁷The ONPG-MUG Test is also known as the Autoanalysis Collort System.~~

~~⁸A-1 broth may be held up to seven days in a tightly closed screw cap tube at 4°C.~~

~~⁹"Methods for the Determination of Inorganic Substances In Environmental Samples," EPA-600/R-93/100, August 1993. Available at NTIS, PB94-121811.~~

~~¹⁰GLI Method 2, "Turbidity," November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, Wisconsin 53223.~~

~~¹¹A description of the SimPlate method, "IDEXX SimPlate™ HPC Test Method for Heterotrophs in Water," November 2000, can be obtained from IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092, Phone 800-321-0207.~~

~~¹²A description of the Hach FilterTrak Method 10133, "Determination of Turbidity by Laser Nephelometry," January 2000, Revision 2.0 can be obtained from: Hach Co., P.O. Box 389, Loveland, Colorado 80539-0389. Phone 800-227-4224.~~

~~¹³Styrene divinyl benzene beads (e.g. AMCO-AEPA-1 or equivalent) and stabilized formazin (e.g. Hach StablCal™ or equivalent) are acceptable substitutes for formazin.~~

13-007.01B Public water systems must measure residual disinfectant concentrations with one of the analytical methods in the following table 40 CFR 141.74(a)(2) which is incorporated herein by reference and can be found at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-74.pdf> or an equivalent method approved by EPA. Except for the method for ozone residuals, the disinfectant residual methods are contained in the 18th, 19th, and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used. Copies of the documents may be obtained from the American Public Health Association, 1015 Fifteenth Street NW, Washington, DC 20005, or the documents may be viewed at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509. The ozone method, 4500-O3-B, is contained in both the 18th and 19th editions of *Standard Methods for the Examination of Water and Wastewater*, 1992 and 1995; either edition may be used. Residual disinfectant concentrations for free chlorine and combined chlorine may also be measured by using DPD colorimetric test kits. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days, or with a protocol approved by the Director.

Residual	Methodology	SM ¹	SM On-line ²	Other
Free Chlorine	Amperometric Titration	4500-Cl-D	4500-Cl-D-00	D1253-03 ³
	DPD Ferrous Titrimetric	4500-Cl-F	4500-Cl-F-00	
	DPD Colorimetric	4500-Cl-G	4500-Cl-G-00	
	Syringaldazine (FACTS)	4500-Cl-H	4500-Cl-H-00	
Total Chlorine	Amperometric Titration	4500-Cl-D	4500-Cl-D-00	D1253-03 ³
	Amperometric Titration	4500-Cl-E	4500-Cl-E-00	
	DPD Ferrous Titrimetric	4500-Cl-F	4500-Cl-F-00	
	DPD Colorimetric	4500-Cl-G	4500-Cl-G-00	
Chlorine Dioxide	Amperometric Titration	4500-ClO ₂ -C	4500-ClO ₂ -C-00	327.0, Revision 1.1 ⁴
	DPD Method	4500-ClO ₂ -D		
	Amperometric Titration	4500-ClO ₂ -E	4500-ClO ₂ -E-00	
	Spectrophotometric			
Ozone	Indigo Method	4500-O ₃ -B	4500-O ₃ -B-97	

¹-All the listed methods are contained in the 18th, 19th, and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1992, 1995, and 1998; the cited methods published in any of these three editions may be used.

²-Standard Methods Online are available at <http://www.standardmethods.org>. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.

³-*Annual Book of ASTM Standards*, Vol. 11.01, 2004; ASTM International; any year containing the cited version of the method may be used. Copies of this method may be obtained from ASTM International, 100 Barr Harbor Drive, P. O. Box C700, West Conshohocken, PA 19428-2959.

⁴-EPA Method 327.0 Revision 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection of Visible Spectrophotometry," USEPA, May 2005. EPA 815-R-05-008. Available online at <http://www.epa.gov/safewater/methods/sourcalt.html>.

13-007.02 Monitoring Requirements for Systems 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 must begin monitoring as specified in 179 NAC 13 beginning six months after the Director determines that the ground water source is under the direct influence of surface water, unless filtration is required, in which case the Director may specify alternative monitoring requirements, as appropriate, until filtration is in place.

13-007.02A Fecal coliform or total coliform density measurements as required by 179 NAC 13-004.01A must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The owner of the system must sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public:

System size (individuals served)	Samples per week ¹
500 or less	1
501 to 3,300	2
3,301 to 10,000	3

TABLE 13.1

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 0.5°C OR LOWER*

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤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

*These CT values achieve greater than a 99.99% 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 13.2

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 5.0°C *

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
<0.4	97	117	139	166	198	236	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

*These CT values achieve greater than a 99.99% 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 13.3

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 10.0°C *

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤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

*These CT values achieve greater than a 99.99% 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 13.4

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 15.0°C *

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤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	64	76	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

*These CT values achieve greater than a 99.99% 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 13.5

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 20.0°C *

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤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

*These CT values achieve greater than a 99.99% 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 13.6

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY FREE CHLORINE AT 25.0°C AND HIGHER*

Residual mg/l	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤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

*These CT values achieve greater than a 99.99% 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 13.7

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY CHLORINE DIOXIDE AND OZONE*

	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

*These CT values achieve greater than a 99.99% inactivation of viruses. 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 13.8

CT VALUES [CT_(99.9)] for 99.9% INACTIVATION OF *GIARDIA LAMBLIA* CYSTS BY CHLORAMINES*

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

*These values are for pH values of 6 to 9. These CT values may be assumed to achieve greater than 99.99% 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 must demonstrate, in accordance with 179 NAC 13-006, that the system is achieving at least 99.99% 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.

13-007.02D The total inactivation ratio must be calculated as follows:

13-007.02D1 If the system uses only one point of disinfectant application, the system owner may determine the total inactivation ratio based on either of the following two methods:

1. One inactivation ratio [CT_{calc} divided by CT_(99.9)] is determined before or at the first customer during peak hourly flow and if CT_{calc} divided by CT_(99.9) is greater than or equal to 1.0, the 99.9% *Giardia lamblia* inactivation requirement has been achieved; or
2. Successive CT_{calc} divided by 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 must be used to calculate the total inactivation ratio:
 - a. Determine CT_{calc} divided by CT_(99.9) for each sequence;
 - b. Add the CT_{calc} divided by CT_(99.9) values together; and
 - c. If the sum of CT_{calc} divided by CT_(99.9) is greater than or equal to 1.0, the 99.9% *Giardia lamblia* inactivation requirement has been achieved.

13-007.02D2 If the system used more than one point of disinfectant application before or at the first customer, the system owner must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The CT_{calc} divided by CT_(99.9) value of each sequence and the sum of CT_{calc} divided by CT_(99.9) must be calculated using the method in 179 NAC 13-007.02D1 item 2 to determine if the system is in compliance with 179 NAC 13-005.01.

13-007.02D3 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:

$$\text{Percent inactivation} = 100 - 100 \text{ divided by } 10^Z$$

Where: Z = 3 times the sum of CT_{calc} divided by CT_(99.9)

13-007.02E The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment. Owners of systems serving 3,300 or fewer individuals may take grab

samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies prescribed below:

System size by population	Samples per day ¹
500 or less	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

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

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

13-007.02F Measurement of Residual Disinfectant

13-007.02F1 ~~The~~ Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 179 NAC 3-004. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 179 NAC 26-006 through 26-010. ~~except that the~~ The Director may allow a public water system which uses both a surface water source or a ground water source under the 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 Director 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 179 NAC 13-007.01A by the Department Laboratory or an approved laboratory in accordance with 179 NAC 3-009 may be measured in lieu of residual disinfectant concentration.

13-007.02F2 If the Director determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by an approved laboratory under the requisite time and temperature conditions required of the approved laboratory, and that the system is providing adequate disinfection in the distribution system, the requirements of 179 NAC 13-007.02F1 do not apply to that system.

13-007.03 Monitoring Requirements for Systems Using Filtration Treatment: A public water system that uses a surface water source or a ground water source under the influence of

surface water and provides filtration treatment must monitor in accordance with 179 NAC 13-007 beginning June 29, 1993, or when filtration is installed, whichever is later.

13-007.03A Turbidity measurements as required by 179 NAC 13-006 must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system owner may substitute continuous turbidity monitoring for grab sample monitoring if the owner validates the continuous measurement for accuracy on a regular basis. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the Director may reduce the sampling frequency to once per day if the Director determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer individuals, the Director may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the Director determines that less frequent monitoring is sufficient to indicate effective filtration performance.

13-007.03B The residual disinfectant concentration of the water entering the distribution system must be monitored continuously, and the lowest value must be recorded each day, except that if there is a failure in the continuous monitoring equipment, grab sampling every four hours may be conducted in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment. Owners of systems serving 3,300 or fewer individuals may take grab samples in lieu of providing continuous monitoring on an ongoing basis at the frequencies each day prescribed below:

System size by population	Samples per day¹
500 or less	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

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

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

13-007.03C Measurement of Residual Disinfectant: ~~The~~ Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in 179 NAC 3-004.01B. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system

and at the same time as total coliforms are sampled, as specified in 179 NAC 26-006 through 26-010. ~~except that the~~The Director may allow a public water system which uses both a surface water source or a ground water source under the 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 Director 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 179 NAC 13-007.01A may be measured in lieu of residual disinfectant concentration.

13-008 REPORTING AND RECORDKEEPING REQUIREMENTS

13-008.01 A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must report monthly to the Director the information specified in 179 NAC 13-008 beginning six months after the Director determines that the ground water source is under the direct influence of surface water, unless filtration is required, in which case the Director may specify alternative reporting requirements, as appropriate, until filtration is in place. The reports must be submitted on Forms PWS 403, PWS 404, and PWS 405 in Attachment 3 to 179 NAC 13 (which is hereby incorporated by reference) or in an alternate format that includes the same information as contained on the appropriate form.

13-008.01A Source water quality information must be reported to the Director within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

1. The cumulative number of months for which results are reported.
2. The number of fecal and/or total coliform samples, whichever are analyzed during the month (if a system monitors for both, only fecal coliforms must 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 per 100 ml fecal coliforms and/or equal to or less than 100 per 100 ml total coliforms.
4. The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.
5. The cumulative number of samples that had equal to or less than 20 per 100 ml of fecal coliforms or equal to or less than 100 per 100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.

6. The percentage of samples that had equal to or less than 20 per 100 ml fecal coliforms or equal to or less than 100 per 100 ml total coliforms, whichever are analyzed, during the previous six months the system served water to the public.
7. The maximum turbidity level measured during the month, the date(s) of occurrence(s) for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the Director.
8. For the first 12 months of recordkeeping, the dates and cumulative number of events during which turbidity exceeded 5 NTU, and after one year of recordkeeping for turbidity measurement, 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 recordkeeping, the dates and cumulative number of events during which the turbidity exceeded 5 NTU, and after 10 years of recordkeeping 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.

13-008.01B Disinfection information specified in 179 NAC 13-007 must be reported to the Director within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

1. For each day, the lowest measurement of residual disinfectant concentration in mg per liter 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 per liter and when the Director was notified of the occurrence.
3. The daily residual disinfectant concentration(s) in mg per liter and disinfectant contact time(s) in minutes used for calculating the CT value(s).
4. If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.
5. The daily measurement(s) of water temperature in degrees Celsius following each point of chlorine disinfection.
6. The daily CT_{calc} and CT_{calc} divided by $CT_{(99.9)}$ values for each disinfectant measurement or sequence and the sum of all CT_{calc} divided by $CT_{(99.9)}$ values before or at the first customer.

7. The daily determination of whether disinfection achieves adequate *Giardia* cyst and virus inactivation, *i.e.*, whether CT_{calc} divided by $CT_{(99.9)}$ is at least 1.0 or, where disinfectants other than chlorine are used, other indicator conditions that the Director 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 179 NAC 13-005:
 - 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 the residual disinfectant concentration is detected and where HPC is greater than 500 per ml;
 - e. Number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500 per ml;
 - f. For the current and previous month the system served water to the public, the value of "V" in the following formula:

$$V = \frac{c+d+e}{a+b} \times 100$$

Where:

- a = the value in 179 NAC 13-008.01B item 8.a.
- b = the value in 179 NAC 13-008.01B item 8.b.
- c = the value in 179 NAC 13-008.01B item 8.c.
- d = the value in 179 NAC 13-008.01B item 8.d.
- e = the value in 179 NAC 13-008.01B item 8.e.

V = percent of samples with undetectable residual disinfectant concentration

- g. If the Director determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by the Department Laboratory or an approved laboratory under the requisite time and temperature conditions required of the laboratory and that the system is providing adequate

disinfection in the distribution system, the requirements of 179 NAC 13-008.01B item 8 do not apply to that system.

9. A system need not report the data listed in 179 NAC 13-008.01B item 1 and 13-008.01B items 3 to 6, if all data listed in 179 NAC 13-008.01B items 1 to 8 remain on file at the system, and the Director determines that:
 1. The system owner has submitted to the Director all the information required by 179 NAC 13-008.01B items 1 to 8 for at least 12 months, and
 2. The Director has determined that the system is not required to provide filtration treatment.

13-008.01C No later than ten days after the end of each federal fiscal year (September 30), each system owner must provide to the Director a report which summarizes its compliance with all wellhead protection requirements specified in 179 NAC 13-004.02E.

13-008.01D No later than ten days after the end of each federal fiscal year (September 30) each system must provide to the Director a report on the on-site inspection conducted during that year pursuant to 179 NAC 13-004.03, unless the on-site inspection was conducted by the Director.

13-008.01E Special Reports

13-008.01E1 Each system, upon discovering that a water-borne disease outbreak potentially attributable to the water system has occurred, must report that occurrence to the Director as soon as possible, but not later than by the end of the next business day.

13-008.01E2 If at any time the turbidity exceeds 5 NTU, the system must consult with the Department as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under 179 NAC 4-005.02 item 3.

13-008.01E3 If at any time the residual falls below 0.2 mg per liter in the water entering the distribution system, the system must notify the Director as soon as possible, but no later than by the end of the next business day. The system also must notify the Director by the end of the next business day whether or not the residual was restored to at least 0.2 mg per liter within four hours.

13-008.02 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 must report monthly to the Director the information specified 179 NAC 13-008 beginning June 29, 1993, or when filtration is installed, whichever is later. The reports must be submitted on Forms

PWS 405 and PWS 408 in Attachment 3 to 179 NAC 13 (which is hereby incorporated by reference) or in an alternate format that includes the same information as contained on the appropriate form.

13-008.02A Turbidity measurements as required by 179 NAC 13-007.03A must be reported within ten days after the end of each month the system serves water to the public. Information that must 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 179 NAC 13-006.
3. The date and value of any turbidity measurements taken during the month which exceed 5 NTU.

13-008.02B Disinfection information specified in 179 NAC 13-007.03 must be reported to the Director within ten days after the end of each month the system serves water to the public. Information that must be reported includes:

1. For each day, the lowest measurement of residual disinfectant concentration in mg per liter 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 per liter and when the Director 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 179 NAC 13-005:
 - 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 the HPC is greater than 500 per ml;

- e. Number of instances where the residual disinfectant concentration is not measured and HPC is greater than 500 per ml;
 - f. For the current and previous month the system serves water to the public, the value of "V" in the following formula:
$$V = \frac{c+d+e}{a+b} \times 100$$

Where:

 - a = the value in 179 NAC 13-008.02B item 3.a.
 - b = the value in 179 NAC 13-008.02B item 3.b.
 - c = the value in 179 NAC 13-008.02B item 3.c.
 - d = the value in 179 NAC 13-008.02B item 3.d.
 - e = the value in 179 NAC 13-008.02B item 3.e.

V = percent of samples with undetectable residual disinfectant concentration
 - g. If the Director determines, based on site-specific considerations, that a system has no means of having a sample transported and analyzed for HPC by the Department Laboratory or an approved laboratory under the requisite time and temperature conditions required of the laboratory and that the system is providing adequate disinfection in the distribution system, the requirements of 179 NAC 13-008.02B items 3.a. to 3.f. do not apply.
4. A system need not report the data listed in 179 NAC 13-008.02B item 1 if all the data listed in 179 NAC 13-008.02B items 1 to 3 remain on file at the system and the Director determines that the system has submitted all the information required by 179 NAC 13-008.02B items 1 to 3 for at least 12 months.

13-008.02C Special Reports

13-008.02C1 Each system owner, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the Director as soon as possible, but no later than by the end of the next business day.

13-008.02C2 If at any time the turbidity exceeds 5 NTU, the system must consult with the Director as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under 179 NAC 4-005.02 item 3.

13-008.02C3 If at any time the residual falls below 0.2 mg per liter in the water entering the distribution system, the system owner must notify the Director as soon as possible, but no later than by the end of the next business day. The system owner must also notify the Director by the end of the next business day whether or not the residual was restored to at least 0.2 mg per liter within four hours.

179 NAC 13 Attachment 1

Minimum Detectable Residuals

- A. The following requirements establish the minimum allowable disinfectant residuals for each type of system.
1. For systems that are utilizing surface water sources, or sources determined to be groundwater under the direct influence of surface water, one of the following options must be implemented to meet the minimum residual requirements.
 - a. 0.2 ppm residual for free chlorine or 0.5 ppm for total chlorine or
 - b. 0.1 ppm residual for free chlorine or 0.25 ppm for total chlorine provided the requirements in Section C items 1-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
 2. All groundwater systems serving water to the public that contains chlorine or chloramines as a chemical disinfectant or oxidant on a continuous basis must use one of the following criteria for minimum residuals.
 - a. 0.1 ppm residual for free chlorine or
 - b. 0.05 ppm for free chlorine if qualifying criteria in section C items 3-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
- B. If a system is required to disinfect under an Administrative Order (AO), the requirements listed in the AO will supersede any requirements for minimum residuals established in this attachment.
- C. In order for a system to maintain the lower minimum residual requirement for free or total chlorine (referred to in A, items 1.b. and 2.b.), the following criteria must be met:
1. Any public water system using surface water or ground water under the direct influence of surface water must meet or exceed all CT inactivation requirements in 179 NAC 13., Tables 13.1 to 13.8 at all times through the treatment process in order to utilize the lower requirements of A, item 1.b.
 2. Any public water system using surface water, or ground water determined to be under the direct influence of surface water, must maintain effluent turbidity levels of less than or equal to 0.3 NTU in 95% of all readings, and at no time exceed 1 NTU.

A system may submit a study to the Department showing that turbidity values in excess of the specified turbidity limits are a direct result of the treatment process and do not represent a threat to public health. The Department will review the study to determine the nature of the high turbidity levels and if they pose a threat to public health.

3. The system must demonstrate that the field test method being used can consistently, reliably, and precisely measure residuals less than or equal to the specified limit being used.
 4. The system must document that the manufacturer's recommendations for calibration or standardization are being done according to manufacturer's specifications and frequency, and make this information available for review during sanitary surveys.
 5. The system must demonstrate that there is no interference with the testing method, or document that interference has been corrected for. This can be done by any one of the following methods:
 - a. Demonstration through historical source water data (a minimum of 12 months of data, or at least four quarterly samples for non-transient non-community systems) that no interference listed under the manufacturer's instructions is present in the system.
 - b. Sampling for applicable interferences once each day that a residual disinfectant compliance sample(s) is taken to obtain a correction factor to be added to all residual compliance samples taken that day.
 - c. Using an EPA approved method that provides a correction for interference as part of the procedure, and documenting all corrections.
 - d. Adjusting all results based on stable historical data and adding the maximum interference obtained, with the Department's approval.
- D. Disinfectant residuals must be at or above the required minimum residual limits in at least 95% of all distribution residuals taken for the month. If the system fails to meet the 95% requirement for two consecutive months, or for $\geq 50\%$ of the previous 12 consecutive months, the system will be deemed to be in violation of prescribed treatment techniques and will be issued a Treatment Technique violation.

179 NAC 13 ATTACHMENT 2

Protocol for the Determination of Influence of Surface Water on Ground Water Sources

I. Background: The Surface Water Treatment Rule (SWTR) promulgated by EPA requires that treatment sufficient to produce a three-log (99.9%) reduction in *Giardia lamblia* cysts and a four-log (99.99%) reduction in viruses be provided for all surface water sources and all ground water sources under the direct influence of surface water. The basic criteria which determines direct influence of surface water on ground water sources, within the context of the SWTR, is the possibility of *Giardia* cysts being carried into the ground water by infiltrating surface water. The more recent Interim Enhanced Surface Water Treatment Rule (IESWTR) and Long Term 1 Enhanced Surface Water Treatment Rule (LT1) add the requirement for 2-log (99%) removal of *Cryptosporidium* oocysts for all surface water sources and all ground water sources under the direct influence of surface water.

II. Obvious Surface Water Sources: The Department has identified ponds, lakes, and streams as obvious sources of surface water.

III. Protocol for Ground Water Under the Direct Influence of Surface Water Determination: The definitive determination of the influence of surface water is to perform particulate analyses on water samples collected from public water sources.

- A. New Sources: The following screening protocol will identify the sources for which particulate analysis will be necessary. Department personnel will examine information on file to determine if a source of water is potentially at risk to the direct influence of surface water. If any one of the following conditions is true, then the source of water is potentially at risk to the direct influence of surface water:
1. The source of water is a spring, horizontal/radial collector well, or an infiltration gallery;
 2. The top of the uppermost intake structure of a well is less than or equal to 50 feet from the ground surface;
 3. There is evidence of *E. coli* contamination of the discharge of the source;
 4. The source of water is less than 200 feet from a source of surface water or the sloping margin of, or the ground bordering a stream that serves to confine the water to the natural channel during the normal course of flow. It is best marked where a distinct channel has been eroded in the valley floor, or where there is a cessation of land vegetation.
 5. There are defects in the condition of the upper terminus (e.g., defective well seals, grouting, or other defects in the upper annulus);
 6. There is inadequate information on file to assess whether the source of water meets one or more of the conditions in III.A.1 through III.A.4. In this case, owners of the public water system will be given the opportunity to provide the required information.

- B. Existing Sources: Any existing source will be evaluated under the screening protocol for new sources if any one of the following conditions exists:
1. A waterborne disease outbreak takes place in the public water system service area and the public water system is suspected of being the cause;
 2. There is evidence of *E. coli* contamination in the source water and the source water meets any of the criteria in III.A above; or
 3. The public water system has continuous disinfection, the source water meets any of the criteria in III.A above, and the source has not been previously evaluated by the Department using temperature, pH, turbidity, or microscopic particulate analysis.
- C. Not Under the Direct Influence: A source of water that does not meet **any of the criteria in III.A or III.B** above is not considered to be at risk to the direct influence of surface water and Title 179 regulations regarding surface water and ground water under the direct influence of surface water do not apply.
- D. At Risk: If a source of water is determined to be potentially at risk to the direct influence of surface water in accordance with the criteria in III.A or III.B above, particulate analysis samples must be taken from the source as follows:
1. A minimum of a set of two samples must be collected and analyses performed for the presence of green algae, blue-green algae, diatoms, nematodes, flagellates, and gastrotrichs. The second sample must be taken a minimum of 24 hours after the conclusion of the previous sampling. Samples must be collected in accordance with the Consensus Method for Determining Groundwaters under the Direct Influence of Surface Water Using Microscopic Particulate Analysis (MPA) which is incorporated herein by reference. This publication is available from the National Technical Information Service, NTIS PB93-180818, U.S. Department of Commerce, ~~5285 Port Royal Road~~5301 Shawnee Road, Alexandria, Springfield, Virginia 22161. The toll-free number is 800-553-6847. This document may be inspected at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509. Sample collection must be at such times as the ground water source is most vulnerable to surface water infiltration (e.g., during periods of high surface water stages, after heavy rainfall or runoff events); however, sample collection will not be required when the source would not be used due to abnormal conditions including but not limited to flooding and natural disasters. Sample volumes must be at least 500 gallons. Analysis must be made by a certified laboratory that has entered into an agreement with the Department laboratory as specified in 179 NAC 20.
 2. The presence of any of the indicators given in III.D.1 in both samples will be considered conclusive evidence of surface water influence and the source is subject to Title 179 regulations regarding surface water and ground water under the direct influence of surface water unless the system is able to determine that a structural defect led to the presence of indicator organisms in the sample(s).

If a structural defect is found and corrected, the system may sample again in order to determine if the source is under the direct influence of surface water.

3. If sample results are inconsistent, an additional set of two samples must be taken as directed by the Department. If any two of the four samples taken contain any of the indicators listed in III.D.1, their presence will be considered conclusive evidence of surface water influence and the source is subject to Title 179 regulations regarding surface water and ground water under the direct influence of surface water.

179 NAC 13 Attachment 3

PWS 403⁽¹⁾

CT DETERMINATION FOR UNFILTERED SYSTEMS – MONTHLY REPORT TO THE DEPARTMENT ⁽³⁾⁽²⁾

Month _____ System/Treatment Plant _____
 Year _____ PWSID NE 31 - _____
 Disinfectant/Sequence of Application _____

Date	Disinfectant ⁽³⁾ Concentration, C (mg/l)	Disinfectant ⁽³⁾ Contact Time, T (min)	CTcalc ⁽⁴⁾ (C x T)	pH ^(3,5)	Water ⁽³⁾ Temp. (deg. C)	CT _{99.9} ⁽⁶⁾	CTcalc/CT _{99.9}
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							
26							
27							
28							
29							
30							
31							
				Prepared By			
				Date			

- Notes: (1) To be included in the monthly report for at least 12 months after the initiation of the reporting. After that time, the Department may no longer require this form.
 (2) Use a separate form for each disinfectant/sampling site. Enter disinfection and sequence position, e.g., "ozone/1st" or "c102/3rd".
 (3) Measurement taken at peak hourly flow.
 (4) CTcalc – c (mg/L) x T (Min.)
 (5) Only required if the disinfectant is free chlorine.
 (6) From Tables 13.1-13.8, 179 NAC 13-007.02C5

PWS 404
DISINFECTION INFORMATION
FOR UNFILTERED SYSTEMS – MONTHLY REPORT TO THE DEPARTMENT

Month _____
Year _____

System/Treatment Plant _____
PWSID NE 31- _____

Date	Minimum Disinfectant Residual at Point-of-Entry to Distribution System (mg/L) ⁽¹⁾	(CT _{calc} /CT _{99.9}) (from Table 6-3)						Sum (CT _{calc} /CT _{99.9}) ⁽²⁾	Sum (CT _{calc} /CT _{99.9}) < 1 (Yes or No) ⁽³⁾
		Disinfectant Sequence							
		1 st	2 nd	3 rd	4 th	5 th	6 th		
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

Prepared By _____
Date _____

Notes:

- (1) If less than 0.2 mg/L, the lowest level and duration of the period must be reported, e.g., "0.1-3 hrs."
- (2) To determine SUM (CT_{calc}/CT_{99.9}), add (CT_{calc}/CT_{99.9}) values from the first disinfection sequence to the last.
- (3) If SUM (CT_{calc}/CT_{99.9}) < 1, a treatment technique violation has occurred, and a "yes" response must be entered.

PWS 405

DISTRIBUTION SYSTEM DISINFECTANT RESIDUAL DATA FOR UNFILTERED AND FILTERED SYSTEMS
MONTHLY REPORT FOR THE DEPARTMENT

Month _____ System/Treatment Plant _____
Year _____ PWSID NE 31- _____

Date	No. of sites where disinfectant residual was measured (=a)	No. of sites where no disinfectant residual was measured, but HPC measured (=b)	No. of sites where disinfectant residual was not detected, no HPC measured (=c)	No. of sites where disinfectant residual not detected, HPC > 500/ml (=d)	No. of sites where disinfectant residual not measured, HPC > 500 ml (=e)
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
Total	a=	b=	c=	d=	e=

$$V = (c+d+e)/(a+b) \times 100 = (_ + _ + _) / (_ + _) \times 100 = _ \%$$

Prepared by _____
Date _____

PWS 408

MONTHLY REPORT TO THE DEPARTMENT FOR COMPLIANCE DETERMINATION – FILTERED SYSTEMS

Month _____ System/Treatment Plant _____
 Year _____ Type of Filtration _____
 Turbidity Limit _____ PWSID NE-31 _____

Turbidity Performance Criteria

- A. Total number of filtered water turbidity measurements = _____
- B. Total number of filtered water turbidity measurements that are less than or equal to the specified limits for the filtration technology employed = _____
- C. The percentage of turbidity measurements meeting the specified limits = $B/A \times 100 = \frac{\quad}{\quad} \times 100 = \quad\%$
- D. Record the date and turbidity value for any measurements exceeding 5 NTU: if none, enter "none."

Date	Turbidity, NTU

Disinfection Performance Criteria

- A. Point-of Entry Minimum Disinfectant Residual Criteria

Date	Minimum Disinfectant Residual at Point-of-Entry to Distribution System (mg/L)	Date	Minimum Disinfectant Residual at Point-of-Entry to Distribution System (mg/L)	Date	Minimum Disinfectant Residual at Point-of Entry to Distribution System (mg/L)
1		11		21	
2		12		22	
3		13		23	
4		14		24	
5		15		25	
6		16		26	
7		17		27	
8		18		28	
9		19		29	
10		20		30	
				31	

Days the Residual was <0.2 mg/L		
Day	Duration of Low Level (hrs.)	Date Reported to the Department

- B. Distribution System Disinfectant Residual Criteria
 The value of a, b, c, d, and e, from Title 179 NAC 13-008.02B item 3f:
 a = _____, b = _____, c = _____, d = _____, e = _____

$$v = \frac{c + d + e}{a + b} \times 100 = \quad\%$$

For previous month, V = _____%

Prepared by _____
 Date _____

179 NAC 13 ATTACHMENT 4

Sampling Training For Individuals Other Than Licensed Operators

PWS System or Community Name: _____

Name of individual taking samples: _____

Parameter(s) sampled routinely by the above individual:

Trainer and Title: _____

Training material used: _____

Handouts given to the above individual:

I certify that on _____ I personally provided the necessary sampling
(Date)

training to assure quality data and approve the above individual as qualified to perform the
above sampling tasks.

X

(Signature of Trainer)

(License Number)

I certify that I did receive said training and I understand how to properly sample the above
parameters.

X

(Signature of Approved Sampling Individual)

When the above-named trained individual no longer takes the samples the individual has been
trained to take, I will inform the Division of Public Health of the Nebraska Department of Health
and Human Services, Field Services Program Manager at (402) 471-0521 within seven days.
Acknowledged by System Owner or Operator in Charge:

X

(Signature)

Date: _____

(Keep a copy for your records and submit original within seven days to DHHS Public Health
Division, Public Water Program at P. O. Box 95026, Lincoln, NE 68509-5026)

TITLE 179 PUBLIC WATER SYSTEMS
CHAPTER 14 CONSUMER CONFIDENCE REPORTS

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TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 14 CONSUMER CONFIDENCE REPORTS

14-001 SCOPE AND AUTHORITY: This chapter establishes the minimum requirements for the content of annual reports that community water systems must deliver to their customers. These reports must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner. The authority is found in Neb. Rev. Stat. §§ 71-5301 to 71-5313.

14-002 DEFINITIONS: For this chapter:

Customers means billing units or service connections to which water is delivered by a community water system.

Detected means at or above the levels prescribed by 179 NAC 3-005.01 item 4.a for inorganic contaminants; at or above the levels prescribed by 179 NAC 3-007.02G for the contaminants listed in 179 NAC 2-002.04B1; at or above the level prescribed by 179 NAC 3-007.03 item 17 for the contaminants listed in 179 NAC 2-002.04B2; at or above the levels prescribed by 179 NAC 16-004.02B item 4 for the contaminants or contaminant groups listed in 179 NAC 2-002.04E1, and at or above the levels prescribed by 179 NAC 3-008.01B for radioactive contaminants.

14-003 DATES REPORTS DUE

14-003.01 Existing Systems: Each existing community water system must deliver its first report by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1 annually thereafter.

14-003.02 New Systems: A new community water system must deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.

14-003.03 Systems That Sell Water to Consecutive Systems: A community water system that sells water to another community water system must deliver the applicable information required in 179 NAC 14 to the buyer system:

1. No later than April 19, 1999, by April 1, 2000, and by April 1 annually thereafter or

2. On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

14-004 CONTENT OF THE REPORTS

14-004.01 Each community water system must provide to its customers an annual report that contains the information specified in 179 NAC 14-004 and 14-005.

14-004.02 Information on the source of the water delivered:

14-004.02A Each report must identify the source(s) of the water delivered by the community water system by providing information on:

1. The type of the water: e.g., surface water, ground water; and
2. The commonly used name (if any) and location of the body (or bodies) of water.

14-004.02B If a source water assessment has been completed, the report must notify consumers of the availability of this information and the means to obtain it. Systems are encouraged to highlight in the report significant sources of contamination in the source water area if they have readily available information. When a source water assessment has been completed, the report must include a brief summary of the system's susceptibility to potential sources of contamination, using language provided by the Department or written by the system.

14-004.03 Definitions

14-004.03A Each report must include the following definitions:

1. Maximum Contaminant Level Goal (MCLG) means the level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
2. Maximum Contaminant Level (MCL) means the highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

14-004.03B A community water system operating under a variance or an exemption must include the following definition: Variances and Exemptions means state permission not to meet an MCL or a treatment technique under certain conditions.

14-004.03C A report which contains data on contaminants that the Department regulates using any of the following terms must include the applicable definitions:

1. Treatment Technique means a required process intended to reduce the level of a contaminant in drinking water.

2. Action Level means the concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
3. Maximum residual disinfectant level goal or MRDLG: The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.
4. Maximum residual disinfectant level or MRDL: The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

14.004.03D A report that contains information regarding a Level 1 or Level 2 Assessment required under 179 NAC 26 must include the applicable definitions:

1. Level 1 Assessment: A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.
2. Level 2 Assessment: A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an *E. coli* MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

14-004.04 Information on Detected Contaminants

14-004.04A 179 NAC 14-004.04A specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*). It applies to:

1. Contaminants subject to an MCL, action level, maximum residual disinfectant level, or treatment technique (regulated contaminants); and
2. Contaminants for which monitoring is required by 40 CFR 141.40, 2013, which is incorporated herein by reference in Attachment 4 is available from the U.S. Government Printing Office online at <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR> (unregulated contaminants).

14-004.04B The data relating to these contaminants must be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report must be displayed separately.

14-004.04C The data must be derived from data collected to comply with state monitoring and analytical requirements during calendar year 1998 for the first report

and subsequent calendar years thereafter except that where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) must include the date and results of the most recent sampling and the report must include a brief statement indicating that the data presented in the report are for the most recent testing done in accordance with the regulations. No data older than five years need be included.

14-004.04D For detected regulated contaminants (listed in Appendix A to this chapter), the table(s) must contain:

1. The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in Appendix A to 179 NAC 14).
2. The MCLG for that contaminant expressed in the same units as the MCL.
3. If there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report must include the definitions for treatment technique and/or action level, as appropriate, specified in 179 NAC 14-004.03C.
4. For contaminants subject to an MCL, except turbidity and total coliforms, total coliform, fecal coliform and *E. coli*, the highest contaminant level used to determine compliance with a drinking water standard and the range of detected levels, as follows: (Note that when rounding of results to determine compliance with the MCL is allowed by the regulations, rounding should be done prior to multiplying the results by the factor listed in Appendix A of 179 NAC 14).
 - a. When compliance with the MCL is determined annually or less frequently, use the highest detected level at any sampling point and the range of detected levels expressed in the same units as the MCL.
 - b. When compliance with the MCL is determined by calculating a running annual average of all samples taken at a monitoring location, use the highest average of any of the monitoring locations and the range of all monitoring locations expressed in the same units as the MCL. For the MCLs for TTHMs and HAA5s in 179 NAC 2-002.04E, systems must include the highest locational running annual average for TTHMs and HAA5s and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system must include the locational running annual averages for all locations that exceed the MCL.

- c. When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all samples at all monitoring locations, use the average and range of detection expressed in the same units as the MCL. When the system has individual sample results for an initial distribution system evaluation (IDSE), the system must include those results when determining the range of TTHM and HAA5 results to be reported in the annual consumer confidence report for the calendar year that the IDSE samples were taken.
5. For Turbidity
 - a. When it is reported pursuant to 40 CFR 141.13 which is ~~incorporated herein by reference in Attachment 1,~~ is available from the U.S. Government Printing Office online at <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR> use the highest average monthly value.
 - b. When it is reported pursuant to the requirements of 179 NAC 13-004, use the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.
 - c. When it is reported pursuant to 179 NAC 13-006 or 179 NAC 17-005 or 179 NAC 19-009.02: the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in 179 NAC 13-006 or 179 NAC 17-005 or 179 NAC 19-009.02 for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity.
6. For Lead and Copper, use the 90th percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level.
7. For Total Coliform analytical results until March 31, 2016:
 - a. Use the highest monthly number of positive samples for systems collecting fewer than 40 samples per month, or
 - b. Use the highest monthly percentage of positive samples for systems collecting at least 40 samples per month.
8. For Fecal Coliform and E. coli until March 31, 2016; ~~use the~~ The total number of positive samples;

9. Likely Source: Include the likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one or more of the typical sources for that contaminant listed in Appendix A to 179 NAC 14 that is most applicable to the system.

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10. For *E. coli* analytical results under 179 NAC 26: The total number of positive samples.

14-004.04E Multiple Independent Distribution Systems: If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table should contain a separate column for each service area and the report should identify each separate distribution system. Alternatively, systems could produce separate reports tailored to include data for each service area.

14-004.04F The table(s) must clearly identify any data indicating violations of MCLs, MRDLs, or treatment techniques, and the report must contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects, and actions taken by the system to address the violation. To describe the potential health effects, the system must use the relevant language of Appendix A to 179 NAC 14.

14-004.04G For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) must contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for monitoring for unregulated contaminants.

14-004.05 Information on *Cryptosporidium*, radon, and other contaminants:

14-004.05A If the system has performed any monitoring for *Cryptosporidium* which indicates that *Cryptosporidium* may be present in the source water or the finished water, the report must include:

1. A summary of the results of the monitoring, and
2. An explanation of the significance of the results.

14-004.05B If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:

1. The results of the monitoring, and
2. An explanation of the significance of the results.

14-004.06 Compliance with Drinking Water Standards: In addition to the requirements of 179 NAC 14-004.04F, the report must note any violation that occurred during the year covered by the report of a requirement listed below, and include a clear and readily understandable explanation of the violation, any potential adverse health effects, and the steps the system has taken to correct the violation.

1. Monitoring and reporting of compliance data;
2. Filtration and disinfection prescribed by 179 NAC 13, Surface Water Treatment (for surface water and ground water under the influence of surface water systems). For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include the following language as part of the explanation of potential adverse health effects: Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches;
3. Lead and copper control requirements prescribed by 179 NAC 12. For systems that fail to take one or more actions prescribed by 179 NAC 12-003.02, 12-004, 12-005, 12-006, 12-007 the report must include the applicable language of Appendix A to 179 NAC 14 for lead, copper or both;
4. Treatment techniques for Acrylamide and Epichlorohydrin prescribed in 179 NAC 2-002.05. For systems that violate the requirements of 179 NAC 2-002.05, the report must include the relevant language from Appendix A to 179 NAC 14;
5. Recordkeeping of compliance data;
6. Special monitoring requirements for unregulated contaminants and sodium; and
7. Violation of the terms of a variance, an exemption, or an administrative or judicial order.

14-004.07 Variances and Exemptions: If a system is operating under the terms of a variance or an exemption issued under 179 NAC 6, the report must contain:

1. An explanation of the reasons for the variance or exemption,
2. The date on which the variance or exemption was issued,

3. A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption, and
4. A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

14-004.08 Additional Information:

14-004.08A The report must contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water including bottled water. This explanation may include the language of 179 NAC 14-004.08A items one to three or systems may use their own comparable language. The report also must include the language of 179 NAC 14-004.08A item 4.

1. The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and ground water wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.
2. Contaminants that may be present in source water include:
 - a. Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.
 - b. Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.
 - c. Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.
 - d. Organic chemical contaminants, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.
 - e. Radioactive contaminants, which can be naturally-occurring or be the result of oil and gas production and mining activities.
3. In order to ensure that tap water is safe to drink, the Director prescribes regulations which limit the amount of certain contaminants in water provided

by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

4. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800-426-4791) or the Department of Health and Human Services, Division of Public Health at 402-471-2541.
5. The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.
6. Systems required to comply with 179 NAC 8.
 - a. Any ground water system that receives notice from the Department of a significant deficiency or notice from a laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the Department under 179 NAC 8-005.04 must inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system must continue to inform the public annually until the Department determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed under 179 NAC 8-006.01. Each report must include the following elements.
 - (1) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the Department or the dates of the fecal indicator-positive ground water source samples;
 - (2) If the fecal contamination in the ground water source has been addressed under 179 NAC 8-006.01 and the date of such action;
 - (3) For each significant deficiency or fecal contamination in the ground water source that has not been addressed under 179 NAC 8-006.01, the Department-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed; and
 - (4) If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the Department under 179 NAC 8-005.04, the potential health effects using the health effects language of Appendix A of 179 NAC 14.

- b. If directed by the Department, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction under 179 NAC 14-004.08A item 6.a.

7. Systems required to comply with 179 NAC 26.

- a. Any system required to comply with a Level 1 assessment requirement or a Level 2 assessment requirement that is not due to an *E. coli* MCL violation must include in the report the text found in 179 NAC 14-004.08 items 7.a.(1) to 7.a.(3) as appropriate, filling in the blanks accordingly and the text found in 179 NAC 14-004.08 items 7.a.(4)(a) and 7.a.(4)(b) if appropriate.

(1) Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in the water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

(2) During the past year we were required to conduct [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s). [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s) were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] of corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(3) During the past year [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were required to be completed for our water system. [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were completed. In addition we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(4) Any system that has failed to complete all the required assessments or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

- (a) During the past year we failed to conduct all of the required assessment(s).
- (b) During the past year we failed to correct all identified defects that were found during the assessment.
- b. Any system required to conduct a Level 2 assessment due to an *E. coli* MCL violation must include in the report the text found in 179 NAC 14-004.08 items 7.b.(1) and (2), filling in the blanks accordingly and the text found in 179 NAC 14-004.08 items 7.b.(3)(a) and (b), if appropriate.

 - (1) *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We found *E. Coli* bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.
 - (2) We were required to complete a Level 2 assessment because we found *E. Coli* in our water system. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.
 - (3) Any system that has failed to complete the required assessment or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

 - (a) We failed to conduct the required assessment.
 - (b) We failed to correct all sanitary defects that were identified during the assessment that we conducted.
- c. If a system detects *E. coli* and has violated the *E. coli* MCL, in addition to completing the table as required in 179 NAC 14-004.04D, the system must include one or more of the following statements to describe any noncompliance, as applicable:

 - (1) We had an *E. coli*-positive repeat sample following a total coliform-positive routine sample.
 - (2) We had a total coliform-positive repeat sample following an *E. coli*-positive routine sample.

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- (3) We failed to take all required repeat samples following an *E. coli*-positive routine sample.
-
- (4) We failed to test for *E. coli* when (a) repeat sample(s) tested positive for total coliform.
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- d. If a system detects *E. coli* and has not violated the *E. coli* MCL, in addition to completing the table as required in 179 NAC 14-004.04D, the system may include a statement that explains that although they have detected *E. coli*, they are not in violation of the *E. coli* MCL.

14-004.08B Phone Number: The report must include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.

14-004.08C Other Languages: In communities that have a population with 20% or more non-English speaking residents, the report must contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.

14-004.08D Meetings: The report must include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

14-004.08E The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

14-005 REQUIRED ADDITIONAL HEALTH INFORMATION

14-005.01 All reports must prominently display the following language: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791) or the Department of Health and Human Services, Division of Public Health at 402-471-2541.

14-005.02 A system that detects arsenic above 0.005 mg/L and up to and including 0.010 mg/L:

1. Must include in its report a short informational statement about arsenic, using language such as: While your drinking water meets EPA's standard for

arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

2. May write its own educational statement, but only in consultation with the Department.

14-005.03 A system which detects nitrate at levels above 5 mg/L, but below the MCL:

1. Must include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant, you should ask advice from your health care provider.
2. May write its own educational statement in consultation with the Department.

14-005.04 Every report must include the following lead-specific information:

1. A short informational statement about lead in drinking water and its effects on children. The statement must include the following information: If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at <http://www.epa.gov/safewater/lead>.
2. A system may write its own educational statement in consultation with the Department.

14-005.05 Community Water Systems that detect TTHMs above 0.080 mg/L, but below the MCL in 179 NAC 2-002.04E1, as an annual average, monitored and calculated under the provisions of 179 NAC 16-005, must include health effects language for TTHMs prescribed by Appendix A to 179 NAC 14.

14-005.06 A community water system that detects arsenic above 0.010 mg/L and up to and including 0.05 mg/L must include the arsenic health effects language prescribed by Appendix A to 179 NAC 14.

14-006 REPORT DELIVERY AND RECORDKEEPING

14-006.01 Except as provided in 179 NAC 14-006.07, each community water system must mail or otherwise directly deliver one copy of the report to each customer.

14-006.02 The system must make a good faith effort to reach consumers who do not get water bills, using means recommended by the Department. An adequate good faith effort must be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: Posting the reports on the internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; delivery to community organizations.

14-006.03 No later than the date the system is required to distribute the report to its customers, each community water system must mail a copy of the report to the primacy agency, followed within three months by a certification that the report has been distributed to customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the Department.

14-006.04 No later than the date the system is required to distribute the report to its customers, each community water system must deliver the report to any other agency or clearinghouse identified by the Department.

14-006.05 Each community water system must make its reports available to the public upon request.

14-006.06 Each community water system serving 100,000 or more individuals must post its current year's report to a publicly-accessible site on the internet.

14-006.07 The Governor or his/her designee can waive the requirement of 179 NAC 14-006.01 for community water systems serving fewer than 10,000 individuals.

14-006.07A Those systems receiving waivers must:

1. Publish the reports in one or more local newspapers serving the area in which the system is located;
2. Inform the customers that the reports will not be mailed, either in the newspapers in which the reports are published or by other means approved by the Department, and

3. Make the reports available to the public upon request.

14-006.07B Systems Serving 500 or Fewer Individuals may forego the requirements of 179 NAC 14-006.07A, items 1 and 2 if they provide notice at least once per year to their customers by mail, door-to-door delivery or by posting in an appropriate location that the report is available upon request.

14-007 RETENTION: Any system subject to this chapter must retain copies of its consumer confidence report for no less than three years.

APPENDIX A to 179 NAC 14

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Microbiological contaminants: Total Coliform Bacteria*.	MCL: (systems that collect ≥40 samples/ month) 5% of monthly samples are positive; (systems that collect <40 samples/ month) 1 positive monthly sample	.....	MCL: (systems that collect ≥40 samples/ month) 5% of monthly samples are positive; (Systems that collect <40 samples/ month) 1 positive monthly sample	0	Naturally present in the environment.	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
<u>Total Coliform Bacteria**</u>	<u>TT</u>		<u>TT</u>	<u>N/A</u>	<u>Naturally present in the environment</u>	<u>Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in the water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.</u>

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Fecal coliform and <i>E. coli</i> *	0 .....	.....	0	0	Human and animal fecal waste.	Fecal coliforms and <i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely-compromised immune systems.
<i>E. coli</i> **	<u>Routine and repeat samples are total coliform-positive and either is <i>E. coli</i>-positive or system fails to take repeat samples following <i>E. coli</i>-positive routine sample or system fails to analyze total coliform-positive repeat sample for <i>E. coli</i>.</u>		<u>Routine and repeat samples are total coliform-positive and either is <i>E. coli</i>-positive or system fails to take repeat samples following <i>E. coli</i>-positive routine sample or system fails to analyze total coliform-positive repeat sample for <i>E. coli</i>.</u>	<u>0</u>	<u>Human and animal fecal waste.</u>	<u><i>E. coli</i> are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely-compromised immune systems.</u>

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Fecal Indicators (enterococci or coliphage)	TT	.....	TT	N/A	Human and animal fecal waste.	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Total organic carbon (ppm)	TT .....	.....	TT	N/A	Naturally present in the environment.	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
Turbidity (NTU)	TT .....	.....	TT	N/A	Soil runoff	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Radioactive contaminants: Beta/photon emitters (mrem/yr)	4 mrem/yr .	.....	4	0	Decay of natural and man-made deposits.	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta particle and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters (pCi/L)	15 pCi/L ....	.....	15	0	Erosion of natural deposits.	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium (pCi/L)	5 pCi/L .....	.....	5	0	Erosion of natural deposits.	Some people who drink water containing radium-226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium (µg/L)	30 µg/L.....	.....	30.....	0.....	Erosion of natural deposits.	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
Inorganic contaminants: Antimony (ppb) .....	.006..... .	1000	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
Arsenic (ppb) .....	.05 through 01/22/06 0.010 Effective 01/23/06.....	1000	50 through 01/22/06 10 Effective 01/23/06.....	N/A through 01/22/06 0 Effective 01/23/06...	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Asbestos (MFL)	7 MFL .....	.....	7	7	Decay of asbestos cement water mains; Erosion of natural deposits.	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium (ppm)	2 .....	.....	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Beryllium (ppb) .....	.004	1000	4	4	Discharge from metal refineries and coal- burning factories; Discharge from electrical, aerospace, and defense industries.	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
Bromate (ppb)	0.010.....	1000	10	0	Byproduct of drinking water disinfection	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
Cadmium (ppb) .....	.005	1000	5	5	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints.	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
Chloramines (ppm)	MRDL = 4	.....	MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Chlorine (ppm)	MRDL = 4	.....	MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
Chlorine dioxide (ppm) ..	MRDL = .8	1000	MRDL = 800	MRDLG = 800	Water additive used to control microbes.	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MCL. Some people may experience anemia.
Chlorite (ppm)	1 .....	.....	1	0.8	Byproduct of drinking water disinfection.	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chromium (ppb) .....	.1	1000	100	100	Discharge from steel and pulp mills; Erosion of natural deposits.	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Copper (ppm)	AL = 1.3 ...	.....	AL = 1.3 ...	1.3	Corrosion of household plumbing systems; Erosion of natural deposits.	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
Cyanide (ppb) .....	.2	1000	200	200	Discharge from steel/metal factories; Discharge from plastic and fertilizer factories.	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
Fluoride (ppm)	4 .....	.....	4	4	Erosion of natural deposits; Water additive that promotes strong teeth; Discharge from fertilizer and aluminum factories.	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
Lead (ppb)	AL = .015	1000	AL = 15	0	Corrosion of household plumbing systems; Erosion of natural deposits.	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Mercury (inorganic) (ppb)	.002	1000	2	2	Erosion of natural deposits; Discharge from refineries and factories; Runoff from landfills; Runoff from cropland.	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
Nitrate (ppm)	10 .....	.....	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Nitrite (ppm)	1.....	.....	1	1	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Selenium (ppb) .....	.05	1000	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
Thallium (ppb) .....	.002	1000	2	0.5	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories.	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Synthetic organic contaminants including pesticides and herbicides: 2,4-D (ppb) .....	.07	1000	70	70	Runoff from herbicide used on row crops.	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
2,4,5-TP [Silvex] (ppb)	.05	1000	50	50	Residue of banned herbicide.	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
Acrylamide	TT .....	.....	TT	0	Added to water during sewage/wastewater treatment.	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
Alachlor (ppb) .....	.002	1000	2	0	Runoff from herbicide used on row crops.	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
Atrazine (ppb) .....	.003	1000	3	3	Runoff from herbicide used on row crops.	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
Benzo(a)pyrene [PAH] (nanograms/L)	.0002	1,000,000	200	0	Leaching from linings of water storage tanks and distribution lines.	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Carbofuran (ppb) .....	.04	1000	40	40	Leaching of soil fumigant used on rice and alfalfa.	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Chlordane (ppb) .....	.002	1000	2	0	Residue of banned termiticide.	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
Dalapon (ppb) .....	.2	1000	200	200	Runoff from herbicide used on rights of way.	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
Di(2-ethylhexyl) adipate (ppb)	.4	1000	400.....	400	Discharge from chemical factories.	Some people who drink water containing di (2- ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties.
Di(2-ethylhexyl) phthalate (ppb)	.006	1000	6	0	Discharge from rubber and chemical factories.	Some people who drink water containing di (2- ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
Dibromochloropropane (ppt)	.0002	1,000,000	200	0	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards.	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer.
Dinoseb (ppb) .....	.007	1000	7	7	Runoff from herbicide used on soybeans and vegetables.	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
Diquat (ppb) .....	.02	1000	20	20	Runoff from herbicide use.	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Dioxin [2,3,7,8-TCDD] (ppq)	.00000003	1,000,000,000	30	0	Emissions from waste incineration and other combustion; Discharge from chemical factories.	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
Endothall (ppb) .....	.1	1000	100	100	Runoff from herbicide use.	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
Endrin (ppb) .....	.002	1000	2	2	Residue of banned insecticide.	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
Epichlorohydrin	TT .....	.....	TT	0	Discharge from industrial chemical factories; An impurity of some water treatment chemicals	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
Ethylene dibromide (ppt)	.00005	1,000,000	50	0	Discharge from petroleum refineries.	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
Glyphosate (ppb) .....	.7	1000	700	700	Runoff from herbicide use.	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
Heptachlor (ppt) .....	.0004	1,000,000	400	0	Residue of banned pesticide.	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Heptachlor epoxide (ppt)	.0002	1,000,000	200	0	Breakdown of heptachlor.	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
Hexachlorobenzene (ppb)	.001	1000	1	0	Discharge from metal refineries and agricultural chemical factories.	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclopentadiene (ppb)	.05	1000	50	50	Discharge from chemical factories.	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
Lindane (ppt) .....	.0002	1,000,000	200	200	Runoff/leaching from insecticide used on cattle, lumber, gardens.	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
Methoxychlor (ppb) .....	.04	1000	40	40	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock.	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
Oxamyl [Vydate] (ppb) ..	.2	1000	200	200	Runoff/leaching from insecticide used on apples, potatoes and tomatoes	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
PCBs [Polychlorinated biphenyls] (ppt)	.0005	1,000,000	500	0	Runoff from landfills; Discharge of waste chemicals.	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Pentachlorophenol (ppb)	.001	1000	1	0	Discharge from wood preserving factories.	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
Picloram (ppb) .....	.5	1000	500	500	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
Simazine (ppb) .....	.004	1000	4	4	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
Toxaphene (ppb) .....	.003	1000	3	0	Runoff/leaching from insecticide used on cotton and cattle.	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
Volatile organic contaminants: Benzene (ppb) .....	.005	1000	5	0	Discharge from factories; Leaching from gas storage tanks and landfills.	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
Carbon tetrachloride (ppb)	.005	1000	5	0	Discharge from chemical plants and other industrial activities.	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
Chlorobenzene (ppb) ....	.1	1000	100	100	Discharge from chemical and agricultural chemical factories.	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
o-Dichlorobenzene (ppb)	.6	1000	600	600	Discharge from industrial chemical factories.	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
p-Dichlorobenzene (ppb)	.075	100	75	75	Discharge from industrial chemical factories.	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
1,2-Dichloroethane (ppb)	.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene (ppb)	.007	1000	7	7	Discharge from industrial chemical factories.	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
cis-1,2-Dichloroethylene (ppb)	.07	1000	70	70	Discharge from industrial chemical factories.	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
trans-1,2-Dichloroethylene (ppb)	.1	1000	100	100	Discharge from industrial chemical factories.	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
Dichloromethane (ppb)..	.005	1000	5	0	Discharge from pharmaceutical and chemical factories.	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane (ppb)	.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminants (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Ethylbenzene (ppb) .....	.7	1000	700	700	Discharge from petroleum refineries.	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
Haloacetic Acids (HAA) (ppb)	.060	1000	60	N/A	Byproduct of drinking water disinfection.	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
Styrene (ppb) .....	.1	1000	100	100	Discharge from rubber and plastic factories; Leaching from landfills.	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
Tetrachloroethylene (ppb)	.005	1000	5	0	Discharge from factories and dry cleaners.	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene (ppb)	.07	1000	70	70	Discharge from textile-finishing factories.	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
1,1,1-Trichloroethane (ppb)	.2	1000	200	200	Discharge from metal degreasing sites and other factories.	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
1,1,2-Trichloroethane (ppb)	.005	1000	5	3	Discharge from industrial chemical factories.	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
Trichloroethylene (ppb) ..	.005	1000	5	0	Discharge from metal degreasing sites and other factories.	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.

Contaminants (units)	Tradition- al MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
TTHMs [Total trihalomethanes] (ppb)	0.10/.080 ..	1000	100/80	N/A	Byproduct of drinking water disinfection.	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
Toluene (ppm)	1 .....	.....	1	1	Discharge from petroleum factories.	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
Vinyl Chloride (ppb) .....	.002	1000	2	0	Leaching from PVC piping; Discharge from plastics factories.	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes (ppm)	10 .....	.....	10	10	Discharge from petroleum factories; Discharge from chemical factories.	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

* Until March 31, 2016.

** Beginning April 1, 2016.

Key:

AL = Action Level

MCL = Maximum Contaminant Level

MCLG = Maximum Contaminant Level Goal

MFL = million fibers per liter

MRDL = Maximum Residual Disinfectant Level

MRDLG = Maximum Residual Disinfectant Level Goal

mrem/year = millirems per year (a measure of radiation absorbed by the body)

N/A = Not Applicable

NTU = Nephelometric Turbidity Units (a measure of water clarity)

pCi/L = picocuries per liter (a measure of radioactivity)

ppm = parts per million, or milligrams per liter (mg/L)

ppb = parts per billion, or micrograms per liter (µg/L)

DRAFT
MAY 8, 2014

NEBRASKA DEPARTMENT OF
HEALTH AND HUMAN SERVICES

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ppt = parts per trillion, or nanograms per liter
ppq = parts per quadrillion, or picograms per liter
TT = Treatment Technique

Attachment 1 to 179 NAC 14 (ALL FROM HERE TO END TO BE DELETED)

Environmental Protection Agency

§ 141.13

on January 23, 2006. Requirements relating to arsenic set forth in §§ 141.23(i)(4), 141.23(k)(3) introductory text, 141.23(k)(3)(ii), 141.51(b), 141.62(b), 141.62(b)(16), 141.62(c), 141.62(d), and 142.62(b) revisions in Appendix A of subpart O for the consumer confidence rule, and Appendices A and B of subpart C for the public notification rule are effective for the purpose of compliance on January 23, 2006. However, the consumer confidence rule reporting requirements relating to arsenic listed in § 141.154(b) and (f) are effective for the purpose of compliance on February 22, 2002.

(k) Regulations set forth in §§ 141.23(i)(1), 141.23(i)(2), 141.24(f)(15), 141.24(f)(22), 141.24(h)(11), 141.24(h)(20), 142.16(e), 142.16(j), and 142.16(k) are effective for the purpose of compliance on January 22, 2004.

[44 FR 68641, Nov. 29, 1979, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 30274, July 1, 1991; 57 FR 22178, May 27, 1992; 57 FR 31838, July 17, 1992; 59 FR 34322, July 1, 1994; 61 FR 24368, May 14, 1996; 66 FR 7061, Jan. 22, 2001; 66 FR 28350, May 22, 2001]

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The maximum contaminant level for arsenic applies only to community water systems. The analyses and determination of compliance with the 0.05 milligrams per liter maximum contaminant level for arsenic use the requirements of § 141.23.

(b) The maximum contaminant level for arsenic is 0.05 milligrams per liter for community water systems until January 23, 2006.

(c) [Reserved]

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

- (1) Such water will not be available to children under 6 months of age; and
- (2) The non-community water system is meeting the public notification requirements under § 141.209, including continuous posting of the fact that ni-

trate levels exceed 10 mg/l and the potential health effects of exposure; and

(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and

(4) No adverse health effects shall result.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 3578, Jan. 30, 1991; 56 FR 26548, June 7, 1991; 56 FR 30274, July 1, 1991; 56 FR 32113, July 15, 1991; 60 FR 33932, June 29, 1995; 65 FR 26022, May 4, 2000; 66 FR 7061, Jan. 22, 2001]

§ 141.12 [Reserved]

§ 141.13 Maximum contaminant levels for turbidity.

The maximum contaminant levels for turbidity are applicable to both community water systems and non-community water systems using surface water sources 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:

EDITORIAL NOTE: At 54 FR 27527, June 29, 1989, § 141.13 was amended by adding introductory text, effective December 31, 1990. However, introductory text already exists. The added text follows.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to § 1412(b)(7)(C)(iii), that filtration is required. The requirements in this section apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to § 1412(b)(7)(C)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

- (1) Interfere with disinfection;
- (2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or
- (3) Interfere with microbiological determinations.

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(b) Five turbidity units based on an average for two consecutive days pursuant to §141.22.

[40 FR 59570, Dec. 24, 1975]

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Coliform sampling.

(a) *Routine monitoring.* (1) Public water systems must 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 State review and revision.

(2) The monitoring frequency for total coliforms for community water systems is based on the population served by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR COMMUNITY WATER SYSTEMS

Population served	Minimum number of samples per month
25 to 1,000 ¹	1
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
3,960,001 or more	480

¹Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

If a community water system serving 25 to 1,000 persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the State may reduce the monitoring frequency specified above, except that in no case may the State reduce the monitoring frequency to less than one sample per quarter. The State must approve the reduced monitoring frequency in writing.

(3) The monitoring frequency for total coliforms for non-community water systems is as follows:

(i) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public, except that the State may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994, the State cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer to less than once/year.

(ii) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, except the State may reduce this monitoring frequency, in writing, for any month the system serves 1,000 persons or fewer. The State cannot reduce the monitoring frequency to less than once/year. For systems using ground water under the direct influence of surface water, paragraph (a)(3)(iv) of this section applies.

(iii) A non-community water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system,

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TABLE 1—UNREGULATED CONTAMINANT MONITORING REPORTING REQUIREMENTS—Continued

Data element	Definition
	<p>SE2 = represents samples collected to meet the UCMR monitoring requirement for the second sampling period (all source types).</p> <p>SE3 = represents samples collected to meet the UCMR monitoring requirement for the third sampling period (surface water and ground water under the direct influence of surface water (GWUDI) sources only).</p> <p>SE4 = represents samples collected to meet the UCMR monitoring requirement for the fourth sampling period (surface water and GWUDI sources only).</p>

[72 FR 389, Jan. 4, 2007]

**Subpart E—Special Regulations,
Including Monitoring Regula-
tions and Prohibition on Lead
Use**

**§ 141.40 Monitoring requirements for
unregulated contaminants.**

(a) *General applicability.* This section specifies the monitoring and quality control requirements that must be followed if you own or operate a public water system (PWS) that is subject to the Unregulated Contaminant Monitoring Regulation (UCMR), as specified in paragraphs (a)(1) and (2) of this section. In addition, this section specifies the UCMR requirements for State and Tribal participation. For the purposes of this section, PWS “population served,” “State,” “PWS Official,” “PWS Technical Contact,” and “finished water” apply as defined in § 141.35(a). The determination of whether a PWS is required to monitor under this rule is based on the type of system (e.g., community water system, non-transient non-community water system, etc.); whether the system purchases all of its water, as finished water, from another system; and its population served as of June 30, 2005.

(1) *Applicability to transient non-community systems.* If you own or operate a transient non-community water system, you do not have to monitor that system for unregulated contaminants.

(2) *Applicability to community water systems and non-transient non-community water systems.*

(i) *Large systems.* If you own or operate a wholesale or retail PWS (other than a transient non-community system) that serves more than 10,000 people, and do not purchase your entire

water supply as finished water from another PWS, you must monitor according to the specifications in this paragraph (a)(2)(i). If you believe that your applicability status is different than EPA has specified in the notification letter that you received, or if you are subject to UCMR requirements and you have not been notified by either EPA or your State, you must report to EPA, as specified in § 141.35(b)(2) or (c)(4).

(A) *Assessment Monitoring.* You must monitor for the unregulated contaminants on List 1 of Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. If you serve a population of more than 10,000 people, you are required to perform this monitoring regardless of whether you have been notified by the State or EPA.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 (Screening Survey) of Table 1, as specified in paragraph (a)(3) of this section, if your system serves 10,001 to 100,000 people and you are notified by EPA or your State that you are part of the State Monitoring Plan for Screening Survey testing. If your system serves more than 100,000 people, you are required to conduct this Screening Survey testing regardless of whether you have been notified by the State or EPA.

(C) *Pre-Screen Testing.* You must monitor for the unregulated contaminants on List 3 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the Pre-Screen Testing.

(ii) *Small systems.* Small PWSs, as defined in this paragraph, will not be selected to monitor for any more than one of the three monitoring lists provided in Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section.

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EPA will provide sample containers, provide pre-paid air bills for shipping the sampling materials, conduct the laboratory analysis, and report and review monitoring results for all small systems selected to conduct monitoring under paragraphs (a)(2)(ii)(A) through (C) of this section. If you own or operate a PWS (other than a transient system) that serves 10,000 or fewer people and do not purchase your entire water supply from another PWS, you must monitor as follows:

(A) *Assessment Monitoring.* You must monitor for the unregulated contaminants on List 1 of Table 1, in paragraph (a)(3) of this section, if you are notified by your State or EPA that you are part

of the State Monitoring Plan for Assessment Monitoring.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the State Monitoring Plan for the Screening Survey.

(C) *Pre-Screen Testing.* You must monitor for the unregulated contaminants on List 3 of Table 1, in paragraph (a)(3) of this section, if you are notified by your State or EPA that you are part of the State Monitoring plan for Pre-Screen Testing.

(3) *Analytes to be monitored.* Lists 1, 2, and 3 of unregulated contaminants are provided in the following table:

TABLE 1—UCMR CONTAMINANT LIST
[List 1: Assessment Monitoring Chemical Contaminants]

1—Contaminant	2—CAS registry number	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
Dimethoate	60-51-5	EPA 527 ^d	0.7 µg/L	EPTDS	1/1/2008-12/31/2010
Terbufos sulfone	56070-16-7	EPA 527 ^d	0.4 µg/L	EPTDS	1/1/2008-12/31/2010
2,2',4,4'-tetrabromodiphenyl ether (BDE-47)	5436-43-1	EPA 527 ^d	0.3 µg/L	EPTDS	1/1/2008-12/31/2010
2,2',4,4',5-pentabromodiphenyl ether (BDE-99)	60348-60-9	EPA 527 ^d	0.9 µg/L	EPTDS	1/1/2008-12/31/2010
2,2',4,4',5,5'-hexabromobiphenyl (HBB)	59080-40-9	EPA 527 ^d	0.7 µg/L	EPTDS	1/1/2008-12/31/2010
2,2',4,4',5,5'-hexabromodiphenyl ether (BDE-153)	68631-49-2	EPA 527 ^d	0.8 µg/L	EPTDS	1/1/2008-12/31/2010
2,2',4,4',6-pentabromodiphenyl ether (BDE-100)	189084-64-8	EPA 527 ^d	0.5 µg/L	EPTDS	1/1/2008-12/31/2010
1,3-dinitrobenzene	99-65-0	EPA 529 ^e	0.8 µg/L	EPTDS	1/1/2008-12/31/2010
2,4,6-trinitrotoluene (TNT)	118-96-7	EPA 529 ^e	0.8 µg/L	EPTDS	1/1/2008-12/31/2010
Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	EPA 529 ^e	1 µg/L	EPTDS	1/1/2008-12/31/2010

TABLE 1—UCMR CONTAMINANT LIST
[List 2: Screening Survey Chemical Contaminants]

1—Contaminant	2—CAS registry number	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
Acetanilide Pesticide Degradation Products					
Acetochlor ESA	187022-11-3	EPA 535 ^f	1 µg/L	EPTDS	1/1/2008-12/31/2010
Acetochlor OA	184992-44-4	EPA 535 ^f	2 µg/L	EPTDS	1/1/2008-12/31/2010
Alachlor ESA	142363-53-9	EPA 535 ^f	1 µg/L	EPTDS	1/1/2008-12/31/2010
Alachlor OA	171262-17-2	EPA 535 ^f	2 µg/L	EPTDS	1/1/2008-12/31/2010
Metolachlor ESA	171118-09-5	EPA 535 ^f	1 µg/L	EPTDS	1/1/2008-12/31/2010
Metolachlor OA	152019-73-3	EPA 535 ^f	2 µg/L	EPTDS	1/1/2008-12/31/2010
Acetanilide Pesticide Parent Compounds					
Acetochlor	34256-82-1	EPA 525.2 ^g ..	2 µg/L	EPTDS	1/1/2008-12/31/2010
Alachlor	15972-60-8	EPA 525.2 ^g ..	2 µg/L	EPTDS	1/1/2008-12/31/2010
Metolachlor	51218-45-2	EPA 525.2 ^g ..	1 µg/L	EPTDS	1/1/2008-12/31/2010

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TABLE 1—UCMR CONTAMINANT LIST—Continued
[List 2: Screening Survey Chemical Contaminants]

1—Contaminant	2—CAS registry number	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
Nitrosamines					
N-nitrosodiethylamine (NDEA)	55-18-5	EPA 521 ^h	0.005 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010
N-nitroso-dimethylamine (NDMA)	62-75-9	EPA 521 ^h	0.002 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010
N-nitroso-di-n-butylamine (NDBA)	924-16-3	EPA 521 ^h	0.004 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010
N-nitroso-di-n-propylamine (NDPA)	621-64-7	EPA 521 ^h	0.007 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010
N-nitroso-methylethylamine (NMEA)	10595-95-6	EPA 521 ^h	0.003 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010
N-nitrosopyrrolidine (NPYR) ...	930-55-2	EPA 521 ^h	0.002 µg/L	DSMRT and EPTDS.	1/1/2008–12/31/2010

TABLE 1—UCMR CONTAMINANT LIST
[List 3: Pre-Screen Testing to be Sampled After Notice of Analytical Methods Availability]

1—Contaminant	2—CAS registry number	3—Analytical methods ^a	4—Minimum reporting level ^b	5—Sampling location ^c	6—Period during which monitoring to be completed
Reserved ⁱ	Reserved ⁱ	Reserved ⁱ	Reserved ⁱ	Reserved ⁱ	Reserved ⁱ

Column headings are:
 1—Contaminant: The name of the contaminant to be analyzed.
 2—CAS (Chemical Abstract Service) Registry Number or Identification Number: A unique number identifying the chemical contaminants.
 3—Analytical Methods: method numbers identifying the methods that must be used to test the contaminants.
 4—Minimum Reporting Level: The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods.
 5—Sampling Location: The locations within a PWS at which samples must be collected.
 6—Period During Which Monitoring To Be Completed: The dates during which the sampling and testing are to occur for the indicated contaminant.

The analytical procedures shall be performed in accordance with the documents associated with each method (per the following footnotes). The incorporation by reference of the following documents listed in footnotes d–h was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Information on how to obtain these documents can be provided by the Safe Drinking Water Hotline at (800) 426-4791. Documents may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington, DC 20460, Telephone: (202) 566-2426; or at the National Archives and Records Administration (NARA). For information on availability of this material at NARA, call 202-741-6030, or go to <http://www.archives.gov/federal-register/index.html>.

^a The version of the EPA methods which you must follow for this Regulation are listed in d–h as follows.
^b The Minimum Reporting Level (MRL) was established by EPA by adding the mean of the Lowest Concentration Minimum Reporting Levels (LCMRL) determined according to the procedure detailed in "Statistical Protocol for the Determination of The Single-Laboratory Lowest Concentration Minimum Reporting Level (LCMRL) and Validation of the Minimum Reporting Level (MRL)" by the primary and secondary laboratories conducting the development and validation of the analytical method to three times the difference of the LCMRLs. If LCMRL data from three or more laboratories were available, the MRL was established by EPA by adding three times the standard deviation of the LCMRLs to the mean of the LCMRLs. Note that EPA Method 525.2 was developed prior to UCMR 2, hence the LCMRLs were not determined for analytes determined by this method.
^c Sampling must occur at entry points to the distribution system (EPTDSs) after treatment is applied that represent each non-emergency water source in routine use over the 12-month period of monitoring. See 40 CFR 141.35(c)(3) for an explanation of the requirements related to use of representative EPTDSs. Sampling for nitrosamines on List 2 must also occur at the disinfection byproduct distribution system maximum residence time (DSMRT) sampling locations as defined in 40 CFR 141.132(b)(1)(i) and at EPTDS sampling locations. If a treatment plant/water source is not subject to the sampling required in 40 CFR 141.132(b)(1), then the samples for nitrosamines must be collected only at the EPTDS location(s).
^d EPA Method 527 "Determination of Selected Pesticides and Flame Retardants in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS)," Revision 1.0, April 2005 is available at <http://www.epa.gov/safewater/methods/sourcalt.html>.
^e EPA Method 529 "Determination of Explosives and Related Compounds in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS)," Revision 1.0, September 2002 is available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.
^f EPA Method 535 "Measurement of Chloroacetanilide and Other Acetamide Herbicide Degradates in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS)," Version 1.1, April 2005 is available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.
^g EPA Method 525.2 "Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry," Revision 2.0, 1995 is available at <http://www.NEMF.gov>.
^h EPA Method 521 "Determination of Nitrosamines in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography with Large Volume Injection and Chemical Ionization Tandem Mass Spectrometry (MS/MS)," Version 1.0, September 2004 is available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.
ⁱ To be determined at a later time.

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(4) *Sampling requirements*—(i) *Large systems*. If you serve more than 10,000 people and meet the UCMR applicability criteria specified in paragraph (a)(2)(i) of this section, you must comply with the requirements specified in paragraphs (a)(4)(i)(A) through (I) of this section. Your samples must be collected according to the schedule that you are assigned by EPA or your State, or the schedule that you revised using EPA's electronic data reporting system on or before August 2, 2007. Your schedule must follow both the timing and frequency of monitoring specified in Tables 1 and 2 of this section.

(A) *Monitoring period*. You must collect the samples in one continuous 12-month period for List 1 Assessment Monitoring, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, during the time frame indicated in column 6 of Table 1, in

paragraph (a)(3) of this section. EPA or your State will specify the month(s) and year(s) in which your monitoring must occur. As specified in §141.35(c)(5), you must contact EPA if you believe you cannot conduct monitoring according to your schedule.

(B) *Frequency*. You must collect the samples within the time frame and according to the frequency specified by contaminant type and water source type for each sampling location, as specified in Table 2, in this paragraph, with the following exception. For the second round of ground water sampling, if a sample location is non-operational for more than one month before and one month after the scheduled sampling month (i.e., it is not possible for you to sample within the five to seven month window specified the Table 2, in this paragraph), you must notify EPA as specified in §141.35(c)(5).

TABLE 2—MONITORING FREQUENCY BY CONTAMINANT AND WATER SOURCE TYPES

Contaminant type	Water source type	Time frame	Frequency
Chemical	Surface water or ground water under the direct influence of surface water (GWUDI) (includes all sampling locations for which some or all of the water comes from a surface water or GWUDI source at any time during the 12 month monitoring period).	12 months	You must monitor for 4 consecutive quarters. Sample events must occur 3 months apart.
	Ground water	12 months	You must monitor twice in a consecutive 12-month period. Sample events must occur 5-7 months apart.

(C) *Location*. You must collect samples for each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, as specified in Table 1, in paragraph (a)(3) of this section. Samples must be collected at each sample point that is specified in column 5 of Table 1, in paragraph (a)(3) of this section. If you are a ground water system with multiple EPTDSs, and you request and receive approval from EPA or the State for sampling at representative EPTDS(s), as specified in §141.35(c)(3), you must collect your samples from the approved representative sampling location(s). Systems conducting Screening Survey monitoring must

also sample for nitrosamines at the disinfection byproduct distribution system maximum residence time (DSMRT) sampling location(s) if they are subject to sampling requirements in §141.132(b)(1).

(D) *Sampling instructions*. For each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, you must follow the sampling procedure for the method specified in column 3 of Table 1, in paragraph (a)(3) of this section. In addition, you must not composite (that is, combine, mix, or blend) the samples; you must collect and preserve each sample separately. Samples collected

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for the analysis of Acetanilide "parent" pesticides and their degradation products (Methods 525.2 and 535) must be collected at the same sampling point, at the same time.

(E) *Sample collection and shipping time.* If you must ship the samples for analysis, you must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature, unless you have made special arrangements with your laboratory to receive the samples.

(F) *Analytical methods.* For each contaminant, you must use the respective analytical methods for List 1, and, if applicable, for List 2, or List 3 that are specified in column 3 of Table 1, in paragraph (a)(3) of this section; report values at or above the minimum reporting levels for List 1, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, that are specified in column 4 of Table 1, in paragraph (a)(3) of this section; and conduct the quality control procedures specified in paragraph (a)(5) of this section.

(G) *Laboratory errors or sampling deviations.* If the laboratory data do not meet the required QC criteria, as specified in paragraph (a)(5) of this section, or you do not follow the required sampling procedures, as specified in paragraphs (a)(4) of this section, you must resample within 30 days of being informed or becoming aware of these facts. This resampling is not for the purpose of confirming previous results, but to correct the sampling or laboratory error. All systems must report the results obtained from the first sampling for each sampling period, except for cases of sampling or laboratory errors. For the purposes of this rule, no samples are to be recollected for the purposes of confirming the results observed in a previous sampling.

(H) *Analysis.* For the List 1 contaminants, and, if applicable, List 2 Screening Survey, or List 3 Pre-Screen Testing contaminants, identified in Table 1, paragraph (a)(3) of this section, you

must arrange for testing by a laboratory that has been approved by EPA according to requirements in paragraph (a)(5)(ii) of this section.

(I) *Review and reporting of results.* After you have received the laboratory results, you must review, approve, and submit the system information, and sample collection data and test results. You must report the results as provided in §141.35(c)(6).

(ii) *Small systems.* If you serve 10,000 or fewer people and are notified that you are part of the State Monitoring Plan for Assessment Monitoring, Screening Survey or Pre-Screen monitoring, you must comply with the requirements specified in paragraphs (a)(4)(i)(A) through (H) of this section. If EPA or the State informs you that they will be collecting your UCMR samples, you must assist them in identifying the appropriate sampling locations and in collecting the samples.

(A) *Monitoring period and frequency.* You must collect samples at the times specified for you by the State or EPA. Your schedule must follow both the timing of monitoring specified in Table 1, List 1, and, if applicable, List 2, or List 3, and the frequency of monitoring in Table 2 of this section.

(B) *Location.* You must collect samples at the locations specified for you by the State or EPA.

(C) *Sample kits.* You must store and maintain the sample collection kits sent to you by the UCMR Sampling Coordinator in accordance with the kit's instructions. The sample kit will include all necessary containers, packing materials and cold packs, instructions for collecting the sample and sample treatment (such as dechlorination or preservation), report forms for each sample, contact name and telephone number for the laboratory, and a prepaid return shipping docket and return address label. If any of the materials listed in the kit's instructions are not included in the kit or arrive damaged, you must notify the UCMR Sampling Coordinator who sent you the sample collection kits.

(D) *Sampling instructions.* You must comply with the instructions sent to you by the State or EPA concerning the use of containers, collection (how to fill the sample bottle),

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dechlorination and/or preservation, and sealing and preparation of sample and shipping containers for shipment. You must not composite (that is, combine, mix, or blend) the samples. You also must collect, preserve, and test each sample separately. You must also comply with the instructions sent to you by the UCMR Sampling Coordinator concerning the handling of sample containers for specific contaminants.

(E) *Sampling deviations.* If you do not collect a sample according to the instructions provided to you for a listed contaminant, you must report the deviation within 7 days of the scheduled monitoring on the sample reporting form, as specified in §141.35(d)(2). You must resample following instructions that you will be sent from the UCMR Sampling Coordinator or State. A copy of the form must be sent to the laboratory with the recollected samples, and to the UCMR Sampling Coordinator.

(F) *Duplicate samples.* EPA will select a subset of systems in the State Monitoring Plan that must collect duplicate samples for quality control. If your system is selected, you will receive two sample kits for an individual sampling location that you must use. You must use the same sampling protocols for both sets of samples, following the instructions in the duplicate sample kit.

(G) *Sampling forms.* You must completely fill out each of the sampling forms and bottles sent to you by the UCMR Sampling Coordinator, including data elements listed in §141.35(e) for each sample. If you are conducting Assessment Monitoring, you must include elements 1 through 5, and 7; and if you are conducting Screening Survey, you must include elements 1 through 7. You must sign and date the sampling forms.

(H) *Sample collection and shipping.* You must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature unless you have made special arrangements with EPA for the laboratory to receive the samples. Once you have collected the

samples and completely filled in the sampling forms, you must send the samples and the sampling forms to the laboratory designated on the air bill.

(5) *Quality control requirements.* If your system serves more than 10,000 people, you must ensure that the quality control requirements listed below are met during your sampling procedures and by the laboratory conducting your analyses. You must also ensure that all method quality control procedures and all UCMR quality control procedures are followed.

(i) *Sample collection/preservation.* You must follow the sample collection and preservation requirements for the specified method for each of the contaminants in Table 1, in paragraph (a)(3) of this section. These requirements specify sample containers, collection, dechlorination, preservation, storage, sample holding time, and extract storage and/or holding time that you must assure that the laboratory follow.

(ii) *Laboratory approval for Lists 1, List 2 and List 3.* To be approved to conduct UCMR testing, the laboratory must be certified under §141.28 for one or more compliance analyses; demonstrate for each analytical method it plans to use for UCMR testing that it can meet the Initial Demonstration of Capability (IDC) requirements detailed in the analytical methods specified in column 3 of Table 1, in paragraph (a)(3) of this section; and successfully participate in the UCMR Proficiency Testing (PT) Program administered by EPA for each analytical method it plans to use for UCMR testing. UCMR laboratory approval decisions will be granted on an individual method basis for the methods listed in column 3 of Table 1 in paragraph (a)(3) of this section for List 1, List 2, and List 3 contaminants. Laboratory approval is contingent upon the capability of the laboratory to post monitoring data to the EPA electronic data reporting system. To participate in the UCMR Laboratory Approval Program, the laboratory must complete and submit the necessary registration forms by April 4, 2007. Correspondence must be addressed to: UCMR 2 Laboratory Approval Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive (MS 140), Cincinnati, OH 45268; or e-mailed to

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EPA at UCMR_Sampling_Coordinator@epa.gov.

(iii) *Minimum Reporting Level*. The MRL is the lowest analyte concentration for which future recovery is predicted to fall, with high confidence (at least 99%), between 50% and 150% recovery.

(A) Validation of laboratory performance. Your laboratory must be capable of quantifying each contaminant listed in Table 1, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section. You must ensure that the laboratory completes and has on file and available for your inspection, records of two distinct procedures. First, your laboratory must have conducted an IDC involving replicate analyses at or below the MRL as described in this paragraph. Second, for each day that UCMR analyses are conducted by your laboratory, a validation of its ability to quantify each contaminant, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section, following the procedure listed in paragraph (a)(5)(iii)(B) of this section, must be performed. The procedure for initial validation of laboratory performance at or below the MRL is as follows:

(1) All laboratories using EPA drinking water methods under UCMR must

demonstrate that they are capable of meeting data quality objectives (DQOs) at or below the MRL listed in Table 1, column 4, in paragraph (a)(3) of this section.

(2) The MRL, or any concentration below the MRL, at which performance is being evaluated, must be contained within the range of calibration. The calibration curve regression model and the range of calibration levels that are used in these performance validation steps must be used in all routine sample analyses used to comply with this regulation. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(3) Replicate analyses of at least seven (7) fortified samples in reagent water must be performed at or below the MRL for each analyte, and must be processed through the entire method procedure (*i.e.*, including extraction, where applicable, and with all preservatives).

(4) A prediction interval of results (PIR), which is based on the estimated arithmetic mean of analytical results and the estimated sample standard deviation of measurement results, must be determined by Equation 1:

$$\text{Equation 1} \quad \text{PIR} = \text{Mean} \pm s \times t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

Where:

t is the Student's t value with df degrees of freedom and confidence level $(1-\alpha)$,

s is the sample standard deviation of n replicate samples fortified at the MRL,

n is the number of replicates.

(5) The values needed to calculate the PIR using Equation 1 are: Number of replicates (n); Student's t value with a two-sided 99% confidence level for n number of replicates; the average (mean) of at least seven replicates; and the sample standard deviation. Factor 1 is referred to as the Half Range PIR (HR_{PIR}).

$$\text{HR}_{\text{PIR}} = s \times t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

For a certain number of replicates and for a certain confidence level in Student's t , this factor

$$C = t_{(df, 1-\alpha/2)} \times \sqrt{1 + \frac{1}{n}}$$

is constant, and can be tabulated according to replicate number and confidence level for the Student's t . Table 3 in this paragraph lists the constant factor (C) for replicate sample numbers

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7 through 10 with a confidence level of 99% for Student's *t*.

(7) The PIR is calculated by Equation 3:

(6) The HRPIR is calculated by Equation 2:

Equation 3 $PIR = Mean \pm HR_{PIR}$

Equation 2 $HR_{PIR} = s \times C$

TABLE 3—THE CONSTANT FACTOR (C) TO BE MULTIPLIED BY THE STANDARD DEVIATION TO DETERMINE THE HALF RANGE INTERVAL OF THE PIR (STUDENT'S *t* 99% CONFIDENCE LEVEL)^A

Replicates	Degrees of freedom	Constant factor (C) to be multiplied by the standard deviation
7	6	3.963
8	7	3.711
9	8	3.536
10	9	3.409

^AThe critical *t*-value for a two-sided 99% confidence interval is equivalent to the critical *t*-value for a one-sided 99.5% confidence interval, due to the symmetry of the *t*-distribution. PIR = Prediction Interval of Results.

(8) The lower and upper result limits of the PIR must be converted to percent recovery of the concentration being tested. To pass criteria at a certain level, the PIR lower recovery limits cannot be lower than the lower recovery limits of the QC interval (50%), and the PIR upper recovery limits cannot be greater than the upper recovery limits of the QC interval (150%). When either of the PIR recovery limits falls outside of either bound of the QC interval of recovery (higher than 150% or less than 50%), laboratory performance is not validated at the concentration evaluated. If the PIR limits are contained within both bounds of the QC interval, laboratory performance is validated for that analyte.

(B) Quality control requirements for validation of laboratory performance at or below the MRL.

(1) You must ensure that the calibration curve regression model and that the range of calibration levels that are used in these performance validation steps are used in future routine sample analysis. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(2) You must ensure, once your laboratory has performed an IDC as specified in each analytical method (demonstrating that DQOs are met at or

below an MRL), that a daily performance check is performed for each analyte and method. A single laboratory blank, fortified at or below the MRL for each analyte, must be processed through the entire method procedure. The measured concentration for each analyte must be converted to a percent recovery, and if the recovery is within 50%–150% (inclusive), the daily performance of the laboratory has been validated. The results for any analyte for which 50%–150% recovery cannot be demonstrated during the daily check are not valid. Laboratories may elect to re-run the daily performance check sample if the performance for any analyte or analytes cannot be validated. If performance is validated for these analytes, the laboratory performance is considered validated. Alternatively, the laboratory may re-calibrate and repeat the performance validation process for all analytes.

(iv) *Laboratory fortified sample matrix and laboratory fortified sample matrix duplicate.* You must ensure that your laboratory prepares and analyzes the Laboratory Fortified Sample Matrix (LFSM) sample for accuracy and Laboratory Fortified Sample Matrix Duplicate (LFSMD) samples for precision to determine method accuracy and precision for all contaminants in Table 1, in paragraph (a)(3) of this section. LFSM/LFSMD samples must be prepared using a sample collected and analyzed

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in accordance with UCMR 2 requirements and analyzed at a frequency of 5% (or 1 LFSM/LFSMD set per every 20 samples) or with each sample batch, whichever is more frequent. In addition, the LFSM/LFSMD fortification concentrations must be alternated between a low-level fortification and mid-level fortification approximately 50% of the time. (For example: A set of 40 samples will require preparation and analysis of 2 LFSM/LFSMD sets. The first set must be fortified at either the low-level or mid-level, and the second set must be fortified with the other standard, either the low-level or mid-level, whichever was not used for the initial LFSM/LFSMD set.) The low-level LFSM/LFSMD fortification concentration must be within $\pm 50\%$ of the MRL for each contaminant (e.g., for an MRL of 1 $\mu\text{g/L}$ the acceptable fortification levels must be between 0.5 $\mu\text{g/L}$ and 1.5 $\mu\text{g/L}$). The mid-level LFSM/LFSMD fortification concentration must be within $\pm 20\%$ of the mid-level calibration standard for each contaminant, and should represent, where possible and where the laboratory has data from previously analyzed samples, an approximate average concentration observed in previous analyses of that analyte. There are no acceptance criteria specified for LFSM/LFSMD analyses. All LFSM/LFSMD data are to be reported.

(v) *Method defined quality control.* You must ensure that your laboratory performs Laboratory Fortified Blanks and Laboratory Performance Checks, as appropriate to the method's requirements, for those methods listed in Table 1, column 3, in paragraph (a)(3) of this section. Each method specifies acceptance criteria for these QC checks.

(vi) *Reporting.* You must ensure that your laboratory reports the analytical results and other data, with the required data listed in Table 1, in §141.35(e). You must require your laboratory to submit these data electronically to the State and EPA using EPA's electronic data reporting system, accessible at (<http://www.epa.gov/safewater/ucmr/ucmr2/reporting.html>), within 120 days from the sample collection date. You then have 60 days from when the laboratory posts the data to review, approve, and submit the data

to the State and EPA, via EPA's electronic data reporting system. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory's posting to EPA's electronic reporting system, the data will be considered approved and final for State and EPA review.

(6) *Violation of this rule—(i) Monitoring violations.* Any failure to monitor in accordance with §141.40(a)(3)–(5) is a monitoring violation.

(ii) *Reporting violations.* Any failure to report in accordance with §141.35 is a reporting violation.

(b) *Petitions and waivers by States—(1) Governors' petition for additional contaminants.* The Safe Drinking Water Act allows Governors of seven (7) or more States to petition the EPA Administrator to add one or more contaminants to the UCMR Contaminant List in paragraph (a)(3) of this section. The petition must clearly identify the reason(s) for adding the contaminant(s) to the monitoring list, including the potential risk to public health, particularly any information that might be available regarding disproportional risks to the health and safety of children, the expected occurrence documented by any available data, any analytical methods known or proposed to be used to test for the contaminant(s), and any other information that could assist the Administrator in determining which contaminants present the greatest public health concern and should, therefore, be included on the UCMR Contaminant List in paragraph (a)(3) of this section.

(2) *State-wide waivers.* A State can waive monitoring requirements only with EPA approval and under very limited conditions. Conditions and procedures for obtaining a waiver are as follows:

(i) *Application.* A State may apply to EPA for a State-wide waiver from the unregulated contaminant monitoring requirements for PWSs serving more than 10,000 people. To apply for such a waiver, the State must submit an application to EPA that includes the following information: The list of contaminants on the UCMR Contaminant List for which a waiver is requested, along with documentation for each

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§ 141.43

contaminant in the request demonstrating that the contaminants or their parent compounds do not occur naturally in the State, and certifying that during the past 15 years they have not been used, applied, stored, disposed of, released, or detected in the source waters or distribution systems in the State.

(ii) *Approval.* EPA will review State applications and notify the State whether it accepts or rejects the request. The State must receive written approval from EPA before issuing a State-wide waiver.

[72 FR 393, Jan. 4, 2007; 72 FR 3916, Jan. 26, 2007]

§ 141.41 Special monitoring for sodium.

(a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was

received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.

(c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels where the State provides such notices in lieu of the supplier.

(d) Analyses for sodium shall be conducted as directed in § 141.23(k)(1).

[45 FR 57345, Aug. 27, 1980, as amended at 59 FR 62470, Dec. 5, 1994]

§ 141.42 Special monitoring for corrosivity characteristics.

(a)-(c) [Reserved]

(d) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the State:

- Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing.
- Copper from piping and alloys, service lines, and home plumbing.
- Galvanized piping, service lines, and home plumbing.
- Ferrous piping materials such as cast iron and steel.
- Asbestos cement pipe.

In addition, States may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water, such as:

- Vinyl lined asbestos cement pipe.
- Coal tar lined pipes and tanks.

[45 FR 57346, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982, as amended at 59 FR 62470, Dec. 5, 1994]

§ 141.43 Prohibition on use of lead pipes, solder, and flux.

(a) *In general*—(1) *Prohibition.* Any pipe, solder, or flux, which is used after

TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 16 DISINFECTANTS AND DISINFECTION BYPRODUCTS

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TITLE 179 PUBLIC WATER SUPPLY SYSTEMS

CHAPTER 16 DISINFECTANTS AND DISINFECTION BYPRODUCTS

16-001 SCOPE AND AUTHORITY: This chapter applies to all community and non-transient, non-community water systems that add a chemical disinfectant to the water in any part of the drinking water treatment process, except for those systems that meet the time limitations for maintenance chlorination as defined in Attachment 1 which is hereby incorporated into these regulations. It also applies to transient non-community water systems that use chlorine dioxide as a disinfectant or oxidant. The authority is found in Neb. Rev. Stat. §§71-5301 to 71-5313.

16-001.01 Compliance Dates

1. Community Water Systems (CWSs) and Non-Transient Non-Community Water Systems (NTNCWSs): Unless otherwise noted, systems must comply with the requirements of this chapter as follows. Public water systems using surface water or ground water under the direct influence of surface water serving 10,000 or more individuals must comply with this chapter beginning January 1, 2002. Public water systems using surface water or ground water under the direct influence of surface water serving fewer than 10,000 individuals and systems using only ground water not under the direct influence of surface water must comply with this chapter beginning January 1, 2004.
2. Transient Non-Community Water Systems (NCWSs): Public water systems using surface water or ground water under the direct influence of surface water serving 10,000 or more individuals and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this chapter beginning January 1, 2002. Public water systems using surface water or ground water under the direct influence of surface water serving fewer than 10,000 individuals and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this chapter beginning January 1, 2004.

16-002 DEFINITIONS

Enhanced coagulation means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

Enhanced softening means the improved removal of disinfection byproduct precursors by precipitative softening.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with Title 179 NAC 24 MCLs (~~upon its effective date~~) under 179 NAC 2-002.04E2a(1) is 120 days.

Haloacetic acids (five) (HAA5) means the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Maximum residual disinfectant level (MRDL) means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a public water system (PWS) is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in 179 NAC 2-002.04F1, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Maximum residual disinfectant level goal (MRDLG) means the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are nonenforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

SUVA means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV_{254}) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

Total organic carbon (TOC) means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

16-003 GENERAL REQUIREMENTS

16-003.01 The regulations in 179 NAC 16 establish criteria under which community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet maximum contaminant levels (MCLs) and MRDLs in 179 NAC 2-002.04E and 2-002.04F, and must meet the treatment technique requirements for disinfection byproduct precursors in 179 NAC 16-008.

16-003.02 The regulations in 179 NAC 16 establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in 179 NAC 2-002.04F1.

16-003.03 The Department has established MCLs for Total Trihalomethanes (TTHMs) and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.

16-003.04 Each CWS and NTNCWS must be operated by a licensed water operator who meets the requirements specified by the Department for the level of licensure required in 179 NAC 10 and is included in a Department list of licensed operators.

16-003.05 Control of Disinfectant Residuals: Notwithstanding the MRDLs in 179 NAC 2-002.04F, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

16-004 ANALYTICAL REQUIREMENTS

16-004.01 General

16-004.01A ~~—40 CFR 141.131(a)(1) through (b)(1) is hereby incorporated by references. It can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf> Systems must use only the analytical method(s) specified in 179 NAC 16-004, or their equivalent as approved by the United States Environmental Protection Agency (EPA) to demonstrate compliance with the requirements of 179 NAC 16, 179 NAC 23, and 179 NAC 24 (upon their effective dates).~~

~~————— 16-004.01B The following documents are incorporated herein by reference: They are available for viewing at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.~~

- ~~1. EPA Method 552.1 is in *Methods for the Determination of Organic Compounds in Drinking Water Supplement II*, USEPA, August 1992, EPA/600/R-92/129 [available through National Information Technical Service (NTIS), PB92-207703], 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~2. EPA Methods 502.2, 524.2, 551.1, and 552.2 are in the *Methods for the Determination of Organic Compounds in Drinking Water Supplement III*, USEPA, August 1995, EPA/600/R-95/131 (available through NTIS, PB95-261616), 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~3. EPA Method 300.0 is in *Methods for the Determination of Inorganic Substances in Environmental Samples*, USEPA, August 1993, EPA/600/R-93/100 (available through NTIS, PB94-121811), 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~4. EPA Methods 300.1 and 321.8 are in *Methods for the Determination of Organic and Inorganic Compounds in Drinking Water Volume 1*, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000-106981, 5285 Port Royal Road, Springfield, VA 22151 (1-800-553-6847);~~
- ~~5. EPA Method 317.0, Revision 2.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis," USEPA, July 2001, EPA 815-B-01-001;~~
- ~~6. EPA Method 326.0, Revision 1.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis," USEPA, June 2002, EPA 815-R-03-007;~~
- ~~7. EPA Method 327.0, Revision 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry," USEPA, May 2005, EPA 815-R-05-008;~~
- ~~8. EPA Method 552.3, Revision 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection," USEPA, July 2003, EPA-815-B-03-002 can be accessed and downloaded directly on-line at <http://www.epa.gov/safewater/methods/sourcalt.html>;~~
- ~~9. EPA Method 415.3, Revision 1.1, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," USEPA, February 2005, EPA/600-R-05/055 can be accessed and downloaded directly on-line at www.epa.gov/norlcwww/ordmeth.htm;~~
- ~~10. Standard Methods 4500-Cl D, 4500-Cl E, 4500-Cl F, 4500-Cl G, 4500-Cl H, 4500-Cl I, 4500-ClO₂D, 4500-ClO₂E, 6251 B, and 5910 B must be~~

~~followed in accordance with *Standard Methods for the Examination of Water and Wastewater, 19th or 20th Edition*, American Public Health Association, 1995 and 1998 respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005;~~

~~11. Standard Methods 5310 B, 5310 C, and 5310 D must be followed in accordance with the *Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater*, or the *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005;~~

~~12. Standard Methods 4500-Cl D-00, 4500-Cl E-00, 4500-Cl F-00, 4500-Cl G-00, 4500-Cl H-00, 4500-Cl I-00, 4500-ClO₂ E-00, 6251B-94, 5310 B-00, 5310 C-00, 5310 D-00 and 5910 B-00 are available at <http://www.standardmethods.org> or at EPA's Water Docket. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that are IBR-approved;~~

~~13. ASTM Methods D 1253-86 and D 1253-86 (Reapproved 1996) must be followed in accordance with the *Annual Book of ASTM Standards, Volume 11.01*, American Society for Testing and Materials International, 1996 or any ASTM edition containing the IBR (Institute for Basic Research)-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428;~~

~~14. ASTM Method D 1253-03 must be followed in accordance with the *Annual Book of ASTM Standards, Volume 11.01*, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428; and~~

~~15. ASTM Method D 6581-00 must be followed in accordance with the *Annual Book of ASTM Standards Volume 11.01*, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959;~~

~~16-004.02 Disinfection Byproducts~~

~~16-004.02A Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in the following table or an equivalent approved by EPA:~~

**APPROVED METHODS FOR DISINFECTION BYPRODUCT COMPLIANCE
MONITORING**

Contaminant and methodology ⁴	EPA method	Standard method ²	SM-online ⁹	ASTM method ³
TTHM				
-P&T/GC/EICD & PID	502.2 ⁴			
-P&T/GC/MS	524.2, 524.3 ⁹			
-LLE/GC/ECD	551.4			
HAA5				
-LLE (diazomethane)/GC/ECD		6251 B ^{5,10}	6251 B-94	
-SPE (acidic methanol)/GC/ECD	552.1 ⁵			
-LLE (acidic methanol)/GC/ECD	552.2, 552.3			
-Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹¹			
Bromate				
-Ion chromatography	300.4			
-Ion chromatography & post column reaction	317.0 Rev. 2.0 ⁶ , 326.0 ⁶			
-IC/ICP-MS	321.8 ^{6,7}			
-Two-Dimensional Ion Chromatography (IC)	302.0 ¹²			D 6581-00
-Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹³			
-Chemically Suppressed Ion Chromatography				D 6581-08 A
-Electrolytically Suppressed Ion Chromatography				D 6581-08 B
Chlorite				
-Amperometric titration	327.0 Rev. 1.1 ⁸	4500-ClO ₂ E ^{8,10}	4500-ClO ₂ E-00 ⁸	
-Spectrophotometry	300.0, 300.1, 317.0			D 6581-00
-Ion chromatography	Rev. 2.0, 326.0			
-Chemically Suppressed Ion Chromatography				D 6581-08 A
Electrolytically Suppressed Ion Chromatography				D 6581-08 B

⁴ P&T = purge and trap; GC = gas chromatography; EICD = electrolytic conductivity detector; PID = photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extraction ; IC = ion chromatography; ICP-MS = inductively coupled plasma/mass spectrometer.

² 19th and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

³ *Annual Book of ASTM Standards*, 2001 or any year containing the cited version of the method, Vol. 11.01

~~⁴If TTHMs are the only analytes being measured in the sample, then a PID is not required.~~

~~⁵The samples must be extracted within 14 days of sample collection.~~

~~⁶Ion chromatography and post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in 179 NAC 16-005.02 item 3.b.~~

~~⁷Samples must be preserved at the time of sampling with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.~~

~~⁸Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in 179 NAC 16-005.02 item 2.a.(1). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in 179 NAC 16-005.02 items 2.a.(2) and 2.b.~~

~~⁹The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at <http://www.standardmethods.org>.~~

~~¹⁰Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.~~

~~¹¹EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009. EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

~~¹²EPA Method 302.0. "Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," September 2009. EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

16-004.02B Analysis under 179 NAC 16 for disinfection byproducts must be conducted by the Department Public Health Environmental Laboratory (certified by EPA) or a laboratory that has entered into an agreement with the Department Laboratory except as specified under 179 NAC 20. To receive certification to conduct analyses for the DBP contaminants in 179 NAC 2-002.04E, 179 NAC 16-008, 179 NAC 23 (~~upon its effective date~~) and 179 NAC 24 (~~upon its effective date~~), the laboratory must:

1. Analyze performance evaluation (PE) samples that are acceptable to the Department at least once during each consecutive 12 month period by each method for which the laboratory desires certification.
2. The laboratory must achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

<u>Disinfection Byproduct</u>	<u>Acceptance limits (percent of true value)</u>	<u>Comments</u>
TTHM Chloroform	<u>+20</u>	Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHMs
Bromodichloromethane	<u>+20</u>	
Dibromochloromethane	<u>+20</u>	
Bromoform	<u>+20</u>	
HAA5 Monochloroacetic Acid	<u>+40</u>	Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5
Dichloroacetic Acid	<u>+40</u>	
Trichloroacetic Acid	<u>+40</u>	
Monobromoacetic Acid	<u>+40</u>	
Dibromoacetic Acid	<u>+40</u>	
Chlorite	<u>+30</u>	
Bromate	<u>+30</u>	

3. Report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with 179 NAC 2-002.04E, 179 NAC 16-008, and 179 NAC 23 (upon its effective date) and 179 NAC 24 (upon its effective date).

Disinfection Byproduct	Minimum reporting level (mg/L) ¹	Comments
TTHM ² Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5 ² Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	
Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Chlorite	0.020	Applicable to monitoring as prescribed in 179 NAC 16-005.02 items 2.a(2) and 2.b.
Bromate	0.0050 or 0.0010	Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 0.0010 mg/L MRL for bromate.

¹ The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory.

The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be $\pm 50\%$ of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

² When adding the individual trihalomethane or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that DBP, unless otherwise specified by the Department.

16-004.02C A Grade I, II, III, or IV licensed water operator or a person who has been trained to take the samples must measure daily chlorite samples at the entrance to the distribution system. If a licensed operator does not take the sample, Attachment 3, which is incorporated herein by reference must be completed and sent to the Department.

16-004.03 Disinfectant Residuals

16-004.03A Systems must measure residual disinfectant concentrations for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table 40 CFR 141.131(c) which is incorporated herein by reference and may be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf> or an equivalent method approved by EPA:

APPROVED METHODS FOR DISINFECTANT RESIDUAL COMPLIANCE MONITORING

Methodology	SM (19 th , 20 th or 21 st ed)	SM-Online ₂	ASTM Method	EPA method	Residual Measured ¹			
					Free Cl ₂	Comb ined Cl ₂	Total Cl ₂	ClO ₂
Amperometric Titration	4500-Cl-D	4500-Cl-D-00	D 1253-86, (96), 03; D 1253-08		X	X	X	
Low Level Amperometric Titration	4500-Cl-E	4500-Cl-E-00					X	
DPD Ferrous Titrimetric	4500-Cl-F	4500-Cl-F-00			X	X	X	
DPD Colorimetric	4500-Cl-G	4500-Cl-G-00			X	X	X	
On-line Chlorine Analyzer				334.0 ³	X		X	
Amperometric Sensor ⁴					X		X	
Syringaldazine (FACTS)	4500-Cl-H	4500-Cl-H-00			X			
Iodometric Electrode	4500-Cl-I	4500-Cl-I-00					X	
DPD	4500-ClO ₂ -D							X
Amperometric Method II	4500-ClO ₂ -E	4500-ClO ₂ -E-00						X
Lissamine Green Spectrophotometric				327.0 Rev 1.1				X

~~⁴X indicates method is approved for measuring specified disinfectant residual. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.~~

~~²The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Methods Committee. Standard Methods Online are available at <http://www.standardmethods.org>.~~

~~³EPA Method 334.0. "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," September 2009. EPA 815-B-09-013. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

~~⁴ChloroSense. "Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense," August 2009. Available at <http://www.nemi.gov> or from Palintest Ltd, 21 Kenton Lands Road, PO Box 18395, Erlanger, KY 41018.~~

16-004.03B If approved by the Department, systems may also measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide by using DPD colorimetric test kits.

16-004.03C A Nebraska licensed Grade I, II, III, or IV operator or a person who has been trained to take the samples must measure residual disinfectant concentration. If the sample is not taken by a licensed operator, Attachment 3 to 179 NAC 16 must be completed and sent to the Department.

16-004.04 Additional Analytical Methods: Systems required to analyze parameters not included in 179 NAC 16-004.02 and 16-004.03 must use the following methods or an equivalent method approved by EPA. The Department Laboratory (certified by EPA) or a laboratory that has entered into an agreement with the Department Laboratory must analyze for the following parameters, except that pH may be analyzed by the Department Laboratory, or a laboratory that has entered into an agreement with the Department Laboratory, or on-site by a Nebraska licensed Grade I, II, III, or IV operator or a person who has been trained on how to take the samples. If the sample is not taken by a licensed operator, Attachment 3 must be completed and sent to the Department. Additional analytical methods are found in 40 CFR 141.131(d)(1) through (d)(6) which is hereby incorporated by reference. The parameters and methods can be found at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf>

1. Alkalinity: All methods allowed in 179 NAC 3-005.11A for measuring alkalinity.
2. Bromide: EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0 or ASTM D 6581-00.
3. Total Organic Carbon (TOC): Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample

collection to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within 28 days.

4. Specific Ultraviolet Absorbance (SUVA): SUVA is equal to the UV absorption at 254 nm (UV_{254}) (measured in m^{-1} divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in 179 NAC 16-004.04 item 4.a. to measure DOC and the method stipulated in 179 NAC 16-004.04 item 4.b. to measure UV_{254} . SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} samples used to determine a SUVA value must be taken at the same time and at the same location. SUVA may be calculated using DOC and UV_{254} data as found in EPA Method 415.3 Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.
- a. Dissolved Organic Carbon (DOC): Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. DOC samples must be filtered through a 0.45 μm pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet the following criteria: $DOC < 0.5$ mg/L.
- b. Ultraviolet Absorption at 254 nm (UV_{254}): Standard Method 5910 B or 5910 B-00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV_{254} samples must be filtered through a 0.45 μm pore-diameter filter. The pH of UV_{254} samples may not be adjusted. Samples

must be analyzed as soon as practical after sampling, not to exceed 48 hours.

5. pH: All methods allowed in 179 NAC 3-005.11A for measuring pH.
6. Magnesium. All methods allowed in 179 NAC 3-005.11A for measuring magnesium.

16-005 MONITORING REQUIREMENTS

16-005.01 General Requirements

1. Systems must take all samples during normal operating conditions.
2. Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with Department approval.
3. Failure to monitor in accordance with the monitoring plan required under 179 NAC 16-005.06 is a monitoring violation.
4. Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.
5. Systems may use only data collected under the provisions of 179 NAC 16 to qualify for reduced monitoring.

16-005.02 Monitoring Requirements for Disinfection Byproducts

1. Total Trihalomethanes (THMs) and HAA5
 - a. Routine Monitoring: Systems must monitor at the frequency indicated in the following table:

ROUTINE MONITORING FREQUENCY FOR TTHM AND HAA5

Type of System	Minimum Monitoring Frequency	Sample Location in the Distribution System
Public water system using surface water or ground water under the direct influence of surface water serving at least 10,000 individuals	Four water samples per quarter per treatment plant	At least 25% of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of individuals served, different sources of water, and different

		treatment methods. ¹
Public water system using surface water or ground water under the direct influence of surface water serving from 500 to 9,999 individuals	One water sample per quarter per treatment plant	Locations representing maximum residence time ¹
Public water system using surface water or ground water under the direct influence of surface water serving fewer than 500 individuals	One sample per year per treatment plant during month of warmest water temperature	Locations representing maximum residence time. ¹ If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in 179 NAC 16-005.02 item 1.d.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 individuals	One water sample per quarter per treatment plant ²	Locations representing maximum residence time ¹
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 individuals	One sample per year per treatment plant ² during month of warmest water temperature	Locations representing maximum residence time. ¹ If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in 179 NAC 16-005.02 item 1.d.

¹ If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

² Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with Department approval.

- b. Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

REDUCED MONITORING FREQUENCY FOR TTHM AND HAA5

If You Are a . . .	You May Reduce Monitoring If You Have Monitored At Least One Year and Your . . .	To This Level
Public water system using surface water or ground water	TTHM annual average \leq 0.040 mg/L and HAA5 annual	One sample per treatment plant per quarter at

under the direct influence of surface water serving at least 10,000 individuals which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L	average ≤ 0.030 mg/L	distribution system location reflecting maximum residence time
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<p>Public water system using surface water or ground water under the direct influence of surface water serving from 500 to 9,999 individuals which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L</p>	<p>One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. NOTE: Any public water system using surface water or ground water under the direct influence of surface water serving fewer than 500 individuals may not reduce its monitoring to less than one sample per treatment plant per year</p>
<p>System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 individuals</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L</p>	<p>One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature</p>
<p>System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 individuals</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L for two consecutive years OR TTHM annual average ≤ 0.020 mg/L and HAA5 annual average ≤ 0.015 mg/L for one year</p>	<p>One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring</p>

- c. Monitoring Requirements for Source Water TOC: In order to qualify for reduced monitoring for TTHMs and HAA5s under 179 NAC 16-005.02 item 1.b., systems using surface water and ground water under the direct influence of surface water not monitoring under 179 NAC 16-005.04 must take monthly TOC samples every 30 days at a location prior to any treatment. In addition to meeting other criteria for reduced monitoring in 179 NAC 16-005.02 item 1.b., the source water TOC running annual average must be ≤ 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHMs and HAA5s. Once qualified for reduced monitoring for TTHMs and HAA5s under 179 NAC 16-005.02 item 1.b., a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

- d. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in 179 NAC 16-005.02 item 1.a. (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHMs and HAA5, respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 individuals, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in 179 NAC 16-005.02 item 1.a. (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5, respectively.
 - e. Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is ≤ 0.060 mg/L and their HAA5 annual average is ≤ 0.045 mg/L.
 - f. The Department may return a system to routine monitoring at the Department's discretion.
2. Chlorite: Community and non-transient non-community water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.
- a. Routine Monitoring
 - (1) Daily Monitoring: Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by 179 NAC 16-005.02 item 2.b., in addition to the sample required at the entrance to the distribution system.
 - (2) Monthly Monitoring: Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under 179 NAC 16-005.02 item 2.b. to meet the requirement for monitoring in this paragraph.

- b. Additional Monitoring: On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).
 - c. Reduced monitoring
 - (1) Chlorite monitoring at the entrance to the distribution system required by 179 NAC 16-005.02 item 2.a.(1) may not be reduced.
 - (2) Chlorite monitoring in the distribution system required by 179 NAC 16-005.02 item 2.a.(2) may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under 179 NAC 16-005.02 item 2.a.(2) has exceeded the chlorite MCL and the system has not been required to conduct monitoring under 179 NAC 16-005.02 item 2.b. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under 179 NAC 16-005.02 item 2.a.(2) exceeds the chlorite MCL or the system is required to conduct monitoring under 179 NAC 16-005.02 item 2.b., at which time the system must revert to routine monitoring.
3. Bromate
- a. Routine Monitoring: Community and non-transient non-community systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.
 - b. Reduced Monitoring:
 - (1) A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is ≤ 0.0025 mg/L based on monthly bromate measurements under 179 NAC 16-005.02 item 3.a. for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0 321.8, 301.0 or 557. If a system has qualified for reduced bromate monitoring under 179 NAC 16-005.02 item 3.b.(1), that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples ≤ 0.0025 mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, 321.8, 301.0 or 557. If the

running annual average bromate concentration is >0.0025 mg/L, the system must resume routine monitoring required by 179 NAC 16-005.02 item 3.a.

16-005.03 Monitoring Requirements for Disinfectant Residuals

1. Chlorine and Chloramines

- a. Routine Monitoring: ~~Until March 31, 2016, Community~~ community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms (routine, repeat, and additional, but not specials) are sampled, as specified in 179 NAC 3-004. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in 179 NAC 26-006 through 26-009. Public water systems using surface water or ground water under the direct influence of surface water may use the results of residual disinfectant concentration sampling conducted under 179 NAC 13-007.02F1 for unfiltered systems or 179 NAC 13-007.03C for systems which filter, in lieu of taking separate samples.
- b. Reduced Monitoring: Monitoring may not be reduced.

2. Chlorine Dioxide

- a. Routine Monitoring: Community, non-transient non-community, and transient non-community water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by 179 NAC 16-005.03 item 2.b. in addition to the sample required at the entrance to the distribution system.
- b. Additional Monitoring: On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take

one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

- c. Reduced Monitoring: Chlorine dioxide monitoring may not be reduced.

16-005.04 Monitoring Requirements for Disinfection Byproduct Precursors (DBPP)

1. Routine Monitoring: Public water systems using surface water or ground water under the direct influence of surface water which use conventional filtration treatment as defined in 179 NAC 13-002 must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.
2. Reduced Monitoring: Public water systems using surface water or ground water under the direct influence of surface water with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC ≥ 2.0 mg/L.

16-005.05 Bromide: Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

16-005.06 Monitoring Plans: Each system required to monitor under 179 NAC 16 must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Department and the general public no later than 30 days following the applicable compliance dates specified in 179 NAC 16-001.01. All public water systems using surface water or ground water under the direct influence of surface water serving more than 3300 people must submit a copy of the monitoring plan to the Department no later than the date of the first report required under 179 NAC 16-007. The Department may also require the plan to be submitted by any other system. After review, the Department may require changes in any plan elements. The plan must include at least the following elements.

1. Specific locations and schedules for collecting samples for any parameters included in 179 NAC 16.
2. How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.
3. If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of 179 NAC 3-010, the sampling plan must reflect the entire distribution system.

16-006 COMPLIANCE REQUIREMENTS

16-006.01 General Requirements

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHMs, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of 179 NAC 16 must be included in determining compliance, even if that number is greater than the minimum required.
3. If, during the first year of monitoring under 179 NAC 16-005, any individual quarter's average will cause the running annual average of that system to exceed the MCL for total trihalomethanes, haloacetic acids (five), or bromate; or the MRDL for chlorine or chloramines, the system is out of compliance at the end of that quarter.

16-006.02 Disinfection Byproducts

1. TTHMs and HAA5
 - a. For systems monitoring quarterly, compliance with MCLs in 179 NAC 2-002.04E must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by 179 NAC 16-005.02 item 1. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007. If a PWS fails to complete four consecutive quarters' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

- b. For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of 179 NAC 16-005.02 item 1 does not exceed the MCLs in 179 NAC 2-002.04E. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and such system is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.
 - c. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public, pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.
 - d. If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.
2. Bromate: Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by 179 NAC 16-005.02 item 3. If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007. If a PWS fails to complete 12 consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.
 3. Chlorite: Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by 179 NAC 16-005.02 item 2.a.(2) and 16-005.02 item 2.b. If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-006.03 Disinfectant Residuals

1. Chlorine and Chloramines
 - a. Compliance (with the MRDL) must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under 179 NAC 16-005.03 item 1. If

the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

- b. In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance (with the MRDL) must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to 179 NAC 16-007 must clearly indicate which residual disinfectant was analyzed for each sample.
- c. Compliance with the minimum detectable residual is based on the requirements of Attachment 2 to 179 NAC 16.

2. Chlorine Dioxide

- a. Acute Violations: Compliance must be based on consecutive daily samples collected by the system under 179 NAC 16-005.03 item 2. If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007.
- b. Nonacute Violations: Compliance must be based on consecutive daily samples collected by the system under 179 NAC 16-005.03 item 2. If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-006.04 Disinfection Byproduct Precursors (DBPP): Compliance must be determined as specified by 179 NAC 16-008.03. Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in 179 NAC 16-008.02B and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to 179 NAC 16-008.02C and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under 179 NAC 16-008.03A item 4 is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-007 REPORTING AND RECORDKEEPING REQUIREMENTS

16-007.01 Systems required to sample quarterly or more frequently must report to the Department within 10 days after the end of each monitoring period in which samples were collected. Systems required to sample less frequently than quarterly must report to the Department within 10 days after the end of each monitoring period in which samples were collected.

16-007.02 Disinfection Byproducts: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 on a quarterly or more frequent basis.	(1) The number of samples taken during the last quarter. (2) The location, date, and result of each sample taken during the last quarter. (3) The arithmetic average of all samples taken in the last quarter. (4) The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters. (5) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 less frequently than quarterly (but at least annually).	(1) The number of samples taken during the last year. (2) The location, date, and result of each sample taken during the last monitoring period. (3) The arithmetic average of all samples taken over the last year. (4) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 less frequently than annually.	(1) The location, date, and result of each sample taken. (2) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.

System monitoring for chlorite under the requirements of 179 NAC 16-005.02.	(1) The number of entry point samples taken each month for the last 3 months. (2) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. (3) For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the distribution system. (4) Whether, based on 179 NAC 16-006.02 item 3, the MCL was violated, in which month, and how many times it was violated each month.
System monitoring for bromate under the requirements of 179 NAC 16-005.02.	(1) The number of samples taken during the last quarter. (2) The location, date, and result of each sample taken during the last quarter. (3) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. (4) Whether, based on 179 NAC 16-006.02 item 2, the MCL was violated.

¹ The Department may choose to perform calculations and determine whether the MCL was exceeded, in lieu of having the system report that information.

16-007.03 Disinfectants: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
System monitoring for chlorine or chloramines under the requirements of 179 NAC 16-005.03.	(1) The number of samples taken during each month of the last quarter. (2) The monthly arithmetic average of all samples taken in each month for the last 12 months. (3) The arithmetic average of all monthly averages for the last 12 months. (4) Whether, based on 179 NAC 16-006.03 item 1, the MRDL was violated.
System monitoring for chlorine dioxide under the requirements of 179 NAC 16-005.03.	(1) The dates, results, and locations of samples taken during the last quarter. (2) Whether, based on 179 NAC 16-006.03 item 2, the MRDL was violated. (3) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

¹ The Department may choose to perform calculations and determine whether the MRDL was exceeded, in lieu of having the system report that information.

16-007.04 Disinfection Byproduct Precursors and Enhanced Coagulation or Enhanced Softening: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
<p>System monitoring monthly or quarterly for TOC under the requirements of 179 NAC 16-005.04 and required to meet the enhanced coagulation or enhanced softening requirements in 179 NAC 16-008.02B or 16-008.02C.</p>	<p>(1) The number of paired (source water and treated water) samples taken during the last quarter. (2) The location, date, and results of each paired sample and associated alkalinity taken during the last quarter. (3) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. (4) Calculations for determining compliance with the TOC percent removal requirements, as provided in 179 NAC 16-008.03A. (5) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in 179 NAC 16-008.02 for the last four quarters.</p>
<p>System monitoring monthly or quarterly for TOC under the requirements of 179 NAC 16-005.04 and meeting one or more of the alternative compliance criteria in 179 NAC 16-008.01B or 16-008.01C.</p>	<p>(1) The alternative compliance criterion that the system is using. (2) The number of paired samples taken during the last quarter. (3) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. (4) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in 179 NAC 16-008.01B, item 1 or 3, or of treated water TOC for systems meeting the criterion in 179 NAC 16-008.01B, item 2. (5) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in 179 NAC 16-008.01B, item 5, or of treated water SUVA for systems meeting the criterion in 179 NAC 16-008.01B, item 6. (6) The running annual average of source water alkalinity for systems meeting the criterion in 179 NAC 16-008.01B, item 3 and of treated water alkalinity for systems meeting the criterion in 179 NAC 16-008.01B, item 1. (7) The running annual average for both TTHMs and HAA5 for systems meeting the criterion in 179 NAC 16-008.01B, item 3 or 4. (8) The running annual average of the amount of magnesium hardness removal (as CaCO₃, in mg/L) for systems meeting the criterion in 179 NAC 16-008.01B, item 2.</p>

	(9) Whether the system is in compliance with the particular alternative compliance criterion in 179 NAC 16-008.01B or 16-008.01C.
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¹The Department may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

16-008 TREATMENT TECHNIQUE FOR CONTROL OF DISINFECTION BYPRODUCT (DBP) PRECURSORS

16-008.01 Applicability

16-008.01A Public water systems using surface water or ground water under the direct influence of surface water using conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in 179 NAC 16-008.02 unless the system meets at least one of the alternative compliance criteria listed in 179 NAC 16-008.01B or 16-008.01C.

16.008.01B Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems: Public water systems using surface water or ground water under the direct influence of surface water using conventional filtration treatment may use the alternative compliance criteria in 179 NAC 16-008.01B items 1 through 6 to comply with this section in lieu of complying with 179 NAC 16-008.02. Systems must still comply with monitoring requirements in 179 NAC 16-005.04.

1. The system's source water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 2.0 mg/L, calculated quarterly as a running annual average.
2. The system's treated water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 2.0 mg/L, calculated quarterly as a running annual average.
3. The system's source water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to 179 NAC 16-004.04 item 1, is greater than 60 mg/L (as CaCO₃), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in 179 NAC 16-001.01, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in 179 NAC 16-001.01 to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Department for approval not later than

the effective date for compliance in 179 NAC 16-001.01. These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of these regulations.

4. The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.
5. The system's source water SUVA, prior to any treatment and measured monthly according to 179 NAC 16-004.04 item 4 is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
6. The system's finished water SUVA, measured monthly according to 179 NAC 16-004.04 item 4 is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

16.008.01C Additional Alternative Compliance Criteria for Softening Systems:
Systems practicing enhanced softening that cannot achieve the TOC removals required by 179 NAC 16-008.02B may use the alternative compliance criteria in 179 NAC 16-008.01C items 1 and 2 in lieu of complying with 179 NAC 16-008.02. Systems must still comply with the monitoring requirements in 179 NAC 16-005.04.

1. Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO₃), measured monthly according to 179 NAC 16-004.04 item 1 and calculated quarterly as a running annual average.
2. Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO₃), measured monthly according to 179 NAC 16-004.04 item 6 and calculated quarterly as an annual running average.

16-008.02 Enhanced Coagulation and Enhanced Softening Performance Requirements

16-008.02A Systems must achieve the percent reduction of TOC specified in 179 NAC 16-008.02B between the source water and the combined filter effluent, unless the Department approves a system's request for alternate minimum TOC removal (Step 2) requirements under 179 NAC 16-008.02C.

16-008.02B Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with 179 NAC 16-004.04. Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

STEP 1 REQUIRED REMOVAL OF TOC BY ENHANCED COAGULATION AND ENHANCED SOFTENING FOR PUBLIC WATER SYSTEMS USING SURFACE WATER OR GROUND WATER UNDER THE DIRECT INFLUENCE OF SURFACE WATER USING CONVENTIONAL TREATMENT^{1,2}

Source-Water TOC, Mg/L	Source-Water Alkalinity, Mg/L as CaCO ₃ (in Percentages)		
	0-60	>60-120	>120 ³
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

¹ Systems meeting at least one of the conditions in 179 NAC 16-008.01B, items 1 to 6, are not required to operate with enhanced coagulation.

² Softening systems meeting one of the alternative compliance criteria in 179 NAC 16-008.01C are not required to operate with enhanced softening.

³ Systems practicing softening must meet the TOC removal requirements in this column.

16-008.02C Public water systems using surface water or ground water under the direct influence of surface water as a source and having conventional treatment systems that cannot achieve the Step 1 TOC removals required by 179 NAC 16-008.02B due to water quality parameters or operational constraints must apply to the Department, within three months of failure to achieve the TOC removals required by 179 NAC 16-008.02B, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in 179 NAC 16-008.02B.

16-008.02D Alternate Minimum TOC Removal (Step 2) Requirements: Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under 179 NAC 16-008.02C must include, at a minimum, results of bench- or pilot-scale testing conducted under 179 NAC 16-008.02D1. The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

16-008.02D1 Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in 179 NAC 16-008.02D1 through 16-008.02D5 such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤ 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Department, this minimum requirement supersedes the minimum TOC removal required by the table in 179 NAC 16-008.02B. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench- and

pilot-scale test. Failure to achieve Department-set alternative minimum TOC removal levels is a violation of these regulations.

16-008.02D2 Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

ENHANCED COAGULATION STEP 2 TARGET pH

Alkalinity (mg/L as CaCO₃)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

16-008.02D3 For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.

16-008.02D4 The system may operate at any coagulant dose or pH necessary to achieve the minimum TOC percent removal approved under 179 NAC 16-008.02C.

16-008.02D5 If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the Department for a waiver of enhanced coagulation requirements.

16-008.03 Compliance Calculations

16-008.03A Public water systems using surface water or ground water under the direct influence of surface water other than those identified in 179 NAC 16-008.01B or 16-008.01C must comply with requirements contained in 179 NAC 16-008.02B or 16-008.02C. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

1. Determine actual monthly TOC percent removal, equal to:
 $[1 - (\text{treated water TOC}/\text{source water TOC})] \times 100$.
2. Determine the required monthly TOC percent removal (from either the table in 179 NAC 16-008.02B or from 179 NAC 16-008.02C).

3. Divide the value in 179 NAC 16-008.03A item 1 by the value in by 179 NAC 16-008.03A item 2.
4. Add together the results of 179 NAC 16-008.03A item 3 for the last 12 months and divide by 12.
5. If the value calculated in 179 NAC 16-008.03A, item 4 is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

16-008.03B Systems may use the provisions in 179 NAC 16-008.03B items 1 through 5 in lieu of the calculations in 179 NAC 16-008.03A items 1 through 5 to determine compliance with TOC percent removal requirements.

1. In any month that the system's treated or source water TOC level, measured according to 179 NAC 16-004.04 item 3 is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
2. In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
3. In any month that the system's source water SUVA, prior to any treatment and measured according to 179 NAC 16-004.04 item 4 is ≤ 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
4. In any month that the system's finished water SUVA, measured according to 179 NAC 16-004.04 item 4 is ≤ 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
5. In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.

16-008.03C Public water systems using surface water or ground water under the direct influence of surface water using conventional treatment may also comply with the requirements of this section by meeting the criteria in 179 NAC 16-008.01B or 16-008.01C.

16-008.04 Treatment Technique Requirements for DBP Precursors: The Department identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For public water systems using surface water or ground water under the direct influence of surface water using conventional treatment, enhanced coagulation or enhanced softening.

179 NAC 16 Attachment 1

**I. TIME REQUIREMENTS TO DETERMINE NEED FOR TESTING UNDER
DISINFECTANT/DISINFECTION BYPRODUCTS RULE**

- A. Time Periods – Public water systems using only groundwater sources that use chlorine, chloramines, chlorine dioxide, or ozone as any part of the treatment or system maintenance process are required to test for disinfection byproducts (DBPs) under the requirements of the Disinfectants/Disinfection Byproducts Rule unless levels of Total Organic Carbon (TOC) for all sources are ≤ 2 mg/L and the use of chlorine or chloramines is limited to usage for a period not longer than 30 consecutive days; or 45 total cumulative days for each calendar year.
- B. Groundwater systems using chlorination for maintenance purposes as defined in I.A. above, or in response to a specific event in the distribution system are exempt from the disinfectant residual requirements set in Attachment 2 to 179 NAC 16.
- C. Reporting – Public water systems using only groundwater that are adding chlorine or chloramines for maintenance purposes, or in response to a specific event in the distribution system, must submit a report for each month in which chlorine or chloramines are used. The report must contain the daily total flows, source of chlorine, percent of available chlorine, the pounds or gallons of solution added for each day, and an explanation of why the chemical was used. The report must be submitted within 10 days of the end of the month in which chlorine or chloramines were used.
- D. Day of Disinfection Definition – Any portion of a 24 hour period, from 12:00 a.m. to 11:59 p.m., that chlorine or chloramines are added to the system's water is considered a day of disinfection. The total number of days of disinfection will be determined from the time the maintenance practice begins until the practice has ceased.
- E. Regardless of the duration for which chlorine or chloramines are used, the Maximum Residual Disinfectant Level must not exceed 4.0 mg/L except as allowed in 179 NAC 16-003.05.

179 NAC 16 Attachment 2

Minimum Detectable Residuals

- A. The following requirements establish the minimum allowable disinfectant residuals for each type of system.
1. For systems that are utilizing surface water sources, or sources determined to be groundwater under the direct influence of surface water, one of the following options must be implemented to meet the minimum residual requirements.
 - a. 0.2 ppm residual for free chlorine or 0.5 ppm for total chlorine or
 - b. 0.1 ppm residual for free chlorine or 0.25 ppm for total chlorine provided the requirements in Section C items 1-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
 2. All groundwater systems serving water to the public that contains chlorine or chloramines as a chemical disinfectant or oxidant on a continuous basis must use one of the following criteria for minimum residuals.
 - a. 0.1 ppm residual for free chlorine or
 - b. 0.05 ppm for free chlorine if qualifying criteria in section C items 3-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
- B. If a system is required to disinfect under an Administrative Order (AO), the requirements listed in the AO will supersede any requirements for minimum residuals established in this attachment.
- C. In order for a system to maintain the lower minimum residual requirement for free or total chlorine (referred to in A, items 1.b. and 2.b.), the following criteria must be met:
1. Any public water system using surface water or ground water under the direct influence of surface water must meet or exceed all CT inactivation requirements in 179 NAC 13., Tables 13.1 to 13.8 at all times through the treatment process in order to utilize the lower requirements of A, item 1.b.
 2. Any public water system using surface water, or ground water determined to be under the direct influence of surface water, must maintain effluent turbidity levels of less than or equal to 0.3 NTU in 95% of all readings, and at no time exceed 1 NTU. A system may submit a study to the Department showing that turbidity values in excess of the specified turbidity limits are a direct result of the treatment process and do not represent a threat to public health. The Department will review the study to determine the nature of the high turbidity levels and if they pose a threat to public health.
 3. The system must demonstrate that the field test method being used can consistently, reliably, and precisely measure residuals less than or equal to the specified limit being used.

4. The system must document that the manufacturer's recommendations for calibration or standardization are being done according to manufacturer's specifications and frequency, and make this information available for review during sanitary surveys.
 5. The system must demonstrate that there is no interference with the testing method, or document that interference has been corrected for. This can be done by any one of the following methods:
 - a. Demonstration through historical source water data (a minimum of 12 months of data, or at least four quarterly samples for non-transient non-community systems) that no interference listed under the manufacturer's instructions is present in the system.
 - b. Sampling for applicable interferences once each day that a residual disinfectant compliance sample(s) is taken to obtain a correction factor to be added to all residual compliance samples taken that day.
 - c. Using an EPA approved method that provides a correction for interference as part of the procedure, and documenting all corrections.
 - d. Adjusting all results based on stable historical data and adding the maximum interference obtained, with the Department's approval.
- D. Disinfectant residuals must be at or above the required minimum residual limits in at least 95% of all distribution residuals taken for the month. If the system fails to meet the 95% requirement for two consecutive months, or for $\geq 50\%$ of the previous 12 consecutive months, the system will be deemed to be in violation of prescribed treatment techniques and will be issued a Treatment Technique violation.

179 NAC 16 ATTACHMENT 3

Sampling Training For Individuals Other Than Licensed Operators

PWS System or Community Name: _____

Name of individual taking samples: _____

Parameter(s) sampled routinely by the above individual:

Trainer and Title: _____

Training material used: _____

Handouts given to the above individual:

I certify that on _____ I personally provided the necessary sampling
(Date)

training to assure quality data and approve the above individual as qualified to perform the
above sampling tasks.

X _____
(Signature of Trainer) (License Number)

I certify that I did receive said training and I understand how to properly sample the above
parameters.

X _____
(Signature of Approved Sampling Individual)

When the above-named trained individual no longer takes the samples the individual has been
trained to take, I will inform the Nebraska Department of Health and Human Services Division of
Public Health, Field Services Program Manager at (402) 471-0521 within seven days.
Acknowledged by System Owner or Operator in Charge:

X _____ Date: _____
(Signature)

(Keep a copy for your records and submit original within seven days to DHHS, Division of Public Health,
Public Water Program at P. O. Box 95026, Lincoln, NE 68509-5026)

TITLE 179 PUBLIC WATER SYSTEMS
CHAPTER 16 DISINFECTANTS AND DISINFECTION BYPRODUCTS

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TITLE 179 PUBLIC WATER SUPPLY SYSTEMS

CHAPTER 16 DISINFECTANTS AND DISINFECTION BYPRODUCTS

16-001 SCOPE AND AUTHORITY: This chapter applies to all community and non-transient, non-community water systems that add a chemical disinfectant to the water in any part of the drinking water treatment process, except for those systems that meet the time limitations for maintenance chlorination as defined in Attachment 1 which is hereby incorporated into these regulations. It also applies to transient non-community water systems that use chlorine dioxide as a disinfectant or oxidant. The authority is found in Neb. Rev. Stat. §§71-5301 to 71-5313.

16-001.01 Compliance Dates

1. Community Water Systems (CWSs) and Non-Transient Non-Community Water Systems (NTNCWSs): Unless otherwise noted, systems must comply with the requirements of this chapter as follows. Public water systems using surface water or ground water under the direct influence of surface water serving 10,000 or more individuals must comply with this chapter beginning January 1, 2002. Public water systems using surface water or ground water under the direct influence of surface water serving fewer than 10,000 individuals and systems using only ground water not under the direct influence of surface water must comply with this chapter beginning January 1, 2004.
2. Transient Non-Community Water Systems (NCWSs): Public water systems using surface water or ground water under the direct influence of surface water serving 10,000 or more individuals and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this chapter beginning January 1, 2002. Public water systems using surface water or ground water under the direct influence of surface water serving fewer than 10,000 individuals and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this chapter beginning January 1, 2004.

16-002 DEFINITIONS

Enhanced coagulation means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

Enhanced softening means the improved removal of disinfection byproduct precursors by precipitative softening.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with Title 179 NAC 24 MCLs (~~upon its effective date~~) under 179 NAC 2-002.04E2a(1) is 120 days.

Haloacetic acids (five) (HAA5) means the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Maximum residual disinfectant level (MRDL) means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a public water system (PWS) is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in 179 NAC 2-002.04F1, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Maximum residual disinfectant level goal (MRDLG) means the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are nonenforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

SUVA means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV_{254}) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

Total organic carbon (TOC) means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

16-003 GENERAL REQUIREMENTS

16-003.01 The regulations in 179 NAC 16 establish criteria under which community water systems (CWSs) and non-transient, non-community water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet maximum contaminant levels (MCLs) and MRDLs in 179 NAC 2-002.04E and 2-002.04F, and must meet the treatment technique requirements for disinfection byproduct precursors in 179 NAC 16-008.

16-003.02 The regulations in 179 NAC 16 establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in 179 NAC 2-002.04F1.

16-003.03 The Department has established MCLs for Total Trihalomethanes (TTHMs) and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.

16-003.04 Each CWS and NTNCWS must be operated by a licensed water operator who meets the requirements specified by the Department for the level of licensure required in 179 NAC 10 and is included in a Department list of licensed operators.

16-003.05 Control of Disinfectant Residuals: Notwithstanding the MRDLs in 179 NAC 2-002.04F, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

16-004 ANALYTICAL REQUIREMENTS

16-004.01 General

16-004.01A ~~—40 CFR 141.131(a)(1) through (b)(1) is hereby incorporated by references. It can be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf> Systems must use only the analytical method(s) specified in 179 NAC 16-004, or their equivalent as approved by the United States Environmental Protection Agency (EPA) to demonstrate compliance with the requirements of 179 NAC 16, 179 NAC 23, and 179 NAC 24 (upon their effective dates).~~

~~————— 16-004.01B The following documents are incorporated herein by reference: They are available for viewing at the Division of Public Health of the Department of Health and Human Services, 301 Centennial Mall South, Lincoln, NE 68509.~~

- ~~1. EPA Method 552.1 is in *Methods for the Determination of Organic Compounds in Drinking Water Supplement II*, USEPA, August 1992, EPA/600/R-92/129 [available through National Information Technical Service (NTIS), PB92-207703], 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~2. EPA Methods 502.2, 524.2, 551.1, and 552.2 are in the *Methods for the Determination of Organic Compounds in Drinking Water Supplement III*, USEPA, August 1995, EPA/600/R-95/131 (available through NTIS, PB95-261616), 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~3. EPA Method 300.0 is in *Methods for the Determination of Inorganic Substances in Environmental Samples*, USEPA, August 1993, EPA/600/R-93/100 (available through NTIS, PB94-121811), 5285 Port Royal Road, Springfield, VA 22161, (1-800-553-6847);~~
- ~~4. EPA Methods 300.1 and 321.8 are in *Methods for the Determination of Organic and Inorganic Compounds in Drinking Water Volume 1*, USEPA, August 2000, EPA 815-R-00-014 (available through NTIS, PB2000-106981, 5285 Port Royal Road, Springfield, VA 22151 (1-800-553-6847);~~
- ~~5. EPA Method 317.0, Revision 2.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis," USEPA, July 2001, EPA 815-B-01-001;~~
- ~~6. EPA Method 326.0, Revision 1.0, "Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis," USEPA, June 2002, EPA 815-R-03-007;~~
- ~~7. EPA Method 327.0, Revision 1.1, "Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry," USEPA, May 2005, EPA 815-R-05-008;~~
- ~~8. EPA Method 552.3, Revision 1.0, "Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection," USEPA, July 2003, EPA-815-B-03-002 can be accessed and downloaded directly on-line at <http://www.epa.gov/safewater/methods/sourcalt.html>;~~
- ~~9. EPA Method 415.3, Revision 1.1, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," USEPA, February 2005, EPA/600-R-05/055 can be accessed and downloaded directly on-line at www.epa.gov/norlcwww/ordmeth.htm;~~
- ~~10. Standard Methods 4500-Cl D, 4500-Cl E, 4500-Cl F, 4500-Cl G, 4500-Cl H, 4500-Cl I, 4500-ClO₂D, 4500-ClO₂E, 6251 B, and 5910 B must be~~

~~followed in accordance with *Standard Methods for the Examination of Water and Wastewater, 19th or 20th Edition*, American Public Health Association, 1995 and 1998 respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005;~~

~~11. Standard Methods 5310 B, 5310 C, and 5310 D must be followed in accordance with the *Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater*, or the *Standard Methods for the Examination of Water and Wastewater, 20th Edition*, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW, Washington, DC 20005;~~

~~12. Standard Methods 4500-Cl D-00, 4500-Cl E-00, 4500-Cl F-00, 4500-Cl G-00, 4500-Cl H-00, 4500-Cl I-00, 4500-ClO₂-E-00, 6251B-94, 5310 B-00, 5310 C-00, 5310 D-00 and 5910 B-00 are available at <http://www.standardmethods.org> or at EPA's Water Docket. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that are IBR-approved;~~

~~13. ASTM Methods D 1253-86 and D 1253-86 (Reapproved 1996) must be followed in accordance with the *Annual Book of ASTM Standards, Volume 11.01*, American Society for Testing and Materials International, 1996 or any ASTM edition containing the IBR (Institute for Basic Research)-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428;~~

~~14. ASTM Method D 1253-03 must be followed in accordance with the *Annual Book of ASTM Standards, Volume 11.01*, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428; and~~

~~15. ASTM Method D 6581-00 must be followed in accordance with the *Annual Book of ASTM Standards Volume 11.01*, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used. Copies may be obtained from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959;~~

~~16-004.02 Disinfection Byproducts~~

~~16-004.02A Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in the following table or an equivalent approved by EPA:~~

**APPROVED METHODS FOR DISINFECTION BYPRODUCT COMPLIANCE
MONITORING**

Contaminant and methodology ⁴	EPA method	Standard method ²	SM-online ⁹	ASTM method ³
TTHM				
-P&T/GC/EICD & PID	502.2 ⁴			
-P&T/GC/MS	524.2, 524.3 ⁹			
-LLE/GC/ECD	551.4			
HAA5				
-LLE (diazomethane)/GC/ECD		6251 B ^{5,10}	6251 B-94	
-SPE (acidic methanol)/GC/ECD	552.1 ⁵			
-LLE (acidic methanol)/GC/ECD	552.2, 552.3			
-Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹¹			
Bromate				
-Ion chromatography	300.4			
-Ion chromatography & post column reaction	317.0 Rev. 2.0 ⁶ , 326.0 ⁶			
-IC/ICP-MS	321.8 ^{6,7}			
-Two-Dimensional Ion Chromatography (IC)	302.0 ¹²			D 6581-00
-Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)	557 ¹³			
-Chemically Suppressed Ion Chromatography				D 6581-08 A
-Electrolytically Suppressed Ion Chromatography				D 6581-08 B
Chlorite				
-Amperometric titration	327.0 Rev. 1.1 ⁸	4500-ClO ₂ E ^{8,10}	4500-ClO ₂ E-00 ⁸	
-Spectrophotometry	300.0, 300.1, 317.0			D 6581-00
-Ion chromatography	Rev. 2.0, 326.0			
-Chemically Suppressed Ion Chromatography				D 6581-08 A
Electrolytically Suppressed Ion Chromatography				D 6581-08 B

⁴ P&T = purge and trap; GC = gas chromatography; EICD = electrolytic conductivity detector; PID = photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extraction ; IC = ion chromatography; ICP-MS = inductively coupled plasma/mass spectrometer.

² 19th and 20th editions of *Standard Methods for the Examination of Water and Wastewater*, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

³ *Annual Book of ASTM Standards*, 2001 or any year containing the cited version of the method, Vol. 11.01

~~⁴If TTHMs are the only analytes being measured in the sample, then a PID is not required.~~

~~⁵The samples must be extracted within 14 days of sample collection.~~

~~⁶Ion chromatography and post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in 179 NAC 16-005.02 item 3.b.~~

~~⁷Samples must be preserved at the time of sampling with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.~~

~~⁸Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in 179 NAC 16-005.02 item 2.a.(1). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in 179 NAC 16-005.02 items 2.a.(2) and 2.b.~~

~~⁹The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at <http://www.standardmethods.org>.~~

~~¹⁰Standard Methods for the Examination of Water and Wastewater, 21st edition (2005). Available from American Public Health Association, 800 I Street, NW, Washington, DC 20001-3710.~~

~~¹¹EPA Method 557. "Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC-ESI-MS/MS)," September 2009. EPA 815-B-09-012. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

~~¹²EPA Method 302.0. "Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection," September 2009. EPA 815-B-09-014. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

16-004.02B Analysis under 179 NAC 16 for disinfection byproducts must be conducted by the Department Public Health Environmental Laboratory (certified by EPA) or a laboratory that has entered into an agreement with the Department Laboratory except as specified under 179 NAC 20. To receive certification to conduct analyses for the DBP contaminants in 179 NAC 2-002.04E, 179 NAC 16-008, 179 NAC 23 (~~upon its effective date~~) and 179 NAC 24 (~~upon its effective date~~), the laboratory must:

1. Analyze performance evaluation (PE) samples that are acceptable to the Department at least once during each consecutive 12 month period by each method for which the laboratory desires certification.
2. The laboratory must achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

<u>Disinfection Byproduct</u>	<u>Acceptance limits (percent of true value)</u>	<u>Comments</u>
TTHM Chloroform	<u>+20</u>	Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHMs
Bromodichloromethane	<u>+20</u>	
Dibromochloromethane	<u>+20</u>	
Bromoform	<u>+20</u>	
HAA5 Monochloroacetic Acid	<u>+40</u>	Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5
Dichloroacetic Acid	<u>+40</u>	
Trichloroacetic Acid	<u>+40</u>	
Monobromoacetic Acid	<u>+40</u>	
Dibromoacetic Acid	<u>+40</u>	
Chlorite	<u>+30</u>	
Bromate	<u>+30</u>	

3. Report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with 179 NAC 2-002.04E, 179 NAC 16-008, and 179 NAC 23 (upon its effective date) and 179 NAC 24 (upon its effective date).

Disinfection Byproduct	Minimum reporting level (mg/L) ¹	Comments
TTHM ² Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5 ² Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	
Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Chlorite	0.020	Applicable to monitoring as prescribed in 179 NAC 16-005.02 items 2.a(2) and 2.b.
Bromate	0.0050 or 0.0010	Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 0.0010 mg/L MRL for bromate.

¹ The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory.

The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be $\pm 50\%$ of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

² When adding the individual trihalomethane or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that DBP, unless otherwise specified by the Department.

16-004.02C A Grade I, II, III, or IV licensed water operator or a person who has been trained to take the samples must measure daily chlorite samples at the entrance to the distribution system. If a licensed operator does not take the sample, Attachment 3, which is incorporated herein by reference must be completed and sent to the Department.

16-004.03 Disinfectant Residuals

16-004.03A Systems must measure residual disinfectant concentrations for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table 40 CFR 141.131(c) which is incorporated herein by reference and may be found online at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf> or an equivalent method approved by EPA:

APPROVED METHODS FOR DISINFECTANT RESIDUAL COMPLIANCE MONITORING

Methodology	SM (19 th , 20 th or 21 st ed)	SM-Online ₂	ASTM Method	EPA method	Residual Measured ¹			
					Free Cl ₂	Comb ined Cl ₂	Total Cl ₂	ClO ₂
Amperometric Titration	4500-Cl-D	4500-Cl-D-00	D 1253-86, (96), 03; D 1253-08		X	X	X	
Low Level Amperometric Titration	4500-Cl-E	4500-Cl-E-00					X	
DPD Ferrous Titrimetric	4500-Cl-F	4500-Cl-F-00			X	X	X	
DPD Colorimetric	4500-Cl-G	4500-Cl-G-00			X	X	X	
On-line Chlorine Analyzer				334.0 ³	X		X	
Amperometric Sensor ⁴					X		X	
Syringaldazine (FACTS)	4500-Cl-H	4500-Cl-H-00			X			
Iodometric Electrode	4500-Cl-I	4500-Cl-I-00					X	
DPD	4500-ClO ₂ -D							X
Amperometric Method II	4500-ClO ₂ -E	4500-ClO ₂ -E-00						X
Lissamine Green Spectrophotometric				327.0 Rev 1.1				X

~~⁴X indicates method is approved for measuring specified disinfectant residual. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.~~

~~²The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Methods Committee. Standard Methods Online are available at <http://www.standardmethods.org>.~~

~~³EPA Method 334.0. "Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer," September 2009. EPA 815-B-09-013. Available at http://epa.gov/safewater/methods/analyticalmethods_ogwdw.html.~~

~~⁴ChloroSense. "Measurement of Free and Total Chlorine in Drinking Water by Palintest ChloroSense," August 2009. Available at <http://www.nemi.gov> or from Palintest Ltd, 21 Kenton Lands Road, PO Box 18395, Erlanger, KY 41018.~~

16-004.03B If approved by the Department, systems may also measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide by using DPD colorimetric test kits.

16-004.03C A Nebraska licensed Grade I, II, III, or IV operator or a person who has been trained to take the samples must measure residual disinfectant concentration. If the sample is not taken by a licensed operator, Attachment 3 to 179 NAC 16 must be completed and sent to the Department.

16-004.04 Additional Analytical Methods: Systems required to analyze parameters not included in 179 NAC 16-004.02 and 16-004.03 must use the following methods or an equivalent method approved by EPA. The Department Laboratory (certified by EPA) or a laboratory that has entered into an agreement with the Department Laboratory must analyze for the following parameters, except that pH may be analyzed by the Department Laboratory, or a laboratory that has entered into an agreement with the Department Laboratory, or on-site by a Nebraska licensed Grade I, II, III, or IV operator or a person who has been trained on how to take the samples. If the sample is not taken by a licensed operator, Attachment 3 must be completed and sent to the Department. Additional analytical methods are found in 40 CFR 141.131(d)(1) through (d)(6) which is hereby incorporated by reference. The parameters and methods can be found at <http://www.gpo.gov/fdsys/pkg/CFR-2013-title40-vol24/pdf/CFR-2013-title40-vol24-sec141-131.pdf>

1. Alkalinity: All methods allowed in 179 NAC 3-005.11A for measuring alkalinity.
2. Bromide: EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0 or ASTM D 6581-00.
3. Total Organic Carbon (TOC): Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample

collection to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within 28 days.

4. Specific Ultraviolet Absorbance (SUVA): SUVA is equal to the UV absorption at 254 nm (UV_{254}) (measured in m^{-1} divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in 179 NAC 16-004.04 item 4.a. to measure DOC and the method stipulated in 179 NAC 16-004.04 item 4.b. to measure UV_{254} . SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} samples used to determine a SUVA value must be taken at the same time and at the same location. SUVA may be calculated using DOC and UV_{254} data as found in EPA Method 415.3 Rev. 1.2, "Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>.
- a. Dissolved Organic Carbon (DOC): Standard Method 5310 B or 5310 B-00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C-00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D-00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. DOC samples must be filtered through a 0.45 μm pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet the following criteria: $DOC < 0.5$ mg/L.
- b. Ultraviolet Absorption at 254 nm (UV_{254}): Standard Method 5910 B or 5910 B-00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1 or Rev. 1.2, Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water," August 2009. EPA/600/R-09/122. Available at <http://www.epa.gov/nerlcwww/ordmeth.htm>. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV_{254} samples must be filtered through a 0.45 μm pore-diameter filter. The pH of UV_{254} samples may not be adjusted. Samples

must be analyzed as soon as practical after sampling, not to exceed 48 hours.

5. pH: All methods allowed in 179 NAC 3-005.11A for measuring pH.
6. Magnesium. All methods allowed in 179 NAC 3-005.11A for measuring magnesium.

16-005 MONITORING REQUIREMENTS

16-005.01 General Requirements

1. Systems must take all samples during normal operating conditions.
2. Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with Department approval.
3. Failure to monitor in accordance with the monitoring plan required under 179 NAC 16-005.06 is a monitoring violation.
4. Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.
5. Systems may use only data collected under the provisions of 179 NAC 16 to qualify for reduced monitoring.

16-005.02 Monitoring Requirements for Disinfection Byproducts

1. Total Trihalomethanes (THMs) and HAA5
 - a. Routine Monitoring: Systems must monitor at the frequency indicated in the following table:

ROUTINE MONITORING FREQUENCY FOR TTHM AND HAA5

Type of System	Minimum Monitoring Frequency	Sample Location in the Distribution System
Public water system using surface water or ground water under the direct influence of surface water serving at least 10,000 individuals	Four water samples per quarter per treatment plant	At least 25% of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of individuals served, different sources of water, and different

		treatment methods. ¹
Public water system using surface water or ground water under the direct influence of surface water serving from 500 to 9,999 individuals	One water sample per quarter per treatment plant	Locations representing maximum residence time ¹
Public water system using surface water or ground water under the direct influence of surface water serving fewer than 500 individuals	One sample per year per treatment plant during month of warmest water temperature	Locations representing maximum residence time. ¹ If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in 179 NAC 16-005.02 item 1.d.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 individuals	One water sample per quarter per treatment plant ²	Locations representing maximum residence time ¹
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 individuals	One sample per year per treatment plant ² during month of warmest water temperature	Locations representing maximum residence time. ¹ If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in 179 NAC 16-005.02 item 1.d.

¹ If a system elects to sample more frequently than the minimum required, at least 25% of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

² Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with Department approval.

- b. Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

REDUCED MONITORING FREQUENCY FOR TTHM AND HAA5

If You Are a . . .	You May Reduce Monitoring If You Have Monitored At Least One Year and Your . . .	To This Level
Public water system using surface water or ground water	TTHM annual average ≤ 0.040 mg/L and HAA5 annual	One sample per treatment plant per quarter at

under the direct influence of surface water serving at least 10,000 individuals which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L	average ≤ 0.030 mg/L	distribution system location reflecting maximum residence time
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<p>Public water system using surface water or ground water under the direct influence of surface water serving from 500 to 9,999 individuals which has a source water annual average TOC level, before any treatment, ≤ 4.0 mg/L</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L</p>	<p>One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. NOTE: Any public water system using surface water or ground water under the direct influence of surface water serving fewer than 500 individuals may not reduce its monitoring to less than one sample per treatment plant per year</p>
<p>System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 individuals</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L</p>	<p>One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature</p>
<p>System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 individuals</p>	<p>TTHM annual average ≤ 0.040 mg/L and HAA5 annual average ≤ 0.030 mg/L for two consecutive years OR TTHM annual average ≤ 0.020 mg/L and HAA5 annual average ≤ 0.015 mg/L for one year</p>	<p>One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring</p>

- c. Monitoring Requirements for Source Water TOC: In order to qualify for reduced monitoring for TTHMs and HAA5s under 179 NAC 16-005.02 item 1.b., systems using surface water and ground water under the direct influence of surface water not monitoring under 179 NAC 16-005.04 must take monthly TOC samples every 30 days at a location prior to any treatment. In addition to meeting other criteria for reduced monitoring in 179 NAC 16-005.02 item 1.b., the source water TOC running annual average must be ≤ 4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHMs and HAA5s. Once qualified for reduced monitoring for TTHMs and HAA5s under 179 NAC 16-005.02 item 1.b., a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

- d. Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in 179 NAC 16-005.02 item 1.a. (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHMs and HAA5, respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 individuals, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in 179 NAC 16-005.02 item 1.a. (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5, respectively.
 - e. Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is ≤ 0.060 mg/L and their HAA5 annual average is ≤ 0.045 mg/L.
 - f. The Department may return a system to routine monitoring at the Department's discretion.
2. Chlorite: Community and non-transient non-community water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.
- a. Routine Monitoring
 - (1) Daily Monitoring: Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by 179 NAC 16-005.02 item 2.b., in addition to the sample required at the entrance to the distribution system.
 - (2) Monthly Monitoring: Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under 179 NAC 16-005.02 item 2.b. to meet the requirement for monitoring in this paragraph.

- b. Additional Monitoring: On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).
 - c. Reduced monitoring
 - (1) Chlorite monitoring at the entrance to the distribution system required by 179 NAC 16-005.02 item 2.a.(1) may not be reduced.
 - (2) Chlorite monitoring in the distribution system required by 179 NAC 16-005.02 item 2.a.(2) may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under 179 NAC 16-005.02 item 2.a.(2) has exceeded the chlorite MCL and the system has not been required to conduct monitoring under 179 NAC 16-005.02 item 2.b. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under 179 NAC 16-005.02 item 2.a.(2) exceeds the chlorite MCL or the system is required to conduct monitoring under 179 NAC 16-005.02 item 2.b., at which time the system must revert to routine monitoring.
3. Bromate
- a. Routine Monitoring: Community and non-transient non-community systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.
 - b. Reduced Monitoring:
 - (1) A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is ≤ 0.0025 mg/L based on monthly bromate measurements under 179 NAC 16-005.02 item 3.a. for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0 321.8, 301.0 or 557. If a system has qualified for reduced bromate monitoring under 179 NAC 16-005.02 item 3.b.(1), that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples ≤ 0.0025 mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, 321.8, 301.0 or 557. If the

running annual average bromate concentration is >0.0025 mg/L, the system must resume routine monitoring required by 179 NAC 16-005.02 item 3.a.

16-005.03 Monitoring Requirements for Disinfectant Residuals

1. Chlorine and Chloramines

- a. Routine Monitoring: ~~Until March 31, 2016, Community~~ community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms (routine, repeat, and additional, but not specials) are sampled, as specified in 179 NAC 3-004. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in 179 NAC 26-006 through 26-009. Public water systems using surface water or ground water under the direct influence of surface water may use the results of residual disinfectant concentration sampling conducted under 179 NAC 13-007.02F1 for unfiltered systems or 179 NAC 13-007.03C for systems which filter, in lieu of taking separate samples.
- b. Reduced Monitoring: Monitoring may not be reduced.

2. Chlorine Dioxide

- a. Routine Monitoring: Community, non-transient non-community, and transient non-community water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by 179 NAC 16-005.03 item 2.b. in addition to the sample required at the entrance to the distribution system.
- b. Additional Monitoring: On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (i.e., no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (i.e., booster chlorination), the system must take

one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

- c. Reduced Monitoring: Chlorine dioxide monitoring may not be reduced.

16-005.04 Monitoring Requirements for Disinfection Byproduct Precursors (DBPP)

1. Routine Monitoring: Public water systems using surface water or ground water under the direct influence of surface water which use conventional filtration treatment as defined in 179 NAC 13-002 must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.
2. Reduced Monitoring: Public water systems using surface water or ground water under the direct influence of surface water with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC ≥ 2.0 mg/L.

16-005.05 Bromide: Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

16-005.06 Monitoring Plans: Each system required to monitor under 179 NAC 16 must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the Department and the general public no later than 30 days following the applicable compliance dates specified in 179 NAC 16-001.01. All public water systems using surface water or ground water under the direct influence of surface water serving more than 3300 people must submit a copy of the monitoring plan to the Department no later than the date of the first report required under 179 NAC 16-007. The Department may also require the plan to be submitted by any other system. After review, the Department may require changes in any plan elements. The plan must include at least the following elements.

1. Specific locations and schedules for collecting samples for any parameters included in 179 NAC 16.
2. How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.
3. If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of 179 NAC 3-010, the sampling plan must reflect the entire distribution system.

16-006 COMPLIANCE REQUIREMENTS

16-006.01 General Requirements

1. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHMs, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.
2. All samples taken and analyzed under the provisions of 179 NAC 16 must be included in determining compliance, even if that number is greater than the minimum required.
3. If, during the first year of monitoring under 179 NAC 16-005, any individual quarter's average will cause the running annual average of that system to exceed the MCL for total trihalomethanes, haloacetic acids (five), or bromate; or the MRDL for chlorine or chloramines, the system is out of compliance at the end of that quarter.

16-006.02 Disinfection Byproducts

1. TTHMs and HAA5
 - a. For systems monitoring quarterly, compliance with MCLs in 179 NAC 2-002.04E must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by 179 NAC 16-005.02 item 1. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007. If a PWS fails to complete four consecutive quarters' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

- b. For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of 179 NAC 16-005.02 item 1 does not exceed the MCLs in 179 NAC 2-002.04E. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and such system is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.
 - c. If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public, pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.
 - d. If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.
2. Bromate: Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average of all samples taken during the month) collected by the system as prescribed by 179 NAC 16-005.02 item 3. If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007. If a PWS fails to complete 12 consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.
 3. Chlorite: Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by 179 NAC 16-005.02 item 2.a.(2) and 16-005.02 item 2.b. If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-006.03 Disinfectant Residuals

1. Chlorine and Chloramines
 - a. Compliance (with the MRDL) must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under 179 NAC 16-005.03 item 1. If

the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

- b. In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance (with the MRDL) must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to 179 NAC 16-007 must clearly indicate which residual disinfectant was analyzed for each sample.
- c. Compliance with the minimum detectable residual is based on the requirements of Attachment 2 to 179 NAC 16.

2. Chlorine Dioxide

- a. Acute Violations: Compliance must be based on consecutive daily samples collected by the system under 179 NAC 16-005.03 item 2. If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and must notify the public pursuant to the procedures for acute health risks in 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007.
- b. Nonacute Violations: Compliance must be based on consecutive daily samples collected by the system under 179 NAC 16-005.03 item 2. If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under 179 NAC 4 in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-006.04 Disinfection Byproduct Precursors (DBPP): Compliance must be determined as specified by 179 NAC 16-008.03. Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in 179 NAC 16-008.02B and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to 179 NAC 16-008.02C and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under 179 NAC 16-008.03A item 4 is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to 179 NAC 4, in addition to reporting to the Department pursuant to 179 NAC 16-007.

16-007 REPORTING AND RECORDKEEPING REQUIREMENTS

16-007.01 Systems required to sample quarterly or more frequently must report to the Department within 10 days after the end of each monitoring period in which samples were collected. Systems required to sample less frequently than quarterly must report to the Department within 10 days after the end of each monitoring period in which samples were collected.

16-007.02 Disinfection Byproducts: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 on a quarterly or more frequent basis.	(1) The number of samples taken during the last quarter. (2) The location, date, and result of each sample taken during the last quarter. (3) The arithmetic average of all samples taken in the last quarter. (4) The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters. (5) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 less frequently than quarterly (but at least annually).	(1) The number of samples taken during the last year. (2) The location, date, and result of each sample taken during the last monitoring period. (3) The arithmetic average of all samples taken over the last year. (4) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.
System monitoring for TTHMs and HAA5 under the requirements of 179 NAC 16-005.02 less frequently than annually.	(1) The location, date, and result of each sample taken. (2) Whether, based on 179 NAC 16-006.02 item 1, the MCL was violated.

System monitoring for chlorite under the requirements of 179 NAC 16-005.02.	(1) The number of entry point samples taken each month for the last 3 months. (2) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. (3) For each month in the reporting period, the arithmetic average of all samples taken in each three sample set taken in the distribution system. (4) Whether, based on 179 NAC 16-006.02 item 3, the MCL was violated, in which month, and how many times it was violated each month.
System monitoring for bromate under the requirements of 179 NAC 16-005.02.	(1) The number of samples taken during the last quarter. (2) The location, date, and result of each sample taken during the last quarter. (3) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. (4) Whether, based on 179 NAC 16-006.02 item 2, the MCL was violated.

¹ The Department may choose to perform calculations and determine whether the MCL was exceeded, in lieu of having the system report that information.

16-007.03 Disinfectants: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
System monitoring for chlorine or chloramines under the requirements of 179 NAC 16-005.03.	(1) The number of samples taken during each month of the last quarter. (2) The monthly arithmetic average of all samples taken in each month for the last 12 months. (3) The arithmetic average of all monthly averages for the last 12 months. (4) Whether, based on 179 NAC 16-006.03 item 1, the MRDL was violated.
System monitoring for chlorine dioxide under the requirements of 179 NAC 16-005.03.	(1) The dates, results, and locations of samples taken during the last quarter. (2) Whether, based on 179 NAC 16-006.03 item 2, the MRDL was violated. (3) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acute or nonacute.

¹ The Department may choose to perform calculations and determine whether the MRDL was exceeded, in lieu of having the system report that information.

16-007.04 Disinfection Byproduct Precursors and Enhanced Coagulation or Enhanced Softening: Systems must report the information specified in the following table:

If You Are a . . .	You Must Report . . .¹
<p>System monitoring monthly or quarterly for TOC under the requirements of 179 NAC 16-005.04 and required to meet the enhanced coagulation or enhanced softening requirements in 179 NAC 16-008.02B or 16-008.02C.</p>	<p>(1) The number of paired (source water and treated water) samples taken during the last quarter. (2) The location, date, and results of each paired sample and associated alkalinity taken during the last quarter. (3) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. (4) Calculations for determining compliance with the TOC percent removal requirements, as provided in 179 NAC 16-008.03A. (5) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in 179 NAC 16-008.02 for the last four quarters.</p>
<p>System monitoring monthly or quarterly for TOC under the requirements of 179 NAC 16-005.04 and meeting one or more of the alternative compliance criteria in 179 NAC 16-008.01B or 16-008.01C.</p>	<p>(1) The alternative compliance criterion that the system is using. (2) The number of paired samples taken during the last quarter. (3) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. (4) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in 179 NAC 16-008.01B, item 1 or 3, or of treated water TOC for systems meeting the criterion in 179 NAC 16-008.01B, item 2. (5) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in 179 NAC 16-008.01B, item 5, or of treated water SUVA for systems meeting the criterion in 179 NAC 16-008.01B, item 6. (6) The running annual average of source water alkalinity for systems meeting the criterion in 179 NAC 16-008.01B, item 3 and of treated water alkalinity for systems meeting the criterion in 179 NAC 16-008.01B, item 1. (7) The running annual average for both TTHMs and HAA5 for systems meeting the criterion in 179 NAC 16-008.01B, item 3 or 4. (8) The running annual average of the amount of magnesium hardness removal (as CaCO₃, in mg/L) for systems meeting the criterion in 179 NAC 16-008.01B, item 2.</p>

	(9) Whether the system is in compliance with the particular alternative compliance criterion in 179 NAC 16-008.01B or 16-008.01C.
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¹The Department may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

16-008 TREATMENT TECHNIQUE FOR CONTROL OF DISINFECTION BYPRODUCT (DBP) PRECURSORS

16-008.01 Applicability

16-008.01A Public water systems using surface water or ground water under the direct influence of surface water using conventional filtration treatment must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in 179 NAC 16-008.02 unless the system meets at least one of the alternative compliance criteria listed in 179 NAC 16-008.01B or 16-008.01C.

16.008.01B Alternative Compliance Criteria for Enhanced Coagulation and Enhanced Softening Systems: Public water systems using surface water or ground water under the direct influence of surface water using conventional filtration treatment may use the alternative compliance criteria in 179 NAC 16-008.01B items 1 through 6 to comply with this section in lieu of complying with 179 NAC 16-008.02. Systems must still comply with monitoring requirements in 179 NAC 16-005.04.

1. The system's source water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 2.0 mg/L, calculated quarterly as a running annual average.
2. The system's treated water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 2.0 mg/L, calculated quarterly as a running annual average.
3. The system's source water TOC level, measured according to 179 NAC 16-004.04 item 3, is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to 179 NAC 16-004.04 item 1, is greater than 60 mg/L (as CaCO₃), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in 179 NAC 16-001.01, the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in 179 NAC 16-001.01 to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the Department for approval not later than

the effective date for compliance in 179 NAC 16-001.01. These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of these regulations.

4. The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.
5. The system's source water SUVA, prior to any treatment and measured monthly according to 179 NAC 16-004.04 item 4 is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.
6. The system's finished water SUVA, measured monthly according to 179 NAC 16-004.04 item 4 is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

16.008.01C Additional Alternative Compliance Criteria for Softening Systems:
Systems practicing enhanced softening that cannot achieve the TOC removals required by 179 NAC 16-008.02B may use the alternative compliance criteria in 179 NAC 16-008.01C items 1 and 2 in lieu of complying with 179 NAC 16-008.02. Systems must still comply with the monitoring requirements in 179 NAC 16-005.04.

1. Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as CaCO₃), measured monthly according to 179 NAC 16-004.04 item 1 and calculated quarterly as a running annual average.
2. Softening that results in removing at least 10 mg/L of magnesium hardness (as CaCO₃), measured monthly according to 179 NAC 16-004.04 item 6 and calculated quarterly as an annual running average.

16-008.02 Enhanced Coagulation and Enhanced Softening Performance Requirements

16-008.02A Systems must achieve the percent reduction of TOC specified in 179 NAC 16-008.02B between the source water and the combined filter effluent, unless the Department approves a system's request for alternate minimum TOC removal (Step 2) requirements under 179 NAC 16-008.02C.

16-008.02B Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with 179 NAC 16-004.04. Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

STEP 1 REQUIRED REMOVAL OF TOC BY ENHANCED COAGULATION AND ENHANCED SOFTENING FOR PUBLIC WATER SYSTEMS USING SURFACE WATER OR GROUND WATER UNDER THE DIRECT INFLUENCE OF SURFACE WATER USING CONVENTIONAL TREATMENT^{1,2}

Source-Water TOC, Mg/L	Source-Water Alkalinity, Mg/L as CaCO ₃ (in Percentages)		
	0-60	>60-120	>120 ³
>2.0-4.0	35.0	25.0	15.0
>4.0-8.0	45.0	35.0	25.0
>8.0	50.0	40.0	30.0

¹ Systems meeting at least one of the conditions in 179 NAC 16-008.01B, items 1 to 6, are not required to operate with enhanced coagulation.

² Softening systems meeting one of the alternative compliance criteria in 179 NAC 16-008.01C are not required to operate with enhanced softening.

³ Systems practicing softening must meet the TOC removal requirements in this column.

16-008.02C Public water systems using surface water or ground water under the direct influence of surface water as a source and having conventional treatment systems that cannot achieve the Step 1 TOC removals required by 179 NAC 16-008.02B due to water quality parameters or operational constraints must apply to the Department, within three months of failure to achieve the TOC removals required by 179 NAC 16-008.02B, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the Department approves the alternative minimum TOC removal (Step 2) requirements, the Department may make those requirements retroactive for the purposes of determining compliance. Until the Department approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in 179 NAC 16-008.02B.

16-008.02D Alternate Minimum TOC Removal (Step 2) Requirements: Applications made to the Department by enhanced coagulation systems for approval of alternative minimum TOC removal (Step 2) requirements under 179 NAC 16-008.02C must include, at a minimum, results of bench- or pilot-scale testing conducted under 179 NAC 16-008.02D1. The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

16-008.02D1 Alternate enhanced coagulation level is defined as coagulation at a coagulant dose and pH as determined by the method described in 179 NAC 16-008.02D1 through 16-008.02D5 such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤ 0.3 mg/L. The percent removal of TOC at this point on the "TOC removal versus coagulant dose" curve is then defined as the minimum TOC removal required for the system. Once approved by the Department, this minimum requirement supersedes the minimum TOC removal required by the table in 179 NAC 16-008.02B. This requirement will be effective until such time as the Department approves a new value based on the results of a new bench- and

pilot-scale test. Failure to achieve Department-set alternative minimum TOC removal levels is a violation of these regulations.

16-008.02D2 Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

ENHANCED COAGULATION STEP 2 TARGET pH

Alkalinity (mg/L as CaCO₃)	Target pH
0-60	5.5
>60-120	6.3
>120-240	7.0
>240	7.5

16-008.02D3 For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalent addition of iron coagulant) is reached.

16-008.02D4 The system may operate at any coagulant dose or pH necessary to achieve the minimum TOC percent removal approved under 179 NAC 16-008.02C.

16-008.02D5 If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalent addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the Department for a waiver of enhanced coagulation requirements.

16-008.03 Compliance Calculations

16-008.03A Public water systems using surface water or ground water under the direct influence of surface water other than those identified in 179 NAC 16-008.01B or 16-008.01C must comply with requirements contained in 179 NAC 16-008.02B or 16-008.02C. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

1. Determine actual monthly TOC percent removal, equal to:
 $[1 - (\text{treated water TOC}/\text{source water TOC})] \times 100$.
2. Determine the required monthly TOC percent removal (from either the table in 179 NAC 16-008.02B or from 179 NAC 16-008.02C).

3. Divide the value in 179 NAC 16-008.03A item 1 by the value in by 179 NAC 16-008.03A item 2.
4. Add together the results of 179 NAC 16-008.03A item 3 for the last 12 months and divide by 12.
5. If the value calculated in 179 NAC 16-008.03A, item 4 is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

16-008.03B Systems may use the provisions in 179 NAC 16-008.03B items 1 through 5 in lieu of the calculations in 179 NAC 16-008.03A items 1 through 5 to determine compliance with TOC percent removal requirements.

1. In any month that the system's treated or source water TOC level, measured according to 179 NAC 16-004.04 item 3 is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
2. In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
3. In any month that the system's source water SUVA, prior to any treatment and measured according to 179 NAC 16-004.04 item 4 is ≤ 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
4. In any month that the system's finished water SUVA, measured according to 179 NAC 16-004.04 item 4 is ≤ 2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.
5. In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as CaCO₃), the system may assign a monthly value of 1.0 (in lieu of the value calculated in 179 NAC 16-008.03A item 3) when calculating compliance under the provisions of 179 NAC 16-008.03A.

16-008.03C Public water systems using surface water or ground water under the direct influence of surface water using conventional treatment may also comply with the requirements of this section by meeting the criteria in 179 NAC 16-008.01B or 16-008.01C.

16-008.04 Treatment Technique Requirements for DBP Precursors: The Department identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For public water systems using surface water or ground water under the direct influence of surface water using conventional treatment, enhanced coagulation or enhanced softening.

179 NAC 16 Attachment 1

**I. TIME REQUIREMENTS TO DETERMINE NEED FOR TESTING UNDER
DISINFECTANT/DISINFECTION BYPRODUCTS RULE**

- A. Time Periods – Public water systems using only groundwater sources that use chlorine, chloramines, chlorine dioxide, or ozone as any part of the treatment or system maintenance process are required to test for disinfection byproducts (DBPs) under the requirements of the Disinfectants/Disinfection Byproducts Rule unless levels of Total Organic Carbon (TOC) for all sources are ≤ 2 mg/L and the use of chlorine or chloramines is limited to usage for a period not longer than 30 consecutive days; or 45 total cumulative days for each calendar year.
- B. Groundwater systems using chlorination for maintenance purposes as defined in I.A. above, or in response to a specific event in the distribution system are exempt from the disinfectant residual requirements set in Attachment 2 to 179 NAC 16.
- C. Reporting – Public water systems using only groundwater that are adding chlorine or chloramines for maintenance purposes, or in response to a specific event in the distribution system, must submit a report for each month in which chlorine or chloramines are used. The report must contain the daily total flows, source of chlorine, percent of available chlorine, the pounds or gallons of solution added for each day, and an explanation of why the chemical was used. The report must be submitted within 10 days of the end of the month in which chlorine or chloramines were used.
- D. Day of Disinfection Definition – Any portion of a 24 hour period, from 12:00 a.m. to 11:59 p.m., that chlorine or chloramines are added to the system's water is considered a day of disinfection. The total number of days of disinfection will be determined from the time the maintenance practice begins until the practice has ceased.
- E. Regardless of the duration for which chlorine or chloramines are used, the Maximum Residual Disinfectant Level must not exceed 4.0 mg/L except as allowed in 179 NAC 16-003.05.

179 NAC 16 Attachment 2

Minimum Detectable Residuals

- A. The following requirements establish the minimum allowable disinfectant residuals for each type of system.
1. For systems that are utilizing surface water sources, or sources determined to be groundwater under the direct influence of surface water, one of the following options must be implemented to meet the minimum residual requirements.
 - a. 0.2 ppm residual for free chlorine or 0.5 ppm for total chlorine or
 - b. 0.1 ppm residual for free chlorine or 0.25 ppm for total chlorine provided the requirements in Section C items 1-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
 2. All groundwater systems serving water to the public that contains chlorine or chloramines as a chemical disinfectant or oxidant on a continuous basis must use one of the following criteria for minimum residuals.
 - a. 0.1 ppm residual for free chlorine or
 - b. 0.05 ppm for free chlorine if qualifying criteria in section C items 3-5 of this attachment are met or
 - c. HPC of <500 cfu/ml.
- B. If a system is required to disinfect under an Administrative Order (AO), the requirements listed in the AO will supersede any requirements for minimum residuals established in this attachment.
- C. In order for a system to maintain the lower minimum residual requirement for free or total chlorine (referred to in A, items 1.b. and 2.b.), the following criteria must be met:
1. Any public water system using surface water or ground water under the direct influence of surface water must meet or exceed all CT inactivation requirements in 179 NAC 13., Tables 13.1 to 13.8 at all times through the treatment process in order to utilize the lower requirements of A, item 1.b.
 2. Any public water system using surface water, or ground water determined to be under the direct influence of surface water, must maintain effluent turbidity levels of less than or equal to 0.3 NTU in 95% of all readings, and at no time exceed 1 NTU. A system may submit a study to the Department showing that turbidity values in excess of the specified turbidity limits are a direct result of the treatment process and do not represent a threat to public health. The Department will review the study to determine the nature of the high turbidity levels and if they pose a threat to public health.
 3. The system must demonstrate that the field test method being used can consistently, reliably, and precisely measure residuals less than or equal to the specified limit being used.

4. The system must document that the manufacturer's recommendations for calibration or standardization are being done according to manufacturer's specifications and frequency, and make this information available for review during sanitary surveys.
 5. The system must demonstrate that there is no interference with the testing method, or document that interference has been corrected for. This can be done by any one of the following methods:
 - a. Demonstration through historical source water data (a minimum of 12 months of data, or at least four quarterly samples for non-transient non-community systems) that no interference listed under the manufacturer's instructions is present in the system.
 - b. Sampling for applicable interferences once each day that a residual disinfectant compliance sample(s) is taken to obtain a correction factor to be added to all residual compliance samples taken that day.
 - c. Using an EPA approved method that provides a correction for interference as part of the procedure, and documenting all corrections.
 - d. Adjusting all results based on stable historical data and adding the maximum interference obtained, with the Department's approval.
- D. Disinfectant residuals must be at or above the required minimum residual limits in at least 95% of all distribution residuals taken for the month. If the system fails to meet the 95% requirement for two consecutive months, or for $\geq 50\%$ of the previous 12 consecutive months, the system will be deemed to be in violation of prescribed treatment techniques and will be issued a Treatment Technique violation.

179 NAC 16 ATTACHMENT 3

Sampling Training For Individuals Other Than Licensed Operators

PWS System or Community Name: _____

Name of individual taking samples: _____

Parameter(s) sampled routinely by the above individual:

Trainer and Title: _____

Training material used: _____

Handouts given to the above individual:

I certify that on _____ I personally provided the necessary sampling
(Date)

training to assure quality data and approve the above individual as qualified to perform the
above sampling tasks.

X _____
(Signature of Trainer) (License Number)

I certify that I did receive said training and I understand how to properly sample the above
parameters.

X _____
(Signature of Approved Sampling Individual)

When the above-named trained individual no longer takes the samples the individual has been
trained to take, I will inform the Nebraska Department of Health and Human Services Division of
Public Health, Field Services Program Manager at (402) 471-0521 within seven days.
Acknowledged by System Owner or Operator in Charge:

X _____ Date: _____
(Signature)

(Keep a copy for your records and submit original within seven days to DHHS, Division of Public Health,
Public Water Program at P. O. Box 95026, Lincoln, NE 68509-5026)

TITLE 179 PUBLIC WATER SYSTEMS

CHAPTER 26 REVISED TOTAL COLIFORM RULE

26-001 SCOPE AND AUTHORITY: The provisions of these regulations include both maximum contaminant level and treatment technique requirements. They apply to all public water systems. Systems must comply with the provisions of this chapter beginning April 1, 2016 unless otherwise specified in this chapter. Failure to comply with the applicable requirements of this chapter is a violation of the Nebraska Safe Drinking Water Act. The authority is found in Neb. Rev. Stat. §§71-5301 to 71-5313.

26-002 DEFINITIONS

Clean Compliance History means, for the purposes of 179 NAC 26, a record of no maximum contaminant level (MCL) violations under 179 NAC 2-002.04C; no monitoring violations under 179 NAC 3-004 or 179 NAC 26; and no coliform treatment technique trigger exceedances or treatment technique violations under 179 NAC 26.

Department means the Division of Public Health of the Department of Health and Human Services.

Level 1 Assessment means an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. It is conducted by the system operator or owner. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

Level 2 Assessment means an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. A Level 2 assessment provides a more detailed examination of the system (including the system's monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. It is conducted by an individual approved by the Department, which may include the system operator. Minimum elements include review and identification of atypical events that

could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type and characteristics of the distribution system. The system must comply with any expedited actions or additional actions required by the Department in the case of an *E. coli* MCL violation.

Sanitary Defect means a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.

Seasonal System means a non-community water system that is not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season.

26-003 ANALYTICAL METHODS AND LABORATORY CERTIFICATION

26-003.01 Analytical Methodology 40 CFR 141.852(a) is incorporated herein by reference. The federal regulations may be found online at <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>

26-003.02 Laboratory Certification: Systems must have all compliance samples required under this chapter analyzed by a laboratory certified by the EPA or the Department Laboratory to analyze drinking water samples and the laboratory must have entered into an agreement with the Department Laboratory to perform such analyses. The laboratory used by the system must be certified for each method [and associated contaminant(s)] used for compliance monitoring analyses under this rule.

26-003.03 Standards Incorporated By Reference: 40 CFR 141.852(a) is incorporated herein by reference. The federal regulations may be found online at <http://www.gpo.gov/fdsys/browse/collectionCfr.action?collectionCode=CFR>

26-004 GENERAL MONITORING REQUIREMENTS FOR ALL PUBLIC WATER SYSTEMS

26-004.01 Sample Siting Plans.

26-004.01A Systems must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the distribution system not later than March 31, 2016. These plans are subject to Department review and revision. Systems must collect total coliform

samples according to the written sample siting plan. Monitoring required by 179 NAC 26-005 through 26-009 may take place at a customer's premises, dedicated sampling station, or other designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet the requirements of 179 NAC 8 must be reflected in the sampling plan.

26-004.01B Systems must collect samples at regular time intervals throughout the month, except that systems that use only ground water and serve 4,900 or fewer people may collect all required samples on a single day if they are taken from different sites.

26-004.01C Systems must take at least the minimum number of required samples even if the system has had an *E. coli* MCL violation or has exceeded the coliform treatment technique triggers in 26-010.01.

26-004.01D A system may conduct more compliance monitoring than is required by this chapter to investigate potential problems in the distribution system and use monitoring as a tool to assist in uncovering problems. A system may take more than the minimum number of required routine samples and must include the results in calculating whether the coliform treatment technique trigger in 26-010.01 items 1.a. and 1.b. has been exceeded only if the samples are taken in accordance with the existing sample siting plan and are representative of water throughout the distribution system.

26-004.01E Systems must identify repeat monitoring locations in the sample siting plan. Unless the provisions of 26-004.01E(1) or 26-004.01E(2) are met, the system must 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 five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one service connection away from the end of the distribution system, the system must still take all required repeat samples. However, the Department may allow an alternative sampling location in lieu of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in 26-004.01E(2), systems required to conduct triggered source water monitoring under 179 NAC 8-005.01 must take ground water source sample(s) in addition to repeat samples required under this chapter.

26-004.01E(1) Systems may propose repeat monitoring locations to the Department that the system believes to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a

situational basis in a standard operating procedure (SOP) in its sample siting plan. The system must design its SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of a distribution system area based on specific situations. The Department may modify the SOP or require alternative monitoring locations as needed.

26-004.01E(2) Ground water systems serving 1,000 or fewer people may propose repeat sampling locations to the Department that differentiate potential source water and distribution system contamination (e.g., by sampling at entry points to the distribution system). A ground water system with a single well required to conduct triggered source water monitoring may, with written Department approval, take one of its repeat samples at the monitoring locations required for triggered source water monitoring under 179 NAC 8-005.01 if the system demonstrates to the Department's satisfaction that the sample siting plan remains representative of water quality in the distribution system. If approved by the Department, the system may use that sample result to meet the monitoring requirements in both 179 NAC 8-005.01 and this section.

26-004.01E(2)(a) If a repeat sample taken at the monitoring location required for triggered source water monitoring is *E. coli* positive, the system has violated the *E. coli* MCL and must also comply with 179 NAC 8-005.01C. If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring, the system may reduce the number of additional source water samples required under 179 NAC 8-005.01C by the number of repeat samples taken at that location that were not *E. coli*-positive.

26-004.01E(2)(b) If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring under 179 NAC 8-005.01, and more than one repeat sample is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with 179 NAC 8-006.01A.

26-004.01E(2)(c) If all repeat samples taken at the monitoring location required for triggered source water monitoring are *E. coli*-negative and a repeat sample taken at a monitoring location other than the one required for triggered source water monitoring is *E. coli*-positive, the system has violated the *E. coli* MCL, but is not required to comply with 179 NAC 8-005.01C.

26-004.01F The Department may review, revise, and approve, as appropriate, repeat sampling proposed by systems under 26-004.01E(1) and 26-004.01E(2).

The system must demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The Department may determine that monitoring at the entry point to the distribution system (especially for undisinfected ground water systems) is effective to differentiate between potential source water and distribution system problems.

26-004.02 Special Purpose Samples: Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, must not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken pursuant to 26-009 are not considered special purpose samples, and must be used to determine whether the coliform treatment technique trigger has been exceeded.

26-004.03 Invalidation of Total Coliform Samples. A total coliform-positive sample invalidated under this 26-004.03 does not count toward meeting the minimum monitoring requirements of this chapter.

26-004.03A The Department may invalidate a total coliform-positive sample only if the conditions of item 1, 2 or 3 below 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 under 26-009.01, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The Department will not invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive samples are also total coliform-positive, and all repeat samples collected at a location other than 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 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 that does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under 26-009.01 and use them to determine whether a coliform treatment technique trigger in 26-010 has been exceeded. To invalidate a total coliform-positive sample under 26-004.03, the decision and supporting rationale must be documented in writing, and approved and signed by the supervisor of the Department official who recommended the decision. The Department will make this document available to EPA and the public.

The written documentation must state the specific cause of the total coliform-positive sample, and what action the system 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.

26-004.03B A laboratory must 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 (P-A) 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 must 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 must 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. Alternatively, the Department may implement criteria for waiving the 24-hour sampling time limit to use in lieu of case-by-case extensions.

26-005 ROUTINE MONITORING REQUIREMENTS FOR NON-COMMUNITY WATER SYSTEMS SERVING 1,000 OR FEWER PEOPLE USING ONLY GROUNDWATER

26-005.01 General

26-005.01A The provisions of this section apply to non-community water systems using only ground water (except ground water under the direct influence of surface water, as defined in 179 NAC 3-002) and serving 1,000 or fewer people.

26-005.01B Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. Coli* analytical requirements in 26-009.

26-005.01C Once all monitoring required by this section and 26-009 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in 26-010 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by 26-010.

26-005.01D For the purpose of determining eligibility for remaining on or qualifying for quarterly monitoring under the provisions of 26-005.06 item 4 and 26-005.07 item 2, respectively, for transient non-community water systems, the Department may elect to not count monitoring violations under 26-011.03A if the missed sample is collected no later than the end of the monitoring period following the monitoring

period in which the sample was missed. The system must collect the make-up sample in a different week than the routine sample for that monitoring period and should collect the sample as soon as possible during the monitoring period. The Department may not use this provision under 26-005.08. This authority does not affect the provisions of 26-011.03A and 26-012.01D.

26-005.02 Monitoring Frequency for Total Coliforms. Systems must monitor each calendar quarter that the system provides water to the public, except for seasonal systems or as provided under 26-005.03 through 26-005.08 and 26-005.10. Seasonal systems must meet the monitoring requirements of 26-005.09.

26-005.03 Transition to 179 NAC 26

26-005.03A Systems, including seasonal systems, must continue to monitor according to the total coliform monitoring schedules under 179 NAC 3-004 that were in effect on March 31, 2016, unless any of the conditions for increased monitoring in 26-005.06 are triggered on or after April 1, 2016, or unless otherwise directed by the Department.

26-005.03B Beginning April 1, 2016, the Department will perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the Department has performed the special monitoring evaluation during each sanitary survey, the Department may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this section. The Department may not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section. For seasonal systems on quarterly or annual monitoring, this evaluation must include review of the approved sample siting plan, which must designate the time period(s) for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). The seasonal system must collect compliance samples during these time periods.

26-005.04 Annual Site Visits: Beginning no later than calendar year 2017, systems on annual monitoring, including seasonal systems, must have an initial and recurring annual site visit by the Department that is equivalent to a Level 2 assessment or an annual voluntary Level 2 assessment that meets the criteria in 26-010.02 to remain on annual monitoring. The periodic required sanitary survey may be used to meet the requirement for an annual site visit for the year in which the sanitary survey was completed.

26-005.05 Criteria for Annual Monitoring: Beginning April 1, 2016, the Department may reduce the monitoring frequency for a well-operated ground water system from quarterly routine monitoring to no less than annual monitoring, if the system demonstrates that it meets the criteria for reduced monitoring in items 1 through 3 below, except for a system that has been on increased monitoring under the provisions of 26-005.06. A system on increased monitoring under 26-005.06 must meet the provisions of 26-005.07 to go to quarterly monitoring and must meet the provisions of 26-005.08 to go to annual monitoring.

1. The system has a clean compliance history for a minimum of 12 months;
2. The most recent sanitary survey shows that the system is free of sanitary defects or has corrected all identified sanitary defects, has a protected water source, and meets approved construction standards; and
3. The Department has conducted an annual site visit within the last 12 months and the system has corrected all identified sanitary defects. The system may substitute a Level 2 assessment that meets the criteria in 26-010.02 for the Department annual site visit.

26-005.06 Increased Monitoring Requirements for Systems on Quarterly or Annual Monitoring: A system on quarterly or annual monitoring that experiences any of the events identified in 26-005.06 items 1 through 4 must begin monthly monitoring the month following the event. A system on annual monitoring that experiences the event identified in item 5 below must begin quarterly monitoring the quarter following the event. The system must continue monthly or quarterly monitoring until the requirements in 26-005.07 for quarterly monitoring or 26-005.08 for annual monitoring are met. A system on monthly monitoring for reasons other than those identified in items 1 through 4 below is not considered to be on increased monitoring for the purposes of 26-005.07 and 26-005.08.

1. The system triggers a Level 2 assessment or two Level 1 assessments under the provisions of 26-010 in a rolling 12-month period.
2. The system has an *E. coli* MCL violation.
3. The system has a coliform treatment technique violation.
4. The system has two 179 NAC 26 monitoring violations or one 179 NAC 26 monitoring violation and one Level 1 assessment under the provisions of 26-010 in a rolling 12-month period for a system on quarterly monitoring.
5. The system has one 179 NAC 26 monitoring violation for a system on annual monitoring.

26-005.07 Requirements for Returning to Quarterly Monitoring: The Department may reduce the monitoring frequency for a system on monthly monitoring triggered under 26-005.06 to quarterly monitoring if the system meets the criteria in 26-005.07 items 1 and 2.

1. Within the last 12 months, the system must have a completed sanitary survey or a site visit by the Department or a voluntary Level 2 assessment by a party approved by the Department, be free of sanitary defects, and have a protected water source; and
2. The system must have a clean compliance history for a minimum of 12 months.

26-005.08 Requirements for Systems on Increased Monitoring to Qualify for Annual Monitoring: The Department may reduce the monitoring frequency for a system on increased monitoring under 26-005.06 if the system meets the criteria in 26-005.07 plus the criteria in items 1 and 2 below.

1. An annual site visit by the Department and correction of all identified sanitary defects. The system may substitute a voluntary Level 2 assessment by a party approved by the Department for the Department annual site visit in any given year.
2. The system must have in place or adopt one or more additional enhancements to the water system barriers to contamination in items a through e below.
 - a. Cross connection control, as approved by the Department.
 - b. A water operator licensed by the Department or regular visits by a Nebraska licensed water operator working as a circuit rider.
 - c. Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the Department.
 - d. Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under 179 NAC 8-006.02C.
 - e. Other equivalent enhancements to water system barriers as approved by the Department.

26-005.09 Seasonal Systems

26-005.09A Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which may include a requirement for startup sampling prior to serving water to the public.

26-005.09B A seasonal system must monitor every month that it is in operation unless it meets the criteria in 26-005.09B items 1 through 3 to be eligible for monitoring less frequently than monthly beginning April 1, 2016, except as provided under 26-005.03.

1. Seasonal systems monitoring less frequently than monthly must have an approved sample siting plan that designates the time period for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). Seasonal systems must collect compliance samples during this time period.
2. To be eligible for quarterly monitoring, the system must meet the criteria in 26-005.07.
3. To be eligible for annual monitoring, the system must meet the criteria under 26-005.08.

26-005.09C The Department may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating, except that systems that monitor less frequently than monthly must still monitor during the vulnerable period designated by the Department.

26-005.10 Additional Routine Monitoring the Month Following a Total Coliform-positive Sample: Systems collecting samples on a quarterly or annual frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the Department may waive this requirement if the conditions of 26-005.10A, 26-005.10B, or 26-005.10C are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations under 26-010.01.

26-005.10A The Department may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the Department, or an individual approved by the Department, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the Department to determine whether additional monitoring and/or any corrective action is needed. The Department cannot approve an employee of the system to perform this site visit, even if the employee is an individual approved by the Department to perform sanitary surveys.

26-005.10B The Department may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the Department has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the Department must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the Department official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.

26-005.10C The Department may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the Department determines that the system has corrected the contamination problem before the system takes the set of repeat samples required in 26-009, and all repeat samples were total coliform-negative, the Department may waive the requirement for additional routine monitoring the next month.

26-006 ROUTINE MONITORING REQUIREMENTS FOR COMMUNITY WATER SYSTEMS SERVING 1,000 OR FEWER PEOPLE USING ONLY GROUND WATER

26-006.01 General

26-006.01A The provisions of this section apply to community water systems using only ground water (except ground water under the direct influence of surface water, as defined in 179 NAC 3-002) and serving 1,000 or fewer people.

26-006.01B Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in 26-009.

26-006.01C Once all monitoring required by this section and 26-009 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in 26-010 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by 26-010.

26-006.02 Monitoring Frequency for Total Coliforms: The monitoring frequency for total coliforms is one sample per month, except as provided for under 26-006.03 through 26-006.06.

26-006.03 Transition to 179 NAC 26

26-006.03A All systems must continue to monitor according to the total coliform monitoring schedules under 179 NAC 3-004 that were in effect on March 31, 2016, unless any of the conditions in 26-006.05 are triggered on or after April 1, 2016, or unless otherwise directed by the Department.

26-006.03B Beginning April 1, 2016, the Department must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the Department has performed the special monitoring evaluation during each sanitary survey, the Department may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of the section. The Department will not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section.

26-006.04 Criteria for Reduced Monitoring: The Department may reduce the monitoring frequency from monthly monitoring to no less than quarterly monitoring if the system is in compliance with Title 179 NAC 10 and demonstrates that it meets the criteria in items 1 through 3 below. A system that loses its licensed operator must return to monthly monitoring the month following that loss.

1. The system has a clean compliance history for a minimum of 12 months.
2. The most recent sanitary survey shows the system is free of sanitary defects (or has an approved plan and schedule to correct them and is in compliance with the plan and the schedule), has a protected water source and meets approved construction standards.
3. The system meets at least one of the following criteria:
 - a. An annual site visit by the Department that is equivalent to a Level 2 assessment or an annual Level 2 assessment by a party approved by the Department and correction of all identified sanitary defects (or an approved plan and schedule to correct them and is in compliance with the plan and schedule).
 - b. Cross connection control, as approved by the Department.
 - c. Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the Department.

- d. Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under 179 NAC 8-006.02C.
- e. Other equivalent enhancements to the water system barriers as approved by the Department.

26-006.05 Return to Routine Monthly Monitoring Requirements: Systems on quarterly monitoring that experience any of the events in items 1 through 4 below must begin monthly monitoring the month following the event. The system must continue monthly monitoring until it meets the reduced monitoring requirements in 26-006.04.

1. The system triggers a Level 2 assessment or two Level 1 assessments in a rolling 12-month period.
2. The system has an *E. coli* MCL violation.
3. The system has a coliform treatment technique violation.
4. The system has two 179 NAC 26 monitoring violations in a rolling 12-month period.

26-006.06 Additional Routine Monitoring the Month Following a Total Coliform-Positive Sample: Systems collecting samples on a quarterly frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the Department may waive this requirement if the conditions of 26-006.06A, 26-006.06B, or 26-006.06C are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations.

26-006.06A The Department may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the Department, or an individual approved by the Department, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the Department to determine whether additional monitoring and/or any corrective action is needed. The Department cannot approve an employee of the system to perform this site visit, even if the employee is an individual approved by the Department to perform sanitary surveys.

26-006.06B The Department may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the Department has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the Department must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the Department official who recommends such a decision, and make this document available to the EPA and the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.

26-006.06C The Department may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the Department determines that the system has corrected the contamination problem before the system takes the set of repeat samples required in 26-009, and all repeat samples were total coliform-negative, the Department may waive the requirement for additional routine monitoring the next month.

26-007 ROUTINE MONITORING REQUIREMENTS FOR SURFACE WATER OR GROUND WATER UNDER THE INFLUENCE OF SURFACE WATER PUBLIC WATER SYSTEMS SERVING 1,000 OR FEWER PEOPLE

26-007.01 General

26-007.01A The provisions of this section apply surface water and ground water under the direct influence of surface water public water systems serving 1,000 or fewer people.

26-007.01B Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in 26-009.

26-007.01C Once all monitoring required by this section and 26-009 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in 26-010 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by 26-010.

26-007.01D Seasonal Systems

26-007.01D1 Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which

may include a requirement for start-up sampling prior to serving water to the public.

26-007.01D2 The Department may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.

26-007.02 Routine Monitoring Frequency for Total Coliforms: Surface water and ground water under the direct influence systems (including consecutive systems) must monitor monthly. Systems may not reduce monitoring.

26-007.03 Unfiltered Surface Water and Ground Water Under the Direct Influence Systems: A surface water or ground water under the direct influence of surface water system that does not practice filtration in compliance with 179 NAC 13, 17, 19, and 25 must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in 179 NAC 13-007.02B, exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the Department determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in 26-010 has been exceeded.

26-008 ROUTINE MONITORING REQUIREMENTS FOR PUBLIC WATER SYSTEMS SERVING MORE THAN 1,000 PEOPLE

26-008.01 General

26-008.01A The provisions of this section apply to public water systems serving more than 1,000 persons.

26-008.01B Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in 26-009.

26-008.01C Once all monitoring required by this section and 26-009 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in 26-010 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by 26-010.

26-008.01D Seasonal Systems

26-008.01D1 Beginning April 1, 2016, all seasonal systems must demonstrate completion of a Department-approved start-up procedure, which may include a requirement for start-up sampling prior to serving water to the public.

26-008.01D2 The Department may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.

26-008.02 Monitoring Frequency for Total Coliforms: The monitoring frequency for total coliforms is based on the population served by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR PUBLIC WATER SYSTEMS SERVING MORE THAN 1,000 PEOPLE

Population Served	Minimum Number of Samples per Month
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
3,960,001 or more	480

26-008.03 Unfiltered Surface Water and Ground Water Under the Direct Influence of Surface Water Systems: A surface water or ground water under the direct influence of surface water system that does not practice filtration in compliance with 179 NAC 13, 17, 19 and 25 must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in 179 NAC 13-007.02B, exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the Department determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in 26-010 has been exceeded.

26-008.04 Reduced Monitoring: Systems may not reduce monitoring, except for non-community water systems using only ground water (and not ground water under the direct influence of surface water) serving 1,000 or fewer people in some months and more than 1,000 persons in other months. In months when more than 1,000 persons are served, the systems must monitor at the frequency specified in 26-008.02. In months when 1,000 or fewer people are served, the Department may reduce the monitoring frequency, in writing, to a frequency allowed under 26-005 for a similarly situated system that always serves 1,000 or fewer people, taking into account the provisions in 26-005.05 through 26-006.

26-009 REPEAT MONITORING AND E. COLI REQUIREMENTS

26-009.01 Repeat Monitoring

26-009.01A If a sample taken under 26-005 through 26-008 is total coliform-positive, the system must collect a set of repeat samples within 24 hours of being notified of the positive result. The system must collect no fewer than three 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. Alternatively, the Department may implement criteria for the system to use in lieu of case-by-case extensions. In the case of an extension, the Department must specify how much time the system has to collect the repeat samples. The Department cannot waive the requirement for a system to collect repeat samples in 26-009.01A through 26-009.01C.

26-009.01B The system must 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 three-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 300 ml.

26-009.01C The system must collect an additional set of repeat samples in the manner specified in 26-009.01A through 26-009.01C if one or more repeat samples in the current set of repeat samples is total coliform-positive. The system must collect the additional set of repeat samples within 24 hours of being notified of the positive result, unless the Department extends the limit as provided in 26-009.01A. The system must continue to collect additional sets of repeat samples until either total coliforms are not detected in one complete set of repeat samples or the system determines that a coliform treatment technique trigger specified in 26-010.01 has been exceeded as a result of a repeat sample being total coliform-positive and notifies the Department. If a trigger identified in 26-010 is exceeded as a result of a routine sample being total coliform-positive, systems are required to conduct only one round of repeat monitoring for each total coliform-positive routine sample.

26-009.01D After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five 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(s) as a repeat sample instead of as a routine sample.

26-009.01E Results of all routine and repeat samples taken under 26-005 through 26-009 not invalidated by the Department must be used to determine whether a coliform treatment technique trigger specified in 26-010 has been exceeded.

26-009.02 *Escherichia coli* (*E. coli*) Testing

26-009.02A If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if *E. coli* are present. If *E. coli* are present, the system must 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 the Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day.

26-009.02B The Department has the discretion to allow a system, on a case-by-case basis, to forgo *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is *E. coli*-positive. Accordingly, the

system must notify the Department as specified in 26-009.02A and the provisions of 179 NAC 2-002.04C3 apply.

26-010 COLIFORM TREATMENT TECHNIQUE TRIGGERS AND ASSESSMENT REQUIREMENTS FOR PROTECTION AGAINST POTENTIAL FECAL CONTAMINATION

26-010.01 Treatment Technique Triggers: Systems must conduct assessments in accordance with 26-010.02 after exceeding treatment technique triggers in items 1 and 2 below.

1. Level 1 treatment technique triggers.
 - a. For systems taking 40 or more samples per month, the system exceeds 5.0% total coliform-positive samples for the month.
 - b. For systems taking fewer than 40 samples per month, the system has two or more total coliform-positive samples in the same month.
 - c. The system fails to take every required repeat sample after any single total coliform-positive sample.
2. Level 2 treatment technique triggers
 - a. An *E. coli* MCL violation, as specified in 26-011.01.
 - b. A second Level 1 trigger as defined in 26-010.01 item 1, within a rolling 12-month period, unless the Department has determined a likely reason that the samples that caused the first Level 1 treatment technique trigger were total coliform-positive and has established that the system has corrected the problem.
 - c. For systems with approved annual monitoring, a Level 1 trigger in two consecutive years.

26-010.02 Requirements for Assessments

26-010.02A Systems must ensure that Level 1 and 2 assessments are conducted in order to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. Level 2 assessments must be conducted by parties approved by the Department.

26-010.02B When conducting assessments, systems must ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in v s; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was

impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system must conduct the assessment consistent with any Department directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

26-010.02C Level 1 Assessments: A system must conduct a Level 1 assessment consistent with Department requirements if the system exceeds one of the treatment technique triggers in 26-010.01 item 1.

1. The system must complete a Level 1 assessment as soon as practical after any trigger in 26-010.01 item 1. In the completed assessment form, the system must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified. The system must submit the completed Level 1 assessment form to the Department within 30 days after the system learns that it has exceeded a trigger.
2. If the Department reviews the completed Level 1 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the Department will consult with the system. If the Department requires revisions after consultation, the system must submit a revised assessment form to the Department on an agreed-upon schedule not to exceed 30 days from the date of the consultation.
3. Upon completion and submission of the assessment form by the system, the Department must determine if the system has identified a likely cause for the Level 1 trigger and, if so, establish that the system has corrected the problem, or has included a schedule acceptable to the Department for correcting the problem.

26-010.02D Level 2 Assessments: A system must ensure that a Level 2 assessment consistent with Department requirements is conducted if the system exceeds one of the treatment technique triggers in 26-010.01 item 2. The system must comply with any expedited actions or additional actions required by the Department in the case of an *E. coli* MCL violation.

26-010.02D1 The system must ensure that a Level 2 assessment is completed by the Department or by a party approved by the Department as soon as practical after any trigger in 26-010.01 item 2. The system must

submit a completed Level 2 assessment form to the Department within 30 days after the system learns that it has exceeded a trigger. The assessment form must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified.

26-010.02D2 The system may conduct Level 2 assessments if the system has staff or management with the license or qualifications specified by the Department unless otherwise directed by the Department.

26-010.02D3 If the Department reviews the completed Level 2 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the Department will consult with the system. If the Department requires revisions after consultation, the system must submit a revised assessment form to the Department on an agreed-upon schedule not to exceed 30 days.

26-010.02D4 Upon completion and submission of the assessment form by the system, the Department will determine if the system has identified a likely cause for the Level 2 trigger and determine whether the system has corrected the problem, or has included a schedule acceptable to the Department for correcting the problem.

26-010.03 Corrective Action: Systems must correct sanitary defects found through either Level 1 or 2 assessments conducted under 26-010.02. For corrections not completed by the time of submission of the assessment form, the system must complete the corrective action(s) in compliance with a timetable approved by the Department in consultation with the system. The system must notify the Department when each scheduled corrective action is completed.

26-010.04 Consultation: At any time during the assessment or corrective action phase, either the water system or the Department may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the Department on all relevant information that may impact on its ability to comply with a requirement of this chapter, including the method of accomplishment, an appropriate timeframe, and other relevant information.

26-011 VIOLATIONS

26-011.01 *E. coli* MCL Violation: A system is in violation of the MCL for *E. coli* when any of the following four conditions occur:

1. The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.

2. The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.
3. The system fails to take all required repeat samples following an *E. coli*-positive routine sample.
4. The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.

26-011.02 Treatment Technique Violation

26-011.02A A treatment technique violation occurs when a system exceeds a treatment technique trigger specified in 26-010.01 and then fails to conduct the required assessment or corrective actions within the timeframe specified in 26-010.02 and 26-010.03.

26-011.02B A treatment technique violation occurs when a seasonal system fails to complete a Department-approved start-up procedure prior to serving water to the public.

26-011.03 Monitoring Violations

26-011.03A Failure to take every required routine or additional routine sample in a compliance period is a monitoring violation.

26-011.03B Failure to analyze for *E. coli* following a total coliform-positive routine sample is a monitoring violation.

26-011.04 Reporting Violations

26-011.04A Failure to submit a monitoring report or completed assessment form after a system properly conducts monitoring or assessment in a timely manner is a reporting violation.

26-011.04B Failure to notify the Department following an *E. coli*-positive sample as required by 26-009.02A in a timely manner is a reporting violation.

26-011.04C Failure to submit certification of completion of a Department-approved start-up procedure by a seasonal system is a reporting violation.

26-012 REPORTING AND RECORDKEEPING

26-012.01 Reporting

26-012.01A *E. coli*

26-012.01A1 A system must notify the Department by the end of the day when the system learns of an *E. coli* MCL violation, unless the system learns of the violation after the Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day, and notify the public in accordance with 179 NAC 4.

26-012.01A2 A system must notify the Department by the end of the day when the system is notified of an *E. coli*-positive routine sample, unless the system is notified of the result after the Department office is closed and the Department does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the Department before the end of the next business day.

26-012.01B A system that has violated the treatment technique for coliforms in 26-010 must report the violation to the Department no later than the end of the next business day after it learns of the violation, and notify the public in accordance with 179 NAC 4.

26-012.01C A system required to conduct an assessment under the provisions of 26-010 must submit the assessment report within 30 days. The system must notify the Department in accordance with 26-010.03 when each scheduled corrective action is completed for corrections not completed by the time of submission of the assessment form.

26-012.01D A system that has failed to comply with a coliform monitoring requirement must report the monitoring violation to the Department within 10 days after the system discovers the violation, and notify the public in accordance with 179 NAC 4.

26-012.01E A seasonal system must certify, prior to serving water to the public, that it has complied with the Department-approved start-up procedure.

26-012.02 Recordkeeping

26-012.02A The system must maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the sanitary defects and corrective actions taken under 26-010 for Department review. This record must be maintained by the system for a period not less than five years after completion of the assessment or corrective action.

26-012.02B The system must maintain a record of any repeat sample taken that meets Department criteria for an extension of the 24-hour period for collecting repeat samples as provided for under 26-009.01A.