

submit a letter to the State describing the legal authority (e.g., state statutes, municipal ordinances, public service contracts or other applicable legal authority) which limits the system's control over the service lines and the extent of the system's control.

(f) **Public education program reporting requirements.** By December 31st of each year, any water system that is subject to the public education requirements in §141.85 shall submit a letter to the State demonstrating that the system has delivered the public education materials that meet the content requirements in §141.85(a) and (b) and the delivery requirements in §141.85(c). This information shall include a list of all the newspapers, radio stations, television stations, facilities and organizations to which the system delivered public education materials during the previous year. The water system shall submit the letter required by this paragraph annually for as long as it exceeds the lead action level.

(g) **Reporting of additional monitoring data.** Any system which collects sampling data in addition to that required by this subpart shall report the results to the State within the first ten days following the end of the applicable monitoring period under §§141.86, 141.87 and 141.88 during which the samples are collected.

**§141.91 Recordkeeping requirements.**

Any system subject to the requirements of this subpart shall retain on its premises original records of all sampling data and analyses, reports, surveys, letters, evaluations, schedules, State determinations, and any other information required by §§141.81 through 141.88. Each water system shall retain the records required by this section for no fewer than 12 years.

- History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. October 1, 1982; February 27, 1982; Transferred and Recodified from 10 NCAC 10D .1621 Eff. April 4, 1990; Amended Eff. July 1, 1994; October 1, 1992; December 1, 1991.

**.1508 INORGANIC CHEMICAL SAMPLING AND ANALYSIS**

The provisions of 40 C.F.R. 141.23 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$.30) per page for each additional page. In addition, two or more water systems that are adjacent and are owned or operated by the same supplier of water and that together serve 15 or more service connections or 25 or more persons shall conform to the following sampling schedule. A water supplier shall submit samples every three years from each section of the water system supplied from a separate source. Travel trailer parks, campgrounds, and marina slips that are community water systems as defined in G.S. 130A-313(10), but do not serve 25 or more of the same people more than six months per year shall monitor as specified for transient non-community water systems.

ADOPTED BY REFERENCE

**§141.23 Inorganic Chemicals Sampling and Analytical Requirements**

Community water systems shall conduct monitoring to determine compliance with the maximum contaminant levels specified in §141.62 in accordance with this section. Non-transient, non-community water systems shall conduct monitoring to determine compliance with the maximum contaminant levels specified in §141.62 in accordance with this section. Transient, non-community water systems shall conduct monitoring to determine compliance with the nitrate and nitrite maximum contaminant levels in §141.11 and §141.62 (as appropriate) in accordance with this section.

- (a) Monitoring shall be conducted as follows:
  - (1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling point) beginning in the initial compliance period. The system shall 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 systems shall take a minimum of one sample 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) beginning in the initial compliance period. The system shall take each sample **OLW** at the same

sampling point unless conditions make another sampling point more representative of each source or treatment plant.

Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.

- (3) If a system draws water from more than one source and the sources are combined before distribution, the system 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) The State may reduce the total number of samples which must be analyzed by allowing the use of compositing. Composite samples from a maximum of five samples are allowed, provided that the detection limit of the method used for the analysis is less than one-fifth of the MCL. Compositing of samples must be done in the laboratory.
  - (i) If the concentration in the composite sample is greater than or equal to one-fifth of the MCL of any inorganic chemical, then a follow-up sample must be taken within 14 days from each sampling point included in the composite. These samples must be analyzed for the contaminants which exceeded one-fifth of the MCL in the composite sample. Detection limits for each analytical method and MCLs for each inorganic contaminant are the following:

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DETECTION LIMITS FOR INORGANIC CONTAMINANTS

Contaminant	MCL (mg/l)	Methodology	Detection Limit (mg/l)
Antimony	0.006	Atomic Absorption; furnace	0.003
		Atomic Absorption; platform	0.0008 <sup>6</sup>
		ICP-Mass Spectrometry	0.0004
		Hydride-Atomic Absorption	0.001
Asbestos	7 MFL <sup>1</sup>	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) <sup>1</sup>
Beryllium	0.004	Atomic Absorption; Furnace	0.0002
		Atomic Absorption; Platform	0.00002 <sup>6</sup>
		Inductively Coupled Plasma <sup>3</sup>	0.0003
		ICP-Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001 <sup>1</sup>
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007(0.001) <sup>1</sup>
Cyanide	0.2	Distillation, Spectrophotometric <sup>4</sup>	0.02
		Distillation, Automated, Spectrophotometric <sup>4</sup>	0.005
		Distillation, Selective Electrode <sup>4</sup>	0.05
		Distillation, Amenable, Spectrophotometric <sup>5</sup>	0.02
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	0.1	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006 <sup>5</sup>
		Inductively Coupled Plasma <sup>3</sup>	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
Nitrite	1 (as N)	Ion Chromatography	0.01
		Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
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 <sup>6</sup>
		ICP-Mass Spectrometry	0.0003

- <sup>1</sup> MFL = million fibers per liter >10 μm.
- <sup>2</sup> Using a 2X preconcentration step as noted in Method 200.7. Lower MDLs may be achieved when using a 4X preconcentration.
- <sup>3</sup> Screening method for total cyanides.
- <sup>4</sup> Measures "free" cyanides.
- <sup>5</sup> Lower MDLs are reported using stabilized temperature graphite furnace atomic absorption.

- (ii) If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
- (iii) 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 State within 14 days

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of collection.

- (5) The frequency of monitoring for asbestos shall be in accordance with paragraph (b) of this section; the frequency of monitoring for antimony, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be in accordance with paragraph (c) of this section; the frequency of monitoring for nitrate shall be in accordance with paragraph (d) of this section; and the frequency of monitoring for nitrite shall be in accordance with paragraph (e) of this section.
- (b) The frequency of monitoring conducted to determine compliance with the maximum contaminant level for asbestos specified in §141.62(b) shall be conducted as follows:
- (1) Each community and non-transient, non-community water system is required to monitor for asbestos during the first three-year compliance period of each nine-year compliance cycle beginning in the compliance period starting January 1, 1993.
  - (2) If the system believes it 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 State for a waiver of the monitoring requirement in paragraph (b)(1) of this section. If the State grants the waiver, the system is not required to monitor.
  - (3) The State may grant a waiver based on a consideration of the following factors:
    - (i) Potential asbestos contamination of the water source, and
    - (ii) The use of asbestos-cement pipe for finished water distribution and the corrosive nature of the water.
  - (4) 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 paragraph (b)(1) of this section.
  - (5) A system vulnerable to asbestos contamination due solely to corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (6) A system vulnerable to asbestos contamination due solely to source water shall monitor in accordance with the provision of paragraph (a) of this section.
  - (7) A system vulnerable to asbestos contamination due both to its source water supply and corrosion of asbestos-cement pipe shall take one sample at a tap served by asbestos-cement pipe and under conditions where asbestos contamination is most likely to occur.
  - (8) A system which exceeds the maximum contaminant levels as determined in (i) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.
  - (9) The State may decrease the quarterly monitoring requirement to the frequency specified in paragraph (b)(1) provided the State has determined that the system is reliably and consistently below the maximum contaminant level. In no case can a State make this determination unless a groundwater 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) If monitoring data collected after January 1, 1990 are generally consistent with the requirements of (b), then the State may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.
- (c) The frequency of monitoring conducted to determine compliance with the maximum contaminant levels in §141.62 for antimony, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium and thallium shall be as follows:
- (1) Groundwater systems shall take one sample at each sampling point during each compliance period. Surface water systems (or combined surface/ground) shall take one sample annually at each sampling point.
  - (2) The system may apply to the State for a waiver from the monitoring frequencies specified in paragraph (c)(1) of this section. States may grant a public water system a waiver for monitoring of cyanide, provided that the State determines that the system is not vulnerable due to lack of any industrial source of cyanide.
  - (3) A condition of the waiver shall require that a system shall take a minimum of one sample while the waiver is effective. The term during which the waiver is effective shall not exceed one compliance cycle (i.e., nine years).
  - (4) The State may grant a waiver provided surface water systems have monitored annually for at least three years and groundwater systems have conducted a minimum of three rounds of

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- monitoring. (At least one sample shall have been taken since January 1, 1990.) Both surface and groundwater systems shall 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 State shall consider:
    - (i) Reported concentrations from all previous monitoring;
    - (ii) The degree of variation in reported concentrations; and
    - (iii) Other factors which may affect contaminant concentrations such as changes in groundwater 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 State to grant a waiver shall be made in writing and shall set forth the basis for the determination. The determination may be initiated by the State or upon an application by the public water system. The public water system shall specify the basis for its request. The State shall review and, where appropriate, revise its determination of the appropriate monitoring frequency when the system submits new monitoring data or when other data relevant to the system's appropriate monitoring frequency become available.
  - (7) Systems which exceed the maximum contaminant levels as calculated in (i) of this section shall monitor quarterly beginning in the next quarter after the violation occurred.
  - (8) The State may decrease the quarterly monitoring requirement to the frequencies specified in paragraphs (c)(1) and (c)(2) provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case can a State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
- (d) All public water systems (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrate in §141.62.
- (1) Community and non-transient, non-community water systems served by groundwater systems shall monitor annually beginning January 1, 1993; systems served by surface water shall monitor quarterly beginning January 1, 1993.
  - (2) For community and non-transient, non-community water systems, the repeat monitoring frequency for ground water systems shall be quarterly for at least one year following any one sample in which the concentration is  $\geq 50$  percent of the MCL. The State may allow a groundwater system to reduce the sampling frequency to annually after four consecutive quarterly samples are reliably and consistently less than the MCL.
  - (3) For community and non-transient, non-community water systems, the State may allow a surface water system to reduce the sampling frequency to annually if all analytical results from four consecutive quarters are  $< 50$  percent of the MCL. A surface water system shall return to quarterly monitoring if any one sample is  $\geq 50$  percent of the MCL.
  - (4) Each transient non-community water system shall monitor annually beginning January 1, 1993.
  - (5) After the initial round of quarterly sampling is completed, each community and non-transient non-community system which is monitoring annually shall take subsequent samples during the quarter(s) which previously resulted in the highest analytical result.
- (e) All public water systems (community; non-transient, non-community; and transient, non-community systems) shall monitor to determine compliance with the maximum contaminant level for nitrite in §141.62(b).
- (1) All public water systems shall take one sample at each sampling point in the compliance period beginning January 1, 1993 and ending December 31, 1995.
  - (2) After the initial sample, systems where an analytical result for nitrite is  $< 50$  percent of the MCL shall monitor at the frequency specified by the State.
  - (3) For community, non-transient, non-community, and transient non-community water systems, the repeat monitoring frequency for any water system shall be quarterly for at least one year following any one sample in which the concentration is  $\geq 50$  percent of the MCL. The State may allow a system to reduce the sampling frequency to annually after determining the system is reliably and consistently less than the MCL.
  - (4) Systems which are monitoring annually shall take each subsequent sample during the quarter(s) which previously resulted in the highest analytical result.

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- (f) Confirmation sampling:
  - (1) Where the results of sampling for asbestos, antimony, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium indicate an exceedance of the maximum contaminant level, the State may require that one additional sample be collected as soon as possible after the initial sample was taken (but not to exceed two weeks) at the same sampling point.
  - (2) Where nitrate or nitrite sampling results indicate an exceedance of the maximum contaminant level, the system shall take a confirmation sample within 24 hours of the system's receipt of notification of the analytical results of the first sample. Systems unable to comply with the 24-hour sampling requirement must immediately notify the consumers served by the area served by the public water system in accordance with §141.32. 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) If a State-required confirmation sample is taken for any contaminant, then the results of the initial and confirmation sample shall be averaged. The resulting average shall be used to determine the system's compliance in accordance with paragraph (i) of this section. States have the discretion to delete results of obvious sampling errors.
- (g) The State may require more frequent monitoring than specified in paragraphs (b), (c), (d) and (e) of this section or may require confirmation samples for positive and negative results at its discretion.
- (h) Systems may apply to the State to conduct more frequent monitoring than the minimum monitoring frequencies specified in this section.
- (i) Compliance with §§ 141.11 or 141.62(b) (as appropriate) shall be determined based on the analytical result(s) obtained at each sampling point.
  - (1) For systems which are conducting monitoring at a frequency greater than annual, compliance with the maximum contaminant levels for antimony, 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 shall be calculated at zero for the purpose of determining the annual average.
  - (2) For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for asbestos, antimony, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the State, the determination of compliance will be based on the average of the two samples.
  - (3) Compliance with the maximum contaminant levels for nitrate and nitrite is determined based on one sample if the levels of these contaminants is below the MCLs. If the levels of nitrate or nitrite exceed the MCLs in the initial sample, a confirmation sample is required in accordance with paragraph (f)(2) of this section, and compliance shall be determined based on the average of the initial and confirmation samples.
  - (4) If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the State may allow the system to give public notice to only the area served by that portion of the system which is out of compliance.
- (j) Each public water system shall monitor at the time designated by the State during each compliance period.
- (k) Inorganic analysis
  - (1) Analysis for the listed inorganic contaminants shall be conducted using the following methods:

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Contaminant	Methodology	EPA	ASTM <sup>2</sup>	SM <sup>3</sup>	USGS <sup>4</sup>	Other
Antimony	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 204.2		3113		
	Atomic Absorption; Platform <sup>6</sup>	<sup>5</sup> 200.9				
	ICP-Mass Spectrometry <sup>6</sup>	<sup>5</sup> 200.8				
	Hydride-Atomic Absorption <sup>7</sup>		D-3697-87			
Asbestos	Transmission Electron Microscopy	<sup>12</sup> EPA				
Barium	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 208.2		3113B		
	Atomic Absorption; Direct <sup>6</sup>	<sup>1</sup> 208.1		3111D		
	Inductively Coupled Plasma <sup>6</sup>	<sup>5</sup> 200.7		3120		
Beryllium	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 210.2	D-3645-84B	3113		
	Atomic Absorption; Platform <sup>6</sup>	<sup>5</sup> 200.9				
	Inductively Coupled Plasma <sup>6</sup>	<sup>5</sup> 200.7		3120		
	ICP-Mass Spectrometry <sup>6</sup>	<sup>5</sup> 200.8				
Cadmium	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 213.2		3113B		
	Inductively Coupled Plasma <sup>6</sup>	<sup>5</sup> 200.7				
Chromium	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 218.2		3113B		
	Inductively Coupled Plasma <sup>6</sup>	<sup>5</sup> 200.7		3120		
Cyanide	Distillation, Spec	<sup>1</sup> 335.2	D-2036-89A	4500-CN-D	1330085	
	Distillation, Automated, Spec	<sup>1</sup> 335.3		4500-CN-E		
	Distillation, Selective Electrode		D-2036-89A	4500-CN-F		
	Distillation, Amenable, Spec	<sup>1</sup> 335.1	D-2036-89B	4500-CN-G		
Mercury	Manual Cold Vapor Technique <sup>9</sup>	<sup>1</sup> 245.1	D3223-86	3112B		
	Automated Cold Vapor Technique <sup>9</sup>	<sup>1</sup> 245.2				
Nickel	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 249.2		3113		
	Atomic Absorption; Platform <sup>6</sup>	<sup>5</sup> 200.9				
	Atomic Absorption; Direct <sup>6</sup>	<sup>1</sup> 249.1		3111B		
	Inductively Coupled Plasma <sup>6</sup>	<sup>5</sup> 200.7		3120		
	ICP-Mass Spectrometry <sup>6</sup>	<sup>1</sup> 200.8				
Nitrate	Manual Cadmium Reduction	<sup>3</sup> 353.3	D3867-90	4500-NO <sub>3</sub> -E		
	Automated Hydrazine Reduction	<sup>3</sup> 353.1				
	Automated Cadmium Reduction	<sup>3</sup> 353.2	D3867-90	4500-NO <sub>3</sub> -F		
	Ion Selective Electrode					WeWWG/ 5880 <sup>7</sup> B-1011 <sup>8</sup>
Nitrite	Ion Chromatography	<sup>11</sup> 300.0				
	Spectrophometric	<sup>1</sup> 354.1				
	Automated Cadmium Reduction	<sup>3</sup> 353.2	D3867-90	4500-NO <sub>3</sub> -F		
	Manual Cadmium Reduction	<sup>3</sup> 353.3	D3867-90	4500-NO <sub>3</sub> -E		
Selenium	Ion Chromatography	<sup>11</sup> 300.0				B-1011 <sup>8</sup>
	Hydride-Atomic Absorption		D3859-84A	3114B		
Thallium	Atomic Absorption; Furnace <sup>6</sup>	<sup>1</sup> 270.2	D3859-88	3113B		
	Atomic Absorption; Platform <sup>6</sup>	<sup>1</sup> 279.2		3113		
	ICP-Mass Spectrometry <sup>6</sup>	<sup>5</sup> 200.9				

<sup>1</sup> "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268 March 1983. EPA-600/4-79-020.

<sup>2</sup> Annual Book of ASTM Standards, Vols. 11.01 and 11.02, 1991, American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

<sup>3</sup> "Standard Methods for the Examination of Water and Wastewater," 17th edition, American Public Health Association, American Water Works Association, Water Pollution Control Federation, 1989.

<sup>4</sup> Techniques of Water Resources Investigations of the U.S. Geological Survey, "Methods of Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5, Chapter A-1, Third Edition, 1989. Available at Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

<sup>5</sup> "Methods for the Determination of Metals in Environmental Samples." Available at NTIS, PB 91-231498.

<sup>6</sup> Samples that contain less than 1 NTU (nephelometric turbidity unit) and are properly preserved (conc HNO<sub>3</sub> to pH <2) may be analyzed directly (without digestion) for total metals, otherwise, digestion is required. Turbidity must be measured on the preserved samples just prior to the initiation of metal analysis. When digestion is required, the total recoverable technique as defined in the method must be used.

<sup>7</sup> "Orion Guide to Water and Wastewater Analysis." Form WeWWWG/5880, p.5, 1985. Orion Research, Inc., Cambridge, MA.

<sup>8</sup> "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography," Method B-1011, Millipore Corporation, Waters Chromatography Division, 34 Maple Street, Milford, MA 01757.

<sup>9</sup> For the gaseous hydride determinations of antimony and selenium and for the determination of mercury by the cold vapor techniques, the proper digestion technique as defined in the method must be followed to ensure the element is in the proper state for analysis.

<sup>10</sup> Add 2 ml of 30% H<sub>2</sub>O<sub>2</sub> and an appropriate concentration of matrix modifier Ni(NO<sub>3</sub>)<sub>2</sub>·6H<sub>2</sub>O (nickel nitrate) to samples.

<sup>11</sup> "Method 300. Determination of Inorganic Anions in Water by Ion Chromatography." Inorganic Chemistry Branch, Environmental Monitoring Systems Laboratory, August 1991.

<sup>12</sup> "Analytical Method For Determination of Asbestos Fibers in Water," EPA-600/4-83-143, September 1983, U.S. EPA Environmental Research Laboratory, Athens, GA 30613.

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- (2) Analyses for arsenic shall be conducted using the following methods: Method 206.2<sup>1</sup>, Atomic Absorption Furnace Technique; or Method 206.3<sup>1</sup>, or Method D2972-88B<sup>4</sup>, or Method 307A<sup>2</sup>, or Method I-1062-85<sup>3</sup>, Atomic Absorption-Gaseous Hydride; or Method 206.4<sup>1</sup>, or Method D-2972-88A<sup>4</sup>, or Method 307B<sup>2</sup>, Spectrophotometric, Silver Diethyl-dithiocarbamate; or Method 200.7A, Inductively Coupled Plasma Technique<sup>5</sup>.

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

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

3 - Techniques of Water-Resources Investigation of the United States Geological Survey, Chapter A-1, "Methods for Determination of Inorganic Substances in Water and Fluvial Sediments," Book 5, 1979, Stock #014-001-03177-9. Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

4 - Annual Book of ASTM Standards, part 31 Water, American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

5 - Appendix to Method 200.7, March 1987, U.S. EPA, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268.

- (3) Analyses for fluoride shall be conducted using the following methods:

REFERENCE (METHOD NUMBER)<sup>1</sup>

Methodology	EPA <sup>1</sup>	ASTM <sup>4</sup>	SM <sup>5</sup>	Other
Colorimetric SPADNS, with distillation	340.1 340.2	D1179-72A D1179-72B	43 A and C 413 B	— —
Potentiometric ion selective electrode	—	—	—	—
Automated Alizarin fluoride blue, with distillation (complexone)	340.3	413 E	129-71W <sup>6</sup>	—
Automated ion selective electrode	—	—	—	380-75WE <sup>7</sup>

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

2 [Reserved]

3 [Reserved]

4 - Annual Book of ASTM Standards, part 31 Water. American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

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

6 - "Fluoride in Water and Wastewater, Industrial Method = 129-71W." Technicon Industrial Systems, Tarrytown, New York, 10591. December 1972.

7 - "Fluoride in Water and Wastewater," Technicon Industrial Systems, Tarrytown, New York, 10591. February 1976.

- (4) Sample collection for antimony, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium under this section shall be conducted using the sample preservation, container, and maximum holding time procedures specified in the table below:

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Contaminant	Preservative <sup>1</sup>	Container <sup>2</sup>	Time <sup>3</sup>
Antimony	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Asbestos	Cool, 4°C	P or G	
Barium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Beryllium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Cadmium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Chromium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Cyanide	Cool, 4°C, NaOH to pH >12	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	Conc HNO <sub>3</sub> to pH <2	P or G	28 days
Nickel	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Nitrate			
Chlorinated	Cool, 4°C	P or G	28 days
Non-chlorinated	Conc H <sub>2</sub> SO <sub>4</sub> to pH <2	P or G	14 days
Nitrite	Cool, 4°C	P or G	48 hours
Selenium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months
Thallium	Conc HNO <sub>3</sub> to pH <2	P or G	6 months

- <sup>1</sup> If HNO<sub>3</sub> cannot be used because of shipping restrictions, sample may be initially preserved by icing and immediately shipping it to the laboratory. Upon receipt in the laboratory, the sample must be acidified with conc HNO<sub>3</sub> to pH <2 and held for 16 hours before analysis.
- <sup>2</sup> P = plastic, hard or soft; G = glass, hard or soft.
- <sup>3</sup> In all cases, samples should be analyzed as soon after collection as possible.
- <sup>4</sup> See method(s) for the information for preservation.

(5) Analysis under this section shall only be conducted by laboratories that have been certified by EPA or the State. Laboratories may conduct sample analysis under provisional certification until January 1, 1996. To receive approval to conduct analyses for antimony, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite, selenium, and thallium the laboratory must:

- (i) Analyze Performance Evaluation samples which include those substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.
- (ii) Achieve quantitative results on the analyses that are within the following acceptance limits:

Contaminant	Acceptance Limit
Antimony	6#30 at ≥0.006 mg/l
Asbestos	2 standard deviations based on study statistics ±
Barium	15% at ≥0.15 mg/l
Beryllium	± 15% at ≥0.01 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

(10) Analysis for the purpose of determining compliance with § 141.11 shall be conducted using the requirements specified in paragraphs (l) through (q) of this section.

- (1) Analysis for all community water systems utilizing surface water sources shall be completed by June 24, 1978. These analyses shall be repeated at yearly intervals.
- (2) Analyses for all community water systems utilizing only ground water sources shall be completed by June 24, 1979. These analyses shall be repeated at three year intervals.
- (3) For non-community water systems, whether supplied by surface or ground sources, analyses

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for nitrate shall be completed by December 24, 1980. These analyses shall be repeated at intervals determined by the State.

- (4) The State has authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.

(m) If the results of an analysis made under paragraph (l) of this section indicates that the level of any contaminant listed in § 141.11 exceeds the maximum contaminant level, the supplier of the water shall report to the State within 7 days and initiate three additional analyses at the same sampling point within one month.

(n) When the average of four analyses made pursuant to paragraph (m) of this section, rounded to the same number of significant figures as the maximum contaminant level for the substance in question, exceeds the maximum contaminant level, the supplier of water shall notify the State pursuant to § 141.31 and give notice to the public pursuant to § 141.32. Monitoring after public notification shall be at a frequency designated by the State and shall 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 shall become effective.

(o) The provisions of paragraphs (m) and (n) of this section notwithstanding, compliance with the maximum contaminant level for nitrate shall be determined on the basis of the mean of the two analyses. When a level exceeding the maximum contaminant level for nitrate is found, a second analysis shall be initiated within 24 hours, and if the mean of the two analyses exceeds the maximum contaminant level, the supplier of water shall report his findings to the State pursuant to § 141.31 and shall notify the public pursuant to § 141.32.

(p) For the initial analysis required by paragraph (l)(1), (2) or (3) of this section, data for surface waters acquired within one year prior to the effective date and data for ground waters acquired within three years prior to the effective date of this part maybe substituted at the discretion of the State.

(q) Analyses conducted to determine compliance with § 141.11 shall be made in accordance with the following methods, or their equivalent as determined by the Administrator.

- (1) Arsenic-Method 206.2<sup>1</sup>, Atomic Absorption Furnace Technique; or Method 206.3<sup>1</sup>, or Method D2972-88B<sup>4</sup> or Method 307A<sup>2</sup>, or Method I-1062-85<sup>3</sup>, Atomic Absorption-Gaseous Hydride; or Method 206.4<sup>1</sup>, or Method D-2972-88A<sup>4</sup>, or Method 307B<sup>2</sup>, Spectrophotometric, Silver Diethyldithiocarbamate; or Method 200.7<sup>8</sup>, Inductively Coupled Plasma Technique.
- (2) Barium-Method 208.1<sup>1</sup> or Method 308<sup>2</sup>, Atomic Absorption-Direct Aspiration; or Method 208.2<sup>1</sup>, Atomic Absorption Furnace Technique; or Method 200.7<sup>8</sup>, Inductively Coupled Plasma Technique.
- (3) Cadmium-Method 213.1<sup>1</sup> or Method D<sup>4</sup> 3557-78A or B, or Method 310A<sup>2</sup>, Atomic Absorption-Direct Aspiration; or Method 213.2<sup>1</sup> Atomic Absorption Furnace Technique; or Method 200.7<sup>8</sup>, Inductively Coupled Plasma Technique.
- (4) Chromium-Method 218.1<sup>1</sup> or Method D 1687-77D, or Method 312A<sup>2</sup>, Atomic Absorption-Direct Aspiration; or Chromium-Method 218.2<sup>1</sup> Atomic Absorption Furnace Technique; or Method 200.7<sup>8</sup>, Inductively Coupled Plasma Technique.
- (5) Mercury-Method 245.1<sup>1</sup>, or Method D-3223-69<sup>4</sup>, or Method 320A<sup>2</sup>, Manual Cold Vapor Technique; or Method 245.2<sup>1</sup>, Automated Cold Vapor Technique.
- (6) Nitrate-Method 352.1<sup>1</sup>, or Method D-992-71<sup>4</sup>, or Method 353.3<sup>1</sup>, or Method D-3867-79B<sup>4</sup>, or Method 418-C<sup>2</sup>, Spectrometric, Cadmium Reduction; Method 353.1<sup>1</sup>, Automated Hydrazine Reduction; or Method 353.2<sup>1</sup>, or Method D-3867-79A<sup>4</sup>, or Method 418F<sup>2</sup>, Automated Cadmium Reduction.
- (7) Selenium-Method 270.2<sup>1</sup>, Atomic Absorption Furnace Technique; or Method 270.3<sup>1</sup>, or Method I-1667-85<sup>3</sup>, or Method D-3859-79<sup>4</sup>, or Method 303F<sup>2</sup>, Hydride Generation-Atomic Absorption Spectrophotometry.
- (8) Lead-Method 239.1<sup>1</sup> or Method<sup>4</sup> D3559-78A or B, or Method<sup>2</sup> 301-A II or III, pp.148-152, Atomic Absorption-Direct Aspiration; or Method 239.2<sup>1</sup>, Atomic Absorption Furnace Technique; or Method 200.7<sup>8</sup>, Inductively Coupled Plasma Technique.

1 "Methods of Chemical Analysis of Water and Wastes," EPA Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268 (EPA-600/4-79-020), March 1983. Available from ORD Publications, CERL, EPA, Cincinnati, Ohio 45268. For approved

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analytical methods for metals, the technique applicable to total metals must be used.

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

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

4 Annual Book of ASTM Standard, part 31 Water, American Society for Testing and Materials, 1976 Race Street, Philadelphia, Pennsylvania 19103.

5-7 [Reserved]

8 "Inductively Coupled Plasma-Atomic Emission Spectrometric Method for Trace Element Analysis of Water and Wastes-Method 200.7" with Appendix to Method 200.7 entitled, "Inductively Coupled Plasma-Atomic Emission Analysis of Drinking Water." March 1987. Available from EPA's Environmental Monitoring and Support Laboratory, Cincinnati, Ohio 45268.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 1, 1989; February 1, 1987; October 1, 1986; April 1, 1983; Transferred and Recodified from 10 NCAC 10D .1625 Eff. April 4, 1990; Amended Eff. July 1, 1994; April 1, 1992; December 1, 1991.*

**.1509 SPECIAL MONITORING FOR SODIUM**

(a) Suppliers of water for community 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 Department approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the Department 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 the Department 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 Department, whichever 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.

(c) The Department shall notify appropriate local health officials of the sodium levels found in community water systems.

(d) Analyses conducted to determine compliance with this Rule shall be made in accordance with methods adopted by the United States Environmental Protection Agency and codified as 40 C.F.R. 141.41(d) which are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

(e) Travel trailer parks, campgrounds, and marina slips that are community water systems as defined by G.S. 130A-313(10), but do not serve 25 or more of the same persons more than six months per year shall be exempt from the provisions of this Rule.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 1, 1989; September 9, 1980; December 19, 1979; Transferred and Recodified from 10 NCAC 10D .1627 Eff. April 4, 1990. Amended Eff. July 1, 1994.*

**.1510 MAXIMUM CONTAMINANT LEVELS FOR INORGANIC CHEMICALS**

(a) The provisions of 40 C.F.R. 141.11 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666

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West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

(b) The provisions of 40 C.F.R. 141.62 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

ADOPTED BY REFERENCE

**§141.11 Maximum Contaminant Levels for Inorganic Chemicals**

(a) The MCL for nitrate is applicable to both community water systems and non-community water systems except as provided by in paragraph (d) of this section. The levels for the other inorganic chemicals apply only to community water systems. Compliance with MCLs for inorganic chemicals is calculated pursuant to § 141.23.

(b) The maximum contaminant levels for cadmium, chromium, mercury, nitrate and selenium shall remain effective until July 30, 1992; the maximum contaminant level for lead shall remain effective until December 7, 1992; the maximum contaminant level for barium shall remain effective January 1, 1993.

Contaminant	Level, milligrams per liter
Arsenic .....	0.05
Barium .....	1
Cadmium .....	0.010
Chromium .....	0.05
Lead .....	0.05
Mercury .....	0.002
Nitrate (as N) .....	10
Selenium .....	0.01

(c) The maximum contaminant level for fluoride is 4.0 mg/l. See 40 CFR 143.3, which establishes a secondary maximum contaminant level at 2.0 mg/l.

(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) There will be continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effected 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.

**§141.62 Maximum Contaminant Levels (MCLs) For Inorganic Contaminants**

(a) [Reserved]

(b) The maximum contaminant levels for inorganic contaminants specified in paragraphs (b)(2)-(6), and (b)(10), and (b)(11)-(15) of this section apply to community water systems and non-transient, non-community water systems. The maximum contaminant level specified in paragraph (b)(1) of this section only applies to community water systems. The Maximum Contaminant Levels specified in paragraphs (b)(7), (b)(8), and (b)(9) of this section apply to community, non-transient non-community, and transient non-community water systems.

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Contaminant	MCL (mg/l)
(1) Fluoride .....	4.0
(2) Asbestos .....	7 Million Fibers/liter (longer than 10 µm)
(3) Barium .....	2
(4) Cadmium .....	0.005
(5) Chromium .....	0.1
(6) Mercury .....	0.002
(7) Nitrate .....	10 (as Nitrogen)
(8) Nitrite .....	1 (as Nitrogen)
(9) Total Nitrate and Nitrate .....	10 (as Nitrogen)
(10) Selenium .....	0.05
(11) Antimony .....	0.006
(12) Beryllium .....	0.004
(13) Cyanide (as free Cyanide) .....	0.2
(14) Nickel .....	0.1
(15) Thallium .....	0.002

(c) The Administrator, pursuant to Section 1412 of the Act, hereby identifies the following as the best technology, treatment technique, or other means available for achieving compliance with the maximum contaminant level for inorganic contaminants identified in paragraph (b) of this section, except fluoride:

BAT FOR INORGANIC CONTAMINANTS LISTED IN §141.62(b)

Chemical Name	BAT(s)
Antimony .....	2,7
Asbestos .....	2,3,8
Barium .....	5,6,7,9
Beryllium .....	1,2,5,6,7
Cadmium .....	2,5,6,7
Chromium .....	2,5,6 <sup>2</sup> ,7
Cyanide .....	5,7,10
Mercury .....	2 <sup>1</sup> ,4,6 <sup>1</sup> ,7 <sup>1</sup>
Nickel .....	5,6,7
Nitrate .....	5,7,9
Nitrite .....	5,7
Selenium .....	1,2 <sup>3</sup> ,6,7,9
Thallium .....	1,5

<sup>1</sup> BAT only if influent Hg concentrations ≤ 10 µg/l.  
<sup>2</sup> BAT for Chromium III only  
<sup>3</sup> BAT for Selenium IV only

- Key to BATs in Table:  
 1 = Activated Alumina  
 2 = Coagulation/Filtration  
 3 = Direct and Diatomite Filtration  
 4 = Granular Activated Carbon  
 5 = Ion Exchange  
 6 = Lime Softening  
 7 = Reverse Osmosis  
 8 = Corrosion Control  
 9 = Electrodialysis  
 10 = Chlorine  
 11 = Ultraviolet

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. October 1, 1986; October 1, 1982; April 1, 1982; March 31, 1981; Transferred and Recodified from 10 NCAC 10D .1616 Eff. April 4, 1990; Amended Eff. April 1, 1992.

15111 CONCENTRATION OF IRON

(a) The requirements of this Rule apply only to community water systems. A community water system which has an iron concentration in excess of 0.30 mg/l shall provide treatment to control the water quality. Analysis of samples shall be made on an as needed basis determined by the Department. Such need basis shall include, but not be limited to, addition of a new well or other raw water source, approval of a new

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community water system, approval of an existing system not previously approved, or problems and complaints of water quality normally associated with iron concentration.

(b) Travel trailer parks, campgrounds, and marina slips that are community water systems as defined by G.S. 130A-313(10), but do not serve 25 or more of the same persons more than six months per year shall be exempt from the provisions of this Rule.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1619 Eff. April 4, 1990; Amended Eff. July 1, 1994.*

**.1512 CONCENTRATION OF MANGANESE**

(a) The requirements of this Rule apply only to community water systems. A community water system which has a manganese concentration in excess of 0.05 mg/l shall provide treatment to control the water quality. Analysis of samples shall be made on an as needed basis determined by the Department. Such need basis shall include, but not be limited to, addition of a new well or other raw water source, approval of a new community water system, approval of an existing system not previously approved, or problems and complaints of water quality normally associated with manganese concentration.

(b) Travel trailer parks, campgrounds, and marina slips that are community water systems as defined by G.S. 130A-313(10), but do not serve 25 or more of the same persons more than six months per year shall be exempt from the provisions of this Rule.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Transferred and Recodified from 10 NCAC 10D .1619 Eff. April 4, 1990; Amended Eff. July 1, 1994.*

**.1513 TOTAL TRIHALOMETHANES SAMPLING AND ANALYSIS: 10,000 OR MORE**

(a) Community water systems which serve a population of 10,000 or more individuals and which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process shall analyze for total trihalomethanes (TTHMs) in accordance with this Rule. For systems serving 75,000 or more individuals, sampling and analyses shall begin not later than November 29, 1980. For systems serving 10,000 to 74,999 individuals, sampling and analyses shall begin not later than November 29, 1982. For the purpose of this Rule, 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 Department approval, be considered one treatment plant for determining the minimum number of samples. All samples taken within an established frequency shall be collected within a 24 hour period.

(b) For all community water systems utilizing surface water sources in whole or in part, and for all community water systems utilizing only ground water sources that have not been determined by the Department to qualify for the monitoring requirements of (c) of this Rule, analyses for TTHMs shall be made as follows:

- (1) Analyses shall be performed at quarterly intervals on at least four water samples for each treatment plant used by the system. At least 25 percent of the samples shall be taken at locations within the distribution system reflecting the maximum residence time of the water in the system. The remaining 75 percent shall be taken at representative locations in the distribution system, taking into account number of persons served, different sources of water and different treatment methods employed. The results of all analyses per quarter shall be arithmetically averaged and reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used in the computation of the average, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in (e) of this Rule.
- (2) Upon the written request of a community water system, the monitoring frequency required by (b)(1) of this Rule may be reduced by the Department to a minimum of one sample analyzed for TTHMs per quarter taken at a point in the distribution system reflecting the maximum residence time of the water in the system, upon a written determination by the Department that the data from at least one year of monitoring in accordance with (b)(1) of this Rule and local conditions demonstrate that total

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- trihalomethane concentrations will be consistently below the maximum contaminant level.
- (3) If at any time during which the reduced monitoring frequency prescribed under this Paragraph applies, the results from any analysis exceed 0.10 mg/1 of TTHMs and such results are confirmed by at least one check sample taken promptly after such results are received, or if the system makes any significant change to its source of water or treatment program, the system shall immediately begin monitoring in accordance with the requirements of (b)(1) of this Rule, which monitoring shall continue for at least one year before the frequency may be reduced again. At the option of the Department, a system's monitoring frequency may and should be increased above the minimum in those cases where it is necessary to detect variations of TTHM levels within the distribution system.
- (c) Upon written request to the Department, a community water system utilizing only ground water sources may seek to have the monitoring frequency required by (b)(1) of this Rule reduced as follows:
- (1) There shall be a minimum of one sample for maximum TTHM potential per year for each treatment plant used by the system taken at a point in the distribution system reflecting maximum residence time of the water in the system. The system shall submit to the Department the results of at least one sample analyzed for maximum TTHM potential for each treatment plant used by the system taken at a point in the distribution system reflecting the maximum residence time of the water in the system. The system's monitoring frequency may only be reduced upon a written determination by the Department that, based upon the data submitted by the system, the system has a maximum TTHM potential of less than 0.10 mg/1 and that, based upon an assessment of the local conditions of the system, the system is not likely to approach or exceed the maximum contaminant level for total TTHMs. The results of all analyses shall be reported to the Department within 30 days of the system's receipt of such results. All samples collected shall be used for determining whether the system must comply with the monitoring requirements of (b) of this Rule, unless the analytical results are invalidated for technical reasons. Sampling and analyses shall be conducted in accordance with the methods listed in (e) of this Rule.
- (2) If at any time during which the reduced monitoring frequency prescribed under (c)(1) of this Rule applies, the results from any analysis taken by the system for maximum TTHM potential are equal to or greater than 0.10 mg/1, and such results are confirmed by at least one check sample taken promptly after such results are received, the system shall immediately begin monitoring in accordance with the requirements of (b) of this Rule and such monitoring shall continue for at least one year before the frequency may be reduced again. In the event of any significant change to the system's raw water or treatment program, the system shall immediately analyze an additional sample for maximum TTHM potential taken at a point in the distribution system reflecting maximum residence time of the water in the system for the purpose of determining whether the system must comply with the monitoring requirements of (b) of this Rule. At the option of the Department, monitoring frequencies may and should be increased above the minimum in those cases where this is necessary to detect variation of TTHM levels within the distribution system.
- (d) Compliance with 15A NCAC 18C .1517(3) shall be determined based on a running annual average of quarterly samples collected by the system as prescribed in (b)(1) or (2) of this Rule. If the average of samples covering any 12 month period exceeds the maximum contaminant level, the supplier of water shall report to the Department pursuant to 15A NCAC 18C .1525 and notify the public pursuant to 15A NCAC 18C .1523. Monitoring after public notification shall be at a frequency designated by the Department and shall continue until a monitoring schedule as a condition to a variance, exemption or enforcement action shall become effective.
- (e) Sampling and analyses made pursuant to this Section shall be conducted by one of the following EPA approved methods:
- (1) "The Analysis of Trihalomethanes in Drinking Waters by the Purge and Trap Method," Method 501.1, Environmental Monitoring and Support Laboratory, EPA Cincinnati, Ohio.
- (2) "The Analysis of Trihalomethanes in Drinking Water by Liquid/Liquid Extraction," Method 501.2, Environmental Monitoring and Support Laboratory, EPA Cincinnati, Ohio.
- Samples for TTHM shall be dechlorinated upon collection to prevent further production of trihalomethanes, according to the procedures described in the methods in (1) and (2) of this Subparagraph. Samples for maximum TTHM potential should not be dechlorinated, and should be held for seven days at 25! C or above prior to analysis, according to the procedures described in the methods in (1) and (2) of this Subparagraph.
- (f) Before a community water system makes any significant modifications to its existing treatment process

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for the purposes of achieving compliance with 15A NCAC 18C .1517(3), such system must submit and obtain Department approval of a detailed plan setting forth its proposed modification and those safeguards that it will implement to ensure that the bacteriological quality of the drinking water served by such system will not be adversely affected by such modification. Each system shall comply with the provisions set forth in the Department approved plan. At a minimum, a Department approved plan shall require the system modifying its disinfection practice to:

- (1) Evaluate the water system for sanitary defects and evaluate the source water for biological quality;
- (2) Evaluate its existing treatment practices and consider improvements that will minimize disinfectant demand and optimize finished water quality throughout the distribution system;
- (3) Provide baseline water quality survey data of the distribution system. Such data shall include the results from monitoring for coliform and fecal coliform bacteria, fecal streptococci, standard plate counts at 35! C and 20! C, phosphate, ammonia nitrogen and total organic carbon. Virus studies shall be required where source waters are heavily contaminated with sewage effluent;
- (4) Conduct additional monitoring to assure continued maintenance of optimal biological quality in finished water, for example, when chloramines are introduced as disinfectants or when pre-chlorination is being discontinued. Additional monitoring shall also be required by the Department for chlorate, chlorite and chlorine dioxide when chlorine dioxide is used as a disinfectant. Standard plate count analyses shall also be required by the Department as appropriate before and after any modifications;
- (5) Consider inclusion in the plan of provisions to maintain an active disinfectant residual throughout the distribution system at all times during and after the modification.

(g) The maximum contaminant levels for trihalomethanes set forth in 15A NCAC 18C .1517 shall take effect November 29, 1981 for community water systems serving seventy-five thousand (75,000) or more individuals, and November 29, 1983 for community water systems serving ten thousand (10,000) to seventy-four thousand nine hundred ninety-nine (74,999) individuals.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 CFR 141;  
 Eff. September 30, 1980;  
 Amended Eff. April 1, 1983;  
 Transferred and Recodified from 10 NCAC 10D .1635 Eff. April 4, 1990;  
 Amended Eff. August 1, 1990.*

**.1514 TREATMENT TECHNIQUES FOR TOTAL TRIHALOMETHANES**

(a) The following have been identified as the best technology, treatment techniques or other means generally available for achieving compliance with 15A NCAC 18C .1517(3):

- (1) Use of chloramines as an alternate or supplemental disinfectant or oxidant;
- (2) Use of chlorine dioxide as an alternate or supplemental disinfectant or oxidant;
- (3) Improved existing clarification for THM precursor reduction;
- (4) Moving the point of chlorination to reduce TTHM formation and, where necessary, substituting for the use of chlorine as a pre-oxidant, chloramines, chlorine dioxide or potassium permanganate;
- (5) Use of powdered activated carbon for THM precursor or TTHM reduction seasonally or intermittently at dosages not to exceed 10 mg/L on an annual average basis.

(b) A community water system or a non-transient, non-community water system shall install and use any treatment method identified in Paragraph (a) of this Rule as a condition for granting a variance unless the Secretary determines that such treatment method is not available and effective for TTHM control for the system. A treatment method shall not be considered to be "available and effective" for an individual system if the treatment method would not be technically appropriate and technically feasible for that system or would only result in a marginal reduction in TTHM for the system. If upon application by a system for a variance, the Secretary determines that none of the treatment methods identified in Paragraph (a) of this Rule is available and effective for the system, that system shall be entitled to a variance under the provisions of 15A NCAC 18C Section .1600. The Secretary's determination as to the availability and effectiveness of such treatment methods shall be based upon studies by the system and other relevant information. If a system submits information intending to demonstrate that a treatment method is not available and effective for TTHM control for that system, the Secretary shall make a finding whether this information supports a decision that such treatment method is not available and effective for that system before requiring installation and use of such treatment method.

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(c) Pursuant to 15A NCAC 18C .1604 (c) through (g), the Secretary shall issue a schedule of compliance that may require the system being granted the variance to examine the following treatment methods to determine the probability that any of these methods will significantly reduce the level of TTHM for that system, and if such probability exists, to determine whether any of these methods are technically feasible and economically reasonable, and that the TTHM reductions obtained will be commensurate with the costs incurred with the installation and use of such treatment methods for that system:

- (1) Introduction of off-line water storage for THM precursor reduction;
- (2) Aeration for TTHM reduction, where geographically and environmentally appropriate;
- (3) Introduction of clarification where not currently practiced;
- (4) Consideration of alternative sources of raw water;
- (5) Use of ozone as an alternate or supplemental disinfectant or oxidant.

(d) If the Secretary determines that a treatment method identified in Paragraph (c) of this Rule is technically feasible, economically reasonable and will achieve TTHM reductions commensurate with the costs incurred with the installation and use of such treatment method for the system, the Secretary shall require the system to install and use that treatment method in connection with a compliance schedule issued under the provisions of 15A NCAC 18C .1600. The Secretary's determination shall be based upon studies by the system and other relevant information. In no event shall the Secretary require a system to install and use a treatment method not described in Paragraphs (a) or (c) of this Rule to obtain or maintain a variance from 15A NCAC 18C .1517(3) or in connection with any variance compliance schedule.

*History Note: Authority G.S. 130A-315; P. L. 93-523; 40 C.F.R. 141; Eff. October 1, 1983; Transferred and Recodified from 10 NCAC 10D .1637 Eff. April 4, 1990; Amended Eff. August 1, 1990.*

**.1515 ORGANIC CHEMICALS OTHER THAN TTHM, SAMPLING AND ANALYSIS**

(a) The provisions of 40 C.F.R. 141.24 are hereby incorporated by reference including any subsequent amendments and editions; however, 40 C.F.R. 141.24(b) is not adopted. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

(b) If the result of an analysis made pursuant to (a) of this Rule indicates that the level of any contaminant listed in 15A NCAC 18C .1517 exceeds the maximum contaminant level, the supplier of water shall report to the Department within 48 hours and initiate three additional analyses within one month.

ADOPTED BY REFERENCE

**§141.24 Organic Chemicals Other Than Total Trihalomethanes Sampling & Analytical Requirements**

- (a) [Reserved]
- (b) [Reserved]
- (c) [Reserved]
- (d) [Reserved]
- (e) [Reserved]

(f) Beginning with the initial compliance period, analysis of the contaminants listed in §141.61(a)(1) through (21), for the purpose of determining compliance with the maximum contaminant level shall be conducted as follows:

- (1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling 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.
- (2) Surface water systems (or combined surface/ground) shall 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

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- a sampling 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) If the system draws water from more than one source and the sources are combined before distribution, the system 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).
  - (4) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in §141.61(a)(2) through (21) during each compliance period, beginning in the initial compliance period.
  - (5) If the initial monitoring for contaminants listed in §141.61(a)(1) through (21) and the monitoring for the contaminants listed in §141.61(a)(9) through (21) as allowed in paragraph (f)(18) has been completed by December 31, 1992, and the system did not detect any contaminant listed in §141.61(a)(1) through (21), then each ground and surface water system shall take one sample annually beginning with the initial compliance period.
  - (6) After a minimum of three years of annual sampling, the State may allow groundwater systems with no previous detection of any contaminant listed in §141.61(a) to take one sample during each compliance period.
  - (7) Each community and non-transient non-community groundwater system which does not detect a contaminant listed in §141.61(a)(1) through (21) may apply to the State for a waiver from the requirements of paragraphs (f)(5) and (f)(6) of this section after completing the initial monitoring. (For the purposes of this section, detection is defined as  $\geq 0.0005$  mg/l.) A waiver shall be effective for no more than six years (two compliance periods). States may also issue waivers to small systems for the initial round of monitoring for 1,2,4-trichlorobenzene.
  - (8) A State may grant a waiver after evaluating the following factor(s):
    - (i) 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 State reveals no previous use of the contaminant within the watershed or zone of influence, a waiver may be granted.
    - (ii) If previous use of the contaminant is unknown or it has been used previously, then the following factors shall be used to determine whether a waiver is granted.
      - (A) Previous analytical results.
      - (B) The proximity of the system 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 persons served by the public water system and the proximity of a smaller system to a larger system.
      - (E) How well the water source is protected against contamination, such as whether it is a surface or groundwater system. Groundwater systems must consider factors such as depth of the well, the type of soil, and wellhead protection. Surface water systems must consider watershed protection.
  - (9) As a condition of the waiver a groundwater system must take one sample at each sampling point 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 paragraph (8) of this section. Based on this vulnerability assessment the State must reconfirm that the system is non-vulnerable. If the State does not make this reconfirmation within three years of the initial determination, then the waiver is invalidated and the system is required to sample annually as specified in paragraph (5) of this section.
  - (10) Each community and non-transient non-community surface water system which does not detect a contaminant listed in §141.61(a)(2) through (21) may apply to the State for a waiver from the requirements of (f)(5) of this section after completing the initial monitoring.

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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. Systems meeting this criteria must be determined by the State to be non-vulnerable based on a vulnerability assessment during each compliance period. Each system receiving a waiver shall sample at the frequency specified by the State (if any).

- (11) If a contaminant listed in §141.61(a)(2) through (21) is detected at a level exceeding 0.0005 mg/l in any sample, then:
- (i) The system must monitor quarterly at each sampling point which resulted in a detection.
  - (ii) The State may decrease the quarterly monitoring requirement specified in paragraph (11)(i) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
  - (iii) If the State determines that the system is reliably and consistently below the MCL, the State may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter(s) which previously yielded the highest analytical result.
  - (iv) Systems which have three consecutive annual samples with no detection of a contaminant may apply to the State for a waiver as specified in paragraph (f)(7) of this section.
  - (v) Groundwater systems which 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 shall monitor quarterly for vinyl chloride. A vinyl chloride sample shall be taken at each sampling point at which one or more of the two-carbon organic compounds was detected. If the results of the first analysis do not detect vinyl chloride, the State may reduce the quarterly monitoring frequency of vinyl chloride monitoring to one sample during each compliance period. Surface water systems are required to monitor for vinyl chloride as specified by the State.
- (12) Systems which violate the requirements of §141.61(a)(1) through (21), as determined by paragraph (f)(15) of this section, must monitor quarterly. After a minimum of four consecutive quarterly samples which show the system is in compliance as specified in paragraph (f)(15) of this section the system and the State determines that the system is reliably and consistently below the maximum contaminant level, the system may monitor at the frequency and time specified in paragraph (f)(11)(iii) of this section.
- (13) The State may require a confirmation sample for positive or negative results. If a confirmation sample is required by the State, the result must be averaged with the first sampling result and the average is used for the compliance determination as specified by paragraph (f)(15). States have discretion to delete results of obvious sampling errors from this calculation.
- (14) The State 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.
- (i) If the concentration in the composite sample is  $\geq 0.0005$  mg/l for any contaminant listed in §141.61(a), then a follow-up sample must be taken within 14 days at each sampling point included in the composite, and be analyzed for that contaminant.
  - (ii) 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 duplicate must be analyzed and the results reported to the State within 14 days of collection.
  - (iii) If the population served by the system is  $> 3,300$  person, then compositing may only be permitted by the State at sampling points within a single system. In systems serving  $\leq 3,300$  persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
  - (iv) Compositing samples prior to GC analysis.
    - (A) Add 5 ml or equal larger amounts of each sample (up to 5 samples are allowed) to

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- 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 small syringe may be used.
- (v) 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.
- (15) Compliance with §141.61(a)(1) through (21) shall be determined based on the analytical results obtained at each sampling point.
- (i) For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample would cause the annual average to be exceeded, then the system is out of compliance immediately.
  - (ii) If monitoring is conducted annually, or less frequently, the system is out of compliance if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the State, the determination of compliance will be based on the average of two samples.
  - (iii) If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the State may allow the system to give public notice to only that area served by that portion of the system which is out of compliance.
- (16) Analysis for the contaminants listed in §141.61(a)(1) through (21) shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in Methods for the Determination of Organic Compounds in Drinking Water, EPA/600/4-88/039, December 1988, Revised July 1991 and are available from the National Technical Information Service (NTIS) NTIS PB91-231480 and PB91-146027, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800-553-6847.
- (i) Method 502.1, "Volatile Halogenated Organic Chemicals in Water by Purge and Trap Gas Chromatography."
  - (ii) Method 502.2, "Volatile Organic Compounds in Water by Purge and Trap Capillary Column Gas Chromatography with Photoionization and Electrolytic Conductivity Detectors in Series."
  - (iii) Method 503.1, "Volatile Aromatic and Unsaturated Organic Compounds in Water by Purge and Trap Gas Chromatography."
  - (iv) Method 524.1, "Measurement of Purgeable Organic Compounds in Water by Purged Column Gas Chromatography/Mass Spectrometry."
  - (v) Method 524.2, "Measurement of Purgeable Organic Compounds in Water by Capillary Column Gas Chromatography/Mass Spectrometry."
- (17) Analysis under this section shall only be conducted by laboratories that are certified by EPA or the State according to the following conditions (laboratories may conduct sample analysis under provisional certification until January 1, 1996):
- (i) To receive certification to conduct analyses for the contaminants in §141.61(a)(2) through (21) the laboratory must:
    - (A) Analyze Performance Evaluation samples which include these substances provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.

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- (B) Achieve the quantitative acceptance limits under paragraphs (f)(17)(i)(C) and (D) of this section for at least 80 percent of the regulated organic chemicals listed in § 141.61(a)(2) through (21).
- (C) Achieve quantitative results on the analyses performed under (f)(17)(i)(A) that are within  $\pm 20$  percent 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 (f)(17)(i)(A) of this section that are within  $\pm 40$  percent 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 Part 136.
- (ii) To receive certification for vinyl chloride, the laboratory must:
  - (A) Analyze Performance Evaluation samples provided by EPA Environmental Monitoring Systems Laboratory or equivalent samples provided by the State.
  - (B) Achieve quantitative results on the analyses performed under (f)(17)(ii)(A) of this section that are within  $\pm 40$  percent 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 Part 136.
  - (D) Obtain certification for the contaminants listed in § 141.61(a)(2) through (21).
- (18) States may allow the use of monitoring data collected after January 1, 1988 required under section 1445 of the Act for purposes of initial monitoring compliance. If the data are generally consistent with the other requirements in this section, the State may use these data (i.e., a single sample rather than four quarterly samples) to satisfy the initial monitoring requirement of paragraph (f)(4) of this section. Systems which use grandfathered samples and did not detect any contaminants listed in § 141.61(a)(2) through (21) shall begin monitoring annually in accordance with paragraph (f)(5) of this section beginning with the initial compliance period.
- (19) States may increase required monitoring where necessary to detect variations within the system.
- (20) Each certified laboratory must determine the method detection limit (MDL), as defined in Appendix B to Part 136, 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 this section.
- (21) Each public water system shall monitor at the time designated by the State within each compliance period.
- (g) [Reserved]
- (h) Analysis of the contaminants listed in §141.61(c) for the purposes of determining compliance with the maximum contaminant level shall be conducted as follows:
  - (1) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling 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 systems [Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.] shall 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). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
  - (3) If the system draws water from more than one source and the sources are combined before distribution, the system 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).
  - (4) (i) Each community and non-transient non-community water system shall take four consecutive quarterly samples for each contaminant listed in §141.61(c) during each compliance period beginning with the initial compliance period.
  - (ii) Systems serving more than 3,300 persons which 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.
- (iii) Systems serving less than or equal to 3,300 persons which 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) Each community and non-transient water system may apply to the State for a waiver from the requirement of paragraph (h)(4) of this section. A system must reapply for a waiver for each compliance period.
- (6) A State 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 system. If a determination by the State 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 shall be used to determine whether a waiver is granted.
- (i) Previous analytical results.
  - (ii) The proximity of the system 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 the use of pesticides to control insect and weed pests on agricultural areas, forest lands, home and gardens, and other land application uses.
  - (iii) The environmental persistence and transport of the pesticide or PCBs.
  - (iv) 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.
  - (v) Elevated nitrate levels at the water supply source.
  - (vi) Use of PCBs in equipment used in the production, storage, or distribution of water (i.e., PCBs used in pumps, transformers, etc.).
- (7) If an organic contaminant listed in §141.61(c) is detected (as defined by paragraph (19) of this section) in any sample, then:
- (i) Each system must monitor quarterly at each sampling point which resulted in a detection.
  - (ii) The State may decrease the quarterly monitoring requirement specified in paragraph (7)(i) of this section provided it has determined that the system is reliably and consistently below the maximum contaminant level. In no case shall the State make this determination unless a groundwater system takes a minimum of two quarterly samples and a surface water system takes a minimum of four quarterly samples.
  - (iii) After the State determines the system is reliably and consistently below the maximum contaminant level the State may allow the system to monitor annually. Systems which monitor annually must monitor during the quarter that previously yielded the highest analytical result.
  - (iv) Systems which have 3 consecutive annual samples with no detection of a contaminant may apply to the State for a waiver as specified in paragraph (h)(6) of this section.
  - (v) 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 shall analyze for all related contaminants.
- (8) Systems which violate the requirements of § 141.61(c) as determined by paragraph (h)(11) of this section must monitor quarterly. After a minimum of four quarterly samples show the system is in compliance and the State determines the system is reliably and consistently below the MCL, as specified in paragraph (h)(11) of this section, the system shall monitor at the frequency specified in paragraph (h)(7)(iii) of this section.
- (9) The State may require a confirmation sample for positive or negative results. If a confirmation sample is required by the State, the result must be averaged with the first sampling result and the average used for the compliance determination as specified by paragraph (11). States have discretion to delete results of obvious sampling errors from this calculation.
- (10) The State 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.

- (i) If the concentration in the composite sample detects one or more contaminants listed in §141.61(c), then a follow-up sample must be taken within 14 days at each sampling point included in the composite, and be analyzed for that contaminant.
  - (ii) If duplicates of the original sample taken from each sampling point used in the composite are available, the system may use these duplicates instead of resampling. The duplicate must be analyzed and the results reported to the State within 14 days of collection.
  - (iii) If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.
- (11) Compliance with §141.61(c) shall be determined based on the analytical results obtained at each sampling point.
- (i) For systems which are conducting monitoring at a frequency greater than annual, compliance is determined by a running annual average of all samples taken at each sampling point. If the annual average of any sampling point is greater than the MCL, then the system is out of compliance. If the initial sample or a subsequent sample would cause the annual average to be exceeded, then the system is out of compliance immediately. Any samples below the detection limit shall be calculated as zero for purposes of determining the annual average.
  - (ii) If monitoring is conducted annually, or less frequently, the system is out of compliance if the level of a contaminant at any sampling point is greater than the MCL. If a confirmation sample is required by the State, the determination of compliance will be based on the average of two samples.
  - (iii) If a public water system has a distribution system separable from other parts of the distribution system with no interconnections, the State may allow the system to give public notice to only that portion of the system which is out of compliance.
- (12) Analysis for the contaminants listed in §141.61(c) and for endrin in §141.12(a) shall be conducted using the following EPA methods or their equivalent as approved by EPA. These methods are contained in Methods for the Determination of Organic Compounds in Drinking Water, ORD Publications, CERL, EPA/600/4-88/039, December 1988, Revised July 1991 and in "Methods for the Determination of Organic Compounds in Drinking Water - Supplement I", EPA/600/4-90/020, July 1990, and "Supplement II", EPA/600/R-92/129, August 1992, Environmental Monitoring Systems Laboratory, Cincinnati, OH 45268. These documents are available from the National Technical Information Service (NTIS) NTIS PB91-231480, PB91-146027 and PB92-207703, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The NTIS toll-free number is 1-800-553-6847.
- (i) Method 504, "1,2-Dibromoethane (EDB) and 1,2-Dibromo-3-chloropropane (DBCP) in Water by Microextraction and Gas Chromatography." Method 504 can be used to measure dibromochloropropane (DBCP) and ethylene dibromide (EDB).
  - (ii) Method 505, "Analysis of Organohalide Pesticides and Commercial Polychlorinated Biphenyl Products (Aroclors) in Water by Microextraction and Gas Chromatography." Method 505 can be used to measure alachlor, atrazine, chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, toxaphene, and simazine. Method 505 can be used as a screen for PCBs.
  - (iii) Method 507, "Determination of Nitrogen- and Phosphorus-Containing Pesticides in Ground Water by Gas Chromatography with a Nitrogen-Phosphorus Detector." Method 507 can be used to measure alachlor, atrazine, and simazine.
  - (iv) Method 508, "Determination of Chlorinated Pesticides in Water by Gas Chromatography with an Electron Capture Detector." Method 508 can be used to measure chlordane, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, lindane, methoxychlor and toxaphene. Method 508 can be used as a screen for PCBs.

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- (v) Method 508A, "Screening for Polychlorinated Biphenyls by Perchlorination and Gas Chromatography." Method 508A is used to quantitate PCBs as decachlorobiphenyl if detected in Methods 505 or 508.
  - (vi) Method 515.1, "Determination of Chlorinated Acids in Water by Gas Chromatography with an Electron Capture Detector." Method 515.1 can be used to measure 2,4-D, dalapon, dinoseb, pentachlorophenol, picloram, and 2,4,5-TP (Silvex).
  - (vii) Method 525.1, "Determination of Organic Compounds in Drinking Water by Liquid-Solid Extraction and Capillary Column Gas Chromatography/Mass Spectrometry." Method 525.1 can be used to measure alachlor, atrazine, chlordane, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, endrin, heptachlor, heptachlor epoxide, hexachlorobenzene, hexachlorocyclopentadiene, lindane, methoxychlor, pentachlorophenol, polynuclear aromatic hydrocarbons, simazine, and toxaphene.
  - (viii) Method 531.1, "Measurement of N-Methyl Carbamoyloximes and N-Methyl Carbamates in Water by Direct Aqueous Injection HPLC with Post-Column Derivatization." Method 531.1 can be used to measure aldicarb, aldicarb sulfoxide, aldicarb sulfone, carbofuran, and oxamyl.
  - (ix) Method 1613, "Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope Dilution." Method 1613 can be used to measure 2,3,7,8-TCDD (dioxin). This method is available from USEPA-OST, Sample Control Center, P.O. Box 1407, Alexandria, VA 22313.
  - (x) Method 547, "Analysis of Glyphosate in Drinking Water by Direct Aqueous Injection HPLC with Post-Column Derivatization" Method 547 can be used to measure glyphosate.
  - (xi) Method 548, "Determination of Endothall in Aqueous Samples." Method 548 can be used to measure endothall.
  - (xii) Method 549, "Determination of Diquat and Paraquat in Drinking Water by High Performance Liquid Chromatography with Ultraviolet Detection." Method 549 can be used to measure diquat.
  - (xiii) Method 550, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Liquid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550 can be used to measure benzo(a)pyrene and other polynuclear aromatic hydrocarbons.
  - (xiv) Method 550.1, "Determination of Polycyclic Aromatic Hydrocarbons in Drinking Water by Liquid-Solid Extraction and HPLC with Coupled Ultraviolet and Fluorescence Detection." Method 550.1 can be used to measure benzo(a)pyrene and other polynuclear aromatic hydrocarbons.
  - (xv) Method 506, "Determination of Phthalate and Adipate Esters in Drinking Water by Liquid-Liquid Extraction or Liquid-Solid Extraction and Gas Chromatography with Photoionization Detection." Method 506 can be used to measure di(2-ethylhexyl) adipate and di(2-ethylhexyl) phthalate.
- (13) Analysis for PCBs shall be conducted as follows:
- (i) Each system which monitors for PCBs shall analyze each sample using either Method 505 or Method 508 (see paragraph (h)(12) of this section).
  - (ii) If PCBs (as one of seven Aroclors) are detected (as designated in this paragraph) in any sample analyzed using Methods 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

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Aroclor	Detection limit (mg/l)
1016 .....	0.00008
1221 .....	0.02
1232 .....	0.0005
1242 .....	0.0003
1248 .....	0.0001
1254 .....	0.0001
1260 .....	0.0002

- (iii) Compliance with the PCB MCL shall be determined based upon the quantitative results of analyses using Method 508A.
- (14) If monitoring data collected after January 1, 1990, are generally consistent with the requirements of (h), then the State may allow systems to use that data to satisfy the monitoring requirement for the initial compliance period beginning January 1, 1993.
- (15) The State 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).
- (16) The State has the authority to determine compliance or initiate enforcement action based upon analytical results and other information compiled by their sanctioned representatives and agencies.
- (17) Each public water system shall monitor at the time designated by the State within each compliance period.
- (18) Detection as used in this paragraph shall be defined as greater than or equal to the following concentrations for each contaminant.

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Contaminant	Detection limit (mg/l)
Alachlor .....	.0002
Aldicarb .....	.0005
Aldicarb sulfoxide .....	.0005
Aldicarb sulfone .....	.0008
Atrazine .....	.0001
Benzo[a]pyrene .....	.00002
Carbofuran .....	.0009
Chlordane .....	.0002
Dalapon .....	.001
Dibromochloropropane (DBCP) .....	.00002
Di (2-ethylhexyl) adipate .....	.0006
Di (2-ethylhexyl) phthalate .....	.0006
Dinoseb .....	.0002
Diquat .....	.0004
2,4-D .....	.0001
Endothall .....	.009
Endrin .....	.00001
Ethylene dibromide (EDB) .....	.00001
Glyphosate .....	.006
Heptachlor .....	.00004
Heptachlor epoxide .....	.00002
Hexachlorobenzene .....	.0001
Hexachlorocyclopentadiene .....	.0001
Lindane .....	.00002
Methoxychlor .....	.0001
Oxamyl .....	.002
Picloram .....	.0001
Polychlorinated biphenyls (PCBs) (as decachlorobiphenyl) .....	.0001
Pentachlorophenol .....	.00004
Simazine .....	.00007
Toxaphene .....	.001
2,3,7,8-TCDD (Dioxin) .....	.000000005
2,4,5-TP (Silvex) .....	.0002

- (19) Analysis under this section shall only be conducted by laboratories that have received certification by EPA or the State and have met the following conditions:
- (i) To receive certification to conduct analyses for the contaminants in § 141.61(c) 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 State.
    - (B) Achieve quantitative results on the analyses that are within the following acceptance limits:

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Contaminant	Acceptance limits (percent)
DBCP	± 40.
EDB	± 40.
Alachlor	± 45.
Atrazine	± 45.
Benzo[a]pyrene	2 standard deviations.
Carbofuran	± 45.
Chlordane	± 45.
Dalapon	2 standard deviations.
Di(2-ethylhexyl)adipate	2 standard deviations.
Di(2-ethylhexyl)phthalate	2 standard deviations.
Dinoseb	2 standard deviations.
Diquat	2 standard deviations.
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.
Picloram	2 standard deviations.
Simazine	2 standard deviations.
Toxaphene	± 45.
Aldicarb	2 standard deviations.
Aldicarb sulfoxide	2 standard deviations.
Aldicarb sulfone	2 standard deviations.
Pentachlorophenol	± 50.
2,3,7,8-TCDD (Dioxin)	2 standard deviations.
2,4-D	± 50.
2,4-TP (Silvex)	± 50.

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. November 1, 1989; December 1, 1988; June 1, 1988; October 1, 1982; Transferred and Recodified from 10 NCAC 10D .1624 Eff. April 4, 1990; Amended Eff. April 1, 1992; December 1, 1991; September 1, 1990.

**.1516 SPECIAL MONITORING FOR INORGANIC AND ORGANIC CHEMICALS**

(a) The provisions of 40 C.F.R. 141.40 are hereby incorporated by reference including any subsequent amendments and editions, except that 40 C.F.R. 141.40(n)(10) is not adopted. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

(b) To comply with the monitoring requirements of this Rule a community water system or non-transient, non-community water system serving fewer than 150 service connections shall take a single water sample to be analyzed for inorganic and organic chemicals.

(c) Travel trailer parks, campgrounds, and marina slips that are community water systems as defined by G.S. 130A-313(10), but do not serve 25 or more of the same persons more than six months per year shall be exempt from the provisions of this Rule.

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§141.40 Special Monitoring for Inorganic and Organic Contaminants

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(a) All community and non-transient, non-community water systems shall monitor for the contaminants listed in paragraph (e) in this section by date specified in Table 1:

TABLE 1. — MONITORING SCHEDULE BY SYSTEM SIZE

Number of Persons Served	Monitoring to begin no later than -
Over 10,000 .....	January 1, 1988
3,300 to 10,000 .....	January 1, 1989
Less than 3,300 .....	January 1, 1991

(b) Surface water systems shall sample at points in the distribution system representative of each water source or at entry points to the distribution system after any application of treatment. The minimum number of samples is one year of quarterly samples per water source.

(c) Ground water systems shall sample at points of entry to the distribution system representative of each well after any application of treatment. The minimum number of samples is one sample per entry point to the distribution system.

(d) The State may require confirmation sample for positive or negative results.

(e) Community water systems and non-transient, non-community water systems shall monitor for the following contaminants except as provided in paragraph (f) of this section:

- (1) Chloroform
- (2) Bromodichloromethane
- (3) Chlorodibromomethane
- (4) Bromoform
- (5) Dibromomethane
- (6) m-Dichlorobenzene
- (8) 1,1-Dichloropropene
- (9) 1,1-Dichloroethane
- (10) 1,1,2,2-Tetrachloroethane
- (11) 1,3-Dichloropropane
- (12) Chloromethane
- (13) Bromomethane
- (14) 1,2,3-Trichloropropane
- (15) 1,1,1,2-Tetrachloroethane
- (16) Chloroethane
- (17) 2,2-Dichloropropane
- (18) o-Chlorotoluene
- (19) p-Chlorotoluene
- (20) Bromobenzene
- (21) 1,3-Dichloropropene

(f) [Reserved]

(g) Analysis of the organic contaminants in paragraphs (e) and (j) of this section shall be conducted using the recommended EPA methods, or their equivalent as determined by EPA. These methods are contained in reference at §141.24(f)(16)

(h) Analysis under this section shall only be conducted by laboratories certified under §141.24(g)(17).

(i) Public water systems may use monitoring data collected any time after January 1, 1983 to meet the requirements for unregulated monitoring, provided that the monitoring program was consistent with the requirements of this section. In addition, the results of EPA's Ground Water Supply Survey may be used in a similar manner for systems supplied by a single well.

(j) Monitoring for the following compounds is required at the discretion of the State:

- (1) 1,2,4-Trimethylbenzene
- (2) 1,2,3-Trichlorobenzene
- (3) n-Propylbenzene

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- (4) n-Butylbenzene
- (5) Naphthalene
- (6) Hexachlorobutadiene
- (7) 1,3,5-Trimethylbenzene
- (8) p-Isopropyltoluene
- (9) Isopropylbenzene
- (10) Tert-butylbenzene
- (11) Sec-butylbenzene
- (12) Fluorotrichloromethane
- (13) Dichlorodifluoromethane
- (14) Bromochloromethane

(k) Instead of performing the monitoring required by this section, a community water system or non-transient non-community water system serving fewer than 150 service connections may send a letter to the State stating that the system is available for sampling. This letter must be sent to the State no later than January 1, 1991. The system shall not send such samples to the State, unless requested to do so by the State.

(l) All community and non-transient, non-community water systems shall repeat the monitoring required in §141.40 no less frequently than every five years from the dates specified in §141.40(a).

(m) States or public water systems may composite up to five samples when monitoring for substances in §141.40(e) and (j) of this section.

(n) Monitoring of the contaminants listed in §141.40(n)(11) and (12) shall be conducted as follows:

- (1) Each community and non-transient, non-community water system shall take four consecutive quarterly samples at each sampling point for each contaminant listed in paragraph (n)(11) of this section and report the results to the State. Monitoring must be completed by December 31, 1995.
- (2) Each community and non-transient non-community water system shall take one sample at each sampling point for each contaminant listed in paragraph (n)(12) of this section and report the results to the States. Monitoring must be completed by December 31, 1995.
- (3) Each community and non-transient non-community water system may apply to the State for a waiver from the requirements of paragraph (n)(1) and (2) of this section.
- (4) The State may grant a waiver for the requirement of paragraph (n)(1) of this section based on the criteria specified in §141.24(h)(6). The State may grant a waiver from the requirement of paragraph (n)(2) of this section if previous analytical results indicate contamination would not occur, provided this data was collected after January 1, 1990.
- (5) Groundwater systems shall take a minimum of one sample at every entry point to the distribution system which is representative of each well after treatment (hereafter called a sampling 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.
- (6) Surface water systems [Note: For purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.] shall 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). Each sample must be taken at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.
- (7) If the system draws water from more than one source and the sources are combined before distribution, the system 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).
- (8) The State may require a confirmation sample for positive or negative results.
- (9) The State 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. Compositing of samples must be done in the laboratory and the composite sample must be analyzed within 14 days of collection. If the population served by the system is >3,300 persons, then compositing may only be permitted by the State at sampling points within a single system. In systems serving ≤3,300 persons, the State may permit compositing among different systems provided the 5-sample limit is maintained.

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- (10) Instead of performing the monitoring required by this section, a community water system or non-transient non-community water system serving fewer than 150 service connections may send a letter to the State stating that the system is available for sampling. This letter must be sent to the State by January 1, 1994. The system shall not send such samples to the State, unless requested to do so by the State.
- (11) The listed methods are in the manuals cited in §141.26(h)(12). List of Unregulated Organic Contaminants:

Organic Contaminants	EPA Analytical Method
Aldicarb .....	531.1
Aldicarb sulfone .....	531.1
Aldicarb sulfoxide .....	531.1
Aldrin .....	505, 508, 525
Butachlor .....	507, 525.1
Carbaryl .....	531.1
Dicamba .....	515.1
Dieldrin .....	505, 508, 525.1
3-Hydroxycarbofuran .....	531.1
Methomyl .....	531.1
Metolachlor .....	507, 525.1
Metribuzin .....	507, 508, 525.1
Propachlor .....	508, 525.1

(12) List of Unregulated Inorganic Contaminants:

Inorganic Contaminants	EPA Analytical Method
Sulfate .....	Colorimetric

History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. June 1, 1988; Amended Eff. November 1, 1989; Transferred and Recodified from 10 NCAC 10D .1638 Eff. April 4, 1990; Amended Eff. July 1, 1994; April 1, 1992; December 1, 1991; August 1, 1990.

**.1517 MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CHEMICALS**

The provisions of 40 C.F.R. 141.12 are hereby incorporated by reference including any subsequent amendments and editions. However, the maximum contaminant level for total trihalomethanes shall apply to all community water systems and non-transient, non-community water systems regardless of population which add a disinfectant (oxidant) to the water in any part of the drinking water treatment process. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

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**§141.12 Maximum Contaminant Levels for Organic Chemicals**

The following are the maximum contaminant levels for organic chemicals. The maximum contaminant levels for organic chemicals in paragraph (a) of this section apply to all community water systems. Compliance with the maximum contaminant level in paragraph (a) of this section is calculated pursuant to §141.24. The maximum contaminant level for total trihalomethanes in paragraph (c) of this section applies only to community water systems which serve a population of 10,000 or more individuals and which add

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a disinfectant (oxidant) to the water in any part of the drinking water treatment process. Compliance with the maximum contaminant level for total trihalomethanes is calculated pursuant to §141.30.

	Level milligrams per liter
(a) [Reserved]	
(b) [Reserved]	
(c) Total trihalomethanes (the sum of the concentrations of bromodichloromethane, dibromochloromethane, tribromomethane (bromoform) and trichloromethane (chloroform))	0.10

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. September 30, 1980; Transferred and Recodified from 10 NCAC 10D .1615 Eff. April 4, 1990; Amended Eff. April 1, 1992; August 1, 1990.*

**.1518 MAXIMUM CONTAMINANT LEVELS FOR ORGANIC CONTAMINANTS**

The provisions of 40 C.F.R. 141.61 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

**ADOPTED BY REFERENCE**

**§141.61 Maximum Contaminant Levels For Organic Contaminants**

(a) The following maximum contaminant levels for organic contaminants apply to community and non-transient, non-community water systems.

CAS No.	Contaminant	MCL (mg/l)
(1) 75-01-4	Vinyl chloride	0.002
(2) 71-43-2	Benzene	0.005
(3) 56-23-5	Carbon tetrachloride	0.005
(4) 107-06-02	1,2-Dichloroethane	0.005
(5) 79-01-6	Trichloroethylene	0.005
(6) 106-46-7	para-Dichlorobenzene	0.075
(7) 75-35-4	1,1-Dichloroethylene	0.007
(8) 71-55-6	1,1,1-Trichloroethane	0.2
(9) 156-59-2	cis-1,2-Dichloroethylene	0.07
(10) 78-87-5	1,2-Dichloropropane	0.005
(11) 100-41-4	Ethylbenzene	0.7
(12) 108-90-7	Monochlorobenzene	0.1
(13) 95-50-1	o-Dichlorobenzene	0.6
(14) 100-42-5	Styrene	0.1
(15) 127-18-4	Tetrachloroethylene	0.005
(16) 108-88-3	Toluene	1
(17) 156-60-5	trans-1,2-Dichloroethylene	0.1
(18) 1330-20-7	Xylenes (total)	10
(19) 75-09-2	Dichloromethane	0.005
(20) 120-82-1	1,2,4-Trichlorobenzene	.07
(21) 79-00-5	1,1,2-Trichloroethane	.005

(b) The Administrator, pursuant to Section 1412 of the Act, hereby identifies as indicated in the Table

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below either 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 paragraphs (a) and (c) of this section:

BAT for Organic Contaminants Listed in §141.61(a) and (c)				
CAS No.	Chemical	GAC	PTA	OX
15972-60-8	Alachlor	X		
116-06-03	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	
50-32-8	Benzo[a]pyrene	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	
78-87-5	1,2-Dichloropropane	X	X	
88-85-7	Dinoseb	X		
85-00-7	Diquat	X		
45-73-3	Endothall	X		
72-20-8	Endrin	X		
100-41-4	Ethylbenzene	X	X	
106-93-4	Ethylene Dibromide (EDB)	X	X	
1071-53-6	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	
135-22-0	Oxamyl (Vydate)	X		
87-86-5	Pentachlorophenol	X		
1918-02-1	Picloram	X		
1336-36-3	Polychlorinated biphenyls (PCBs)	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	
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	

(c) The following maximum contaminant levels for organic contaminants apply to community water systems and non-transient, non-community water systems.

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CAS No.	Contaminant	MCL (mg/l)
(1) 15972-60-8	Alachlor	0.002
(2) 116-06-3	Aldicarb	0.002
(3) 1646-87-3	Aldicarb sulfoxide	0.004
(4) 1646-87-4	Aldicarb sulfone	0.003
(5) 1912-24-9	Atrazine	0.003
(6) 1563-66-2	Carbofuran	0.04
(7) 57-74-9	Chlordane	0.002
(8) 96-12-8	Dibromochloropropane	0.0002
(9) 94-75-7	2,4-D	0.07
(10) 106-93-4	Ethylene dibromide	0.00005
(11) 76-44-8	Heptachlor	0.0004
(12) 1024-57-3	Heptachlor epoxide	0.0002
(13) 58-89-9	Lindane	0.0002
(14) 72-43-5	Methoxychlor	0.04
(15) 1336-36-3	Polychlorinated biphenyls	0.0005
(16) 87-86-5	Pentachlorophenol	0.001
(17) 8001-35-2	Toxaphene	0.003
(18) 93-72-1	2,4,5-TP	0.05
(19) 50-32-8	Benzo[a]pyrene	0.0002
(20) 75-99-0	Dalapon	0.2
(21) 103-23-1	Di(2-ethylhexyl)adipate	0.4
(22) 117-81-7	Di(2-ethylhexyl)phthalate	0.006
(23) 88-85-7	Dinoseb	0.007
(24) 85-00-7	Diquat	0.02
(25) 145-73-3	Endothall	0.1
(26) 72-20-8	Endrin	0.002
(27) 1071-53-6	Glyphosate	0.7
(28) 118-74-1	Hexachlorobenzene	0.001
(29) 77-47-4	Hexachlorocyclopentadiene	0.05
(30) 23135-22-0	Oxamyl (Vydate)	0.2
(31) 1918-02-1	Picloram	0.5
(32) 122-34-9	Simazine	0.004
(33) 1746-01-6	2,3,7,8-TCDD (Dioxin)	3 x 10 <sup>-8</sup>

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. June 1, 1988; Transferred and Recodified from 10 NCAC 10D .1639 Eff. April 4, 1990; Amended Eff. April 1, 1992.*

**.1519 MONITORING FREQUENCY FOR RADIOACTIVITY**

(a) The provisions of 40 C.F.R. 141.26 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

(b) An adjacent water system shall conform to the following sampling schedule rather than the schedule set forth in 40 C.F.R. 141.26(a) and (b). A water supplier shall take samples for gross alpha particle activity, radium-226 and radium-228, and for man-made radioactivity from the water system when the Secretary determines that the system is in an area subject to radiological contamination. When the sampling is required, a water supplier shall submit samples every four years from each section of the water system supplied from a separate source.

(c) Travel trailer parks, campgrounds, and marina slips that are community water systems as defined by G.S. 130A-313(10), but do not serve 25 or more of the same persons more than six months per year shall monitor the same as required by adjacent systems in Paragraph (b) of this Rule.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141; Eff. September 1, 1979; Amended Eff. March 1, 1989; September 9, 1980; December 19, 1979; Transferred and Recodified from 10 NCAC 10D .1627 Eff. April 4, 1990. Amended Eff. July 1, 1994.*

**.1520 MAXIMUM CONTAMINANT LEVELS FOR RADIUM**

The provisions of 40 C.F.R. 141.15 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members

may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979;  
Transferred and Recodified from 10 NCAC 10D .1617 Eff. April 4, 1990;  
Amended Eff. July 1, 1994.*

#### **.1521 MAXIMUM CONTAMINANT LEVELS FOR MAN-MADE RADIONUCLIDES**

The provisions of 40 C.F.R. 141.16 are hereby incorporated by reference including any subsequent amendments and editions. This material is available for inspection at the Department of Environment, Health, and Natural Resources, Division of Environmental Health, 1330 Saint Mary's Street, Raleigh, North Carolina. Non-members may obtain copies from the American Water Works Association, Information Services, 6666 West Quincy Avenue, Denver, Colorado 80235 at a cost of fifteen dollars (\$15.00) up to 20 pages and thirty cents (\$0.30) per page for each additional page.

*History Note: Authority G.S. 130A-315; P.L. 93-523; 40 C.F.R. 141;  
Eff. September 1, 1979;  
Transferred and Recodified from 10 NCAC 10D .1618 Eff. April 4, 1990;  
Amended Eff. July 1, 1994.*

#### **.1522 ANALYTICAL METHODS FOR RADIOACTIVITY**

(a) The methods specified in "INTERIM RADIOCHEMICAL METHODOLOGY FOR DRINKING WATER," Environmental Monitoring and Support Laboratory, EPA-600/4-75-008, USEPA, Cincinnati, Ohio 45268, or those listed below, which are adopted by reference in accordance with G.S. 150B-14(c), shall be used to determine compliance with Rules .1520 and .1521 of this Section except in cases where alternative methods have been approved in accordance with Rule .1528 of this Section:

- (1) Gross Alpha and Beta Method 302 "Gross Alpha and Beta Radioactivity in Water," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.;
- (2) Total Radium-Method 304 "Radium in Water by Precipitation," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.;
- (3) Radium-226-Method 305 "Radium-226 by Radon in Water," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.;
- (4) Strontium-89,90-Method 303 "Total Strontium and Strontium-90 in Water," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.;
- (5) Tritium-Method 306 "Tritium in Water," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.;
- (6) Cesium-134-ASTM D-2459 "Gamma Spectrometry in Water," ANNUAL BOOK OF ASTM STANDARDS, WATER AND ATMOSPHERIC ANALYSIS, Part 31, American Society for Testing and Materials, Philadelphia, PA;
- (7) Uranium-ASTM D-2907 "Micro-quantities of Uranium in Water by Fluorometry," STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER, American Public Health Association, New York, N.Y.

(b) When the identification and measurement of radionuclides other than those listed in (a) of this Rule is required, the following references, which are adopted by reference in accordance with G.S. 150B-14(c), shall be used, except in cases where alternative methods have been approved in accordance with Rule .1528 of this Section.

- (1) PROCEDURES FOR RADIOCHEMICAL ANALYSIS OF NUCLEAR REACTOR AQUEOUS SOLUTIONS, H.L. Krieger and S. Godd, EPA-R4-73-014; USEPA, Cincinnati, Ohio;
- (2) HASL PROCEDURE MANUAL, Edited by John H. Harley, HASL 300, ERDA Health and Safety Laboratory, New York, N. Y.

(c) For the purpose of monitoring radioactivity concentrations in drinking water, the required sensitivity of the