United States
Environmental Protection
Agency

Office of Water
(4606)

EPA 816-F-01-003
June 2001

Radionuclides Rule: A Quick Reference Guide

Overview of the Rule

Title	**Radionuclides Rule** **66 FR 76708** **December 7, 2000** **Vol. 65, No. 236**
Purpose	**Reducing the exposure to radionuclides in drinking water will reduce the risk of cancer. This rule will also improve public health protection by reducing exposure to all radionuclides.**
General Description	**The rule retains the existing MCLs for combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon activity. The rule regulates uranium for the first time.**
Utilities Covered	**Community water systems, all size categories.**

Public Health Benefits

Implementation of the Radionuclides Rule will result in . . .	**Reduced uranium exposure for 620,000 persons, protection from toxic kidney effects of uranium, and a reduced risk of cancer.**
Estimated impacts of the Radionuclides Rule include . . .	**Annual compliance costs of $81 million.** **Only 795 systems will have to install treatment.**

Regulated Contaminants

Regulated Radionuclide	MCL	MCLG
Beta/photon emitters*	**4 mrem/yr**	**0**
Gross alpha particle	**15 pCi/L**	**0**
Combined radium-226/228	**5 pCi/L**	**0**
Uranium	**30 µg/L**	**0**

***A total of 168 individual beta particle and photon emitters may be used to calculate compliance with the MCL.**

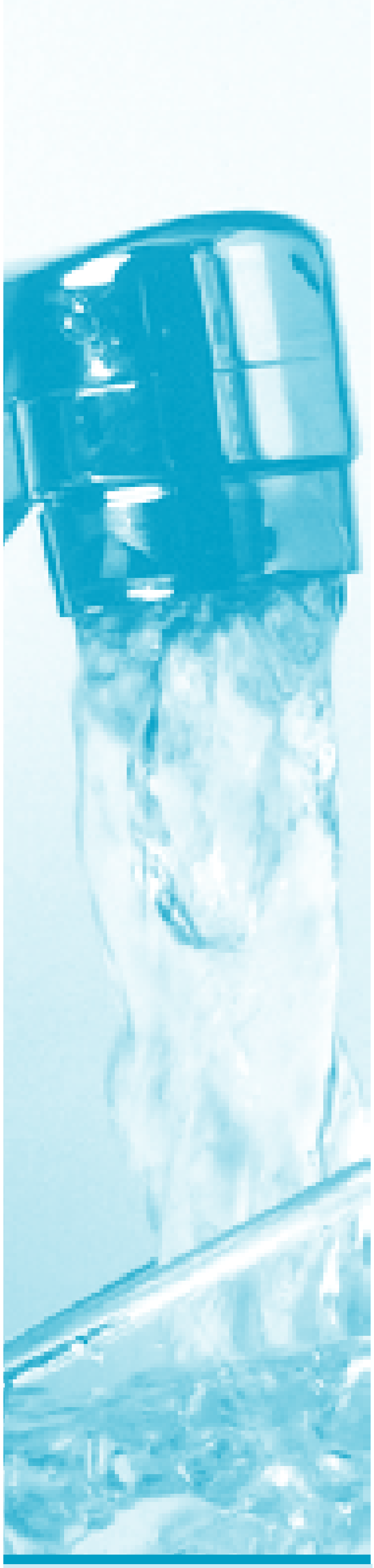
Critical Deadlines & Requirements

For Drinking Water Systems

June 2000 - December 8, 2003	**When allowed by the State, data collected between these dates may be eligible for use as grandfathered data (excluding beta particle and photon emitters).**
December 8, 2003	**Systems begin initial monitoring under State-specified monitoring plan unless the State permits use of grandfathered data.**
December 31, 2007	**All systems must complete initial monitoring.**

For States

December 2000 - December 2003	**States work with systems to establish monitoring schedules.**
December 8, 2000	**States should begin to update vulnerability assessments for beta photon and particle emitters and notify systems of monitoring requirements.**
Spring 2001	**EPA meets and works with States to explain new rules and requirements and to initiate adoption and implementation activities.**
December 8, 2002	**State submits primacy revision application to EPA. (EPA approves within 90 days.)**



For additional information on the Radionuclides Rule

Call the Safe Drinking Water Hotline at 1-800-426-4791; visit the EPA Web site at www.epa.gov/safewater; or contact your State drinking water representative. EPA will provide radionuclide training over the next year.

Monitoring Requirements

Gross Alpha, Combined Radium-226/228, and Uranium (1)	Beta Particle and Photon Radioactivity (1)
Initial Monitoring	
Four consecutive quarters of monitoring.	No monitoring required for most CWSs. Vulnerable CWSs (2) must sample for: • Gross beta: quarterly samples. • Tritium and Strontium-90: annual samples.
Reduced Monitoring	
If the average of the initial monitoring results for each contaminant is below the detection limit: One sample every 9 years. If the average of the initial monitoring results for each contaminant is greater than or equal to the detection limit, but less than or equal to one-half the MCL: One sample every 6 years. If the average of the initial monitoring results for each contaminant is greater than one-half the MCL, but less than or equal to the MCL: One sample every 3 years.	If the running annual average of the gross beta particle activity minus the naturally occurring potassium-40 activity is less than or equal to 50 pCi/L: One sample every 3 years.
Increased Monitoring	
A system with an entry point result above the MCL must return to quarterly sampling until 4 consecutive quarterly samples are below the MCL.	If gross beta particle activity minus the naturally occurring potassium-40 activity exceeds 50 pCi/L, the system must: • Speciate as required by the State. • Sample at the initial monitoring frequency.

(1) All samples must be collected at each entry point to the distribution system.
(2) The rule also contains requirements for CWSs using waters contaminated by effluents from nuclear facilities.

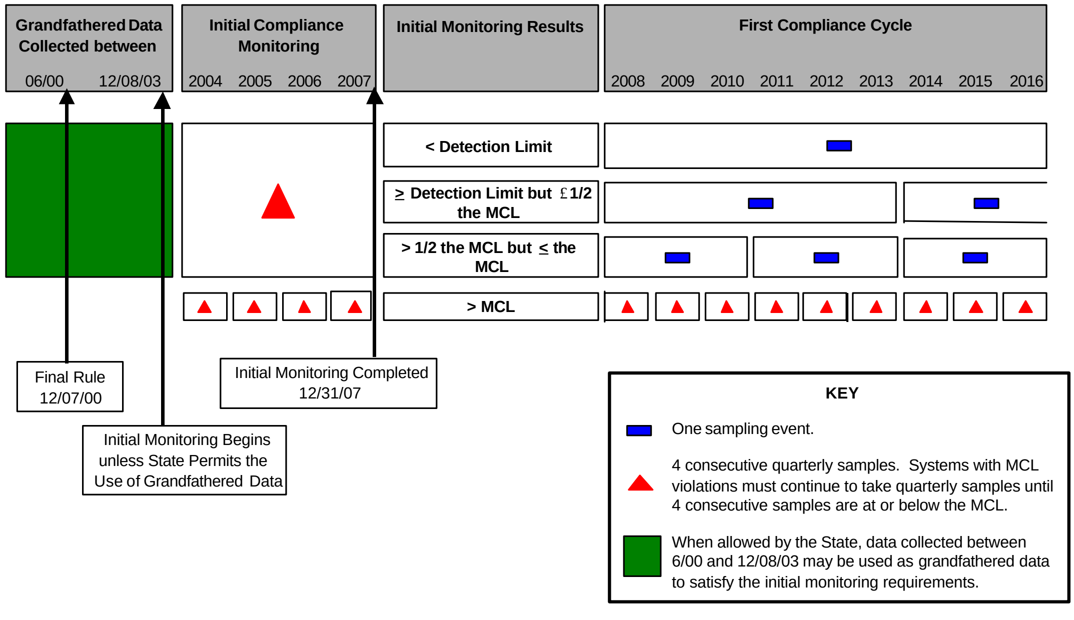
Grandfathering of Data

When allowed by the State, data collected between June, 2000 and December 8, 2003 may be used to satisfy the initial monitoring requirements if samples have been collected from:

- Each entry point to the distribution system (EPTDS).
- The distribution system, provided the system has a single EPTDS.
- The distribution system, provided the State makes a written justification explaining why the sample is representative of all EPTDS.

Applicability of the Standardized Monitoring Framework to Radionuclides

(Excluding the Beta Particle and Photon Emitters)



KEY

▬ One sampling event.

▲ 4 consecutive quarterly samples. Systems with MCL violations must continue to take quarterly samples until 4 consecutive samples are at or below the MCL.

🟩 When allowed by the State, data collected between 6/00 and 12/08/03 may be used as grandfathered data to satisfy the initial monitoring requirements.

United States
Environmental
Protection Agency

Implementation Guidance for Radionuclides

Office of Ground Water and
Drinking Water (4606M)
EPA 816-F-00-002
www.epa.gov/safewater
March 2002

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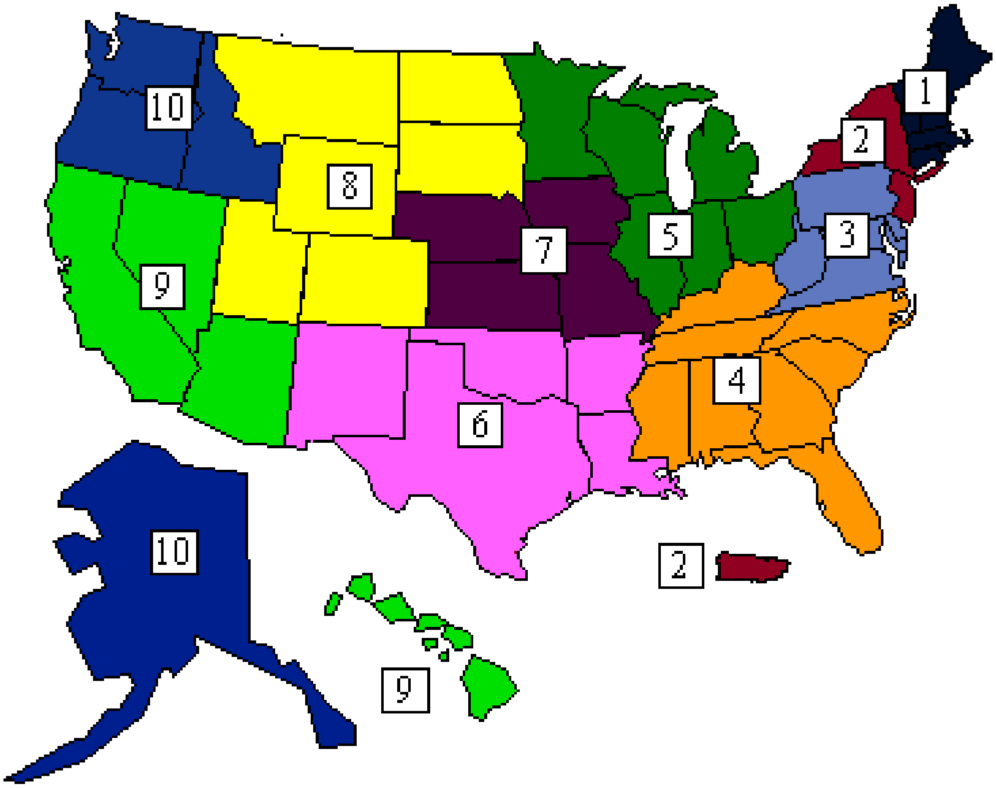

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Abbreviations and Acronyms

< - Less than
≤ - Less than or equal to
> - Greater than
≥- Greater than or equal to
µg - Microgram, one-millionth of a gram (3.5 x 10^{-8} of an ounce)
BAT - Best available technology
CCR - Consumer confidence report
CFR - Code of Federal Regulations
Cs - Cesium
CWS - Community water system
DL- Detection limit
DTF - Data transfer format
EPA - U.S. Environmental Protection Agency
EPTDS - Entry point to the distribution system
FR - Federal Register
I - Iodine
ICP-MS - Ion chromatography mass spectroscopy
IE - Ion exchange
L - Liter
MCL - Maximum contaminant level
MCLG - Maximum contaminant level goal
mrem - Millirem
NBS - National Bureau of Standards
NIST - National Institute of Standards and Technology
NODA - Notice of Data Availability
NPDWRs- National Primary Drinking Water Regulations
NRC - National Research Council
NTNCWS - Nontransient noncommunity water system
OECA - Office of Enforcement and Compliance Assurance
OGC - Office of General Counsel
OGWDW - Office of Ground Water and Drinking Water
ORC - Office of Regional Counsel
pCi - Picocurie
PE - Performance evaluation
pH - Negative logarithm of hydrogen ion concentration
PN - Public notification
POE - Point-of-entry
POU - Point-of-use
PQL - Practical quantification level
PT - Proficiency testing
PWS - Public water system
PWSS - Public Water Systems Supervision
RO - Reverse osmosis
SDWA - Safe Drinking Water Act
SDWIS/FED - Safe Drinking Water Information System/Federal
SDWIS - Safe Drinking Water Information System
SNC - Significant noncomplier
Sr - Strontium
SSCT - Small system compliance technology

SWA - Source water assessment
U.S. - United States
yr - Year

Introduction

The purpose of this guidance manual is to provide assistance to the U.S. Environmental Protection Agency (EPA), States,[1] and community water systems (CWSs) during the implementation of The Radionuclides Rule published in the *Federal Register* on December 7, 2000 (65 FR 76708).[2] EPA and State decision-makers retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate. Any decisions regarding a particular facility will be based on the applicable statutes and regulations. Therefore, interested parties are free to raise questions and objections about the appropriateness of the application of this guidance to a particular situation, and EPA will consider whether the recommendations or interpretations in the guidance are appropriate in that situation. EPA may change this guidance in the future.

This document does not substitute for EPA's regulation nor is this document regulation itself. Thus, it cannot impose legally binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances.

Developed through a workgroup process involving EPA Regions, States, and stakeholders, the manual is organized as follows:

- Section I summarizes The Radionuclides Rule and presents a timeline of important dates.

- Section II addresses violation determination and associated reporting requirements and includes a violation table to assist States with compliance activities.

- Section III covers State Primacy Revision Requirements including a timeframe for application review and approval. This section also contains guidance and references to help States adopt new special primacy requirements included in The Rule.

- Section IV contains a series of "stand alone" guidance materials that will help States and CWSs comply with the new requirements.

The Appendices of this document provide information that will be useful to States and EPA Regions throughout the primacy revision application process and implementation of the Radionuclides Rule.

- Appendix A contains a series of diagrams which illustrate initial and reduced monitoring scenarios.

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- Appendix B contains a violation table arranged for data management and enforcement purposes.

- Appendix C contains the sample Extension Agreement between EPA and the States that will enable States and EPA to document how they will share rule implementation responsibilities if the State does not submit a primacy application by the deadline.

- Appendix D contains the primacy revision crosswalks for The Rule.

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[1] "State" is used in this guide to refer to the Primacy Agency.

[2] Throughout this document, the December 7, 2000, Final Radionuclides Rule is referred to as the Radionuclides Rule, the revised Radionuclides Rule, the Rule, or the new Rule. The Proposed Radionuclides Rule published in 1991 is referred to as the 1991 proposal or the 1991 proposed rule. The Radionuclides Rule published in 1976 is referred to as the 1976 Rule or the 1976 standard.

- Appendix E contains the State reporting guidance.

- Appendix F is EPA's Statement of Principles on the effect of State audit immunity/privilege laws on enforcement authority for federal programs.

- Appendix G contains training presentation materials for The Radionuclides Rule.

- Appendix H is a copy of The Radionuclides Rule.

- Appendix I provides copies of beta and photon emitter conversion tables.

- Appendix J lists references used to develop this guidance.

To help explain the provisions of The Radionuclides Rule, this guidance also includes a series of illustrations based on hypothetical CWSs of all sizes. The illustrations appear in boxes throughout the document and are for illustrative purposes only.

Section I.

Rule Requirements

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I-A. Executive Summary - Radionuclides Rule

Purpose

The purpose of this summary is to acquaint State decision-makers and other public health officials with the final rule for (non-radon) radionuclides in drinking water. The Radionuclides Rule was published in the *Federal Register* on December 7, 2000 (65 FR 76708). The Rule is applicable to community water systems (CWSs), establishes a new maximum contaminant level (MCL) for uranium, which was not previously regulated, and revises the monitoring requirements for combined radium-226/228, gross alpha particle radioactivity, and beta particle and photon radioactivity. The Rule retains the existing MCLs for combined radium-226/228, gross alpha particle radioactivity, and beta particle and photon radioactivity.

Background

Regulations for radionuclides in drinking water were first promulgated in 1976 as interim regulations under the authority of the Safe Drinking Water Act (SDWA) of 1974. Standards were set for three groups of radionuclides: beta and photon emitters, radium (radium-226 and radium-228), and gross alpha radiation. These standards became effective in 1977. The 1986 SDWA Amendments added radon and uranium to the list of regulated radionuclides and set deadlines for issuing the regulations. EPA failed to meet the deadlines and was subject to consent decrees to issue the rules.

In 1991, EPA proposed new regulations for uranium and radon and revisions to the existing radionuclides regulations. This proposal was not promulgated as a final rule. The 1996 amendments extended statutory deadlines or otherwise relieved EPA of the duty to issue regulations for most pending rules, although not for the radionuclides. All the cases were dismissed and EPA and the plaintiffs entered into a stipulation whereby EPA would promulgate the radionuclides in November 2000. EPA published the rule in December 2000.

Benefits of the Radionuclides Rule

The Radionuclides Rule requires monitoring at each entry point to a CWS's distribution system to ensure that every customer's water meets the MCLs for radionuclides. (This requirement is consistent with the monitoring requirements for other, comparable drinking water contaminants.) By contrast, the 1976 Rule protected "the average customer" by requiring the collection of monitoring samples from a "free flowing tap."

The new uranium MCL will reduce the exposure of 620,000 persons to this contaminant, will protect CWS customers from exposure to uranium at levels that may cause kidney damage, and will reduce the risk of cancer caused by exposure to uranium. An estimated 0.8 cancer cases are expected to be avoided annually due to the MCL, resulting in estimated benefits of $3 million per year. (The monetary benefits from reduced kidney damage cannot be quantified because of limitation in existing health effects models at levels near the MCL.) Reducing the presence of uranium in drinking water will also remove other contaminants, providing additional benefits to CWS customers.

In addition, the new Rule sets separate monitoring requirements for radium-228, which are expected to reduce the exposure of 420,000 persons and result in the avoidance of 0.4 cancer cases per year, with estimated monetized health effects benefits of $2 million annually. Water mitigation for radium also tends to reduce iron and manganese levels and hardness, which also has significant associated benefits.

Applicability and Compliance Dates

The Radionuclides Rule applies to all CWSs (40 CFR 141.26). The regulations do not apply to noncommunity water systems.

The effective date of The Rule is December 8, 2003 (40 CFR 141.66(f)). Systems must monitor, in accordance with a State-specified plan, between the effective date and December 31, 2007, unless the State allows the use of grandfathered data (40 CFR 141.26(a)(1)).

Maximum Contaminant Levels and Maximum Contaminant Level Goals

The revised Radionuclides Rule promulgates an MCL for uranium and retains the existing MCLs for combined radium-226/228, gross alpha particle, and beta particle and photon radioactivity. The Rule also finalizes maximum contaminant level goals (MCLGs), which are shown in Table I-1 (40 CFR 141.55).

Table I-1: MCLs and MCLGs for Regulated Radionuclides

Regulated Radionuclide	MCL	MCLG
Beta/photon emitters	4 mrem/year	Zero
Gross alpha particle	15 pCi/L	Zero
Combined radium-226/228	5 pCi/L	Zero
Uranium	30 µg/L	Zero

Requirements of the Rule

Record Keeping and Reporting

The standard record keeping and reporting requirements for public water system (PWS) monitoring programs apply to the Radionuclides Rule (see 40 CFR 141.31 and 141.33 for PWS requirements and 40 CFR 142.14 and 142.15 for State requirements) and are discussed in detail in Sections I-C.2 and I-C.3 of this document.

Monitoring

Under the 1976 Rule, a water system with multiple entry points to its distribution system was not required to test at every entry point, but rather to monitor at each source as well as “water from a free flowing tap” (40 CFR 141.26(a)(3)(iii)). Under the new Rule, each entry point will be tested.

The standardized monitoring framework for radionuclides is complex, in part, because of the inter-relationship of the analytes; the alpha emitters, including radium-226 and uranium, contribute to gross alpha activity. A detailed discussion of the monitoring requirements is included in Sections I-C.4 and I-C.8 of this document.

Grandfathered Data and Monitoring Waivers

Systems may not use grandfathered data to satisfy the monitoring requirements for beta and photon emitters (40 CFR 141.26(b)). However, under certain circumstances, States may allow data collected between June 2000 and December 8, 2003, to be used to comply with the initial monitoring requirements for gross alpha, radium-226/228, and uranium (40 CFR 141.26(a)(2)(ii)). A detailed discussion about the grandfathering of data can be found in the Section I-C.5 of this document.

States cannot issue waivers for the radionuclide monitoring requirements. However, States may waive the final two quarters of initial monitoring for gross alpha, uranium, radium-226, and radium-228, if the sampling results from the previous two quarters are below the detection limit[3] (40 CFR 141.26(a)(2)(iii)). See Section I-C.6 of this document for more detail on monitoring waivers.

Requirements for New Systems/Sources

New systems, and systems that begin using a new source of supply, must conduct initial monitoring for gross alpha, radium-226/228, and uranium during the calendar quarter that follows the quarter in which they begin using the new source of supply (40 CFR 141.26(a)(1)(ii)). A detailed discussion and annotated example are provided in Section I-C.7 of this document.

Laboratory Methods

Many testing procedures for regulated radionuclides were approved in 1976 and many additions or changes to analytical methods were included in the 1991 proposed Rule. EPA approved 66 radiochemical methods in the March 5, 1997, Radionuclides Methods Rule (40 CFR 141.25). As of this manual's publication, approximately 90 radiochemical methods are approved for compliance monitoring of radionuclides in drinking water. These methods and various quality control requirements are detailed in Section I-C.9 of this document. EPA is continuing to evaluate additional analytical methods for approval.

Treatment Technologies and Costs

EPA has evaluated several technologies for removing radionuclides from drinking water. Details on EPA's review of the 1999 draft of *Technologies and Costs*, the EPA 1998 Radium Compliance Cost Study, the 1998 *Federal Register* announcement of *Small System Compliance Technology Lists for Existing National Primary Drinking Water Regulations Concerning Variance Technologies* (63 FR 42032), and the November 2000 Radionuclides Economic Analysis are included in Section I-C.10 of this document.

Cost information is available in an Appendix to the 1999 *Technologies and Costs* document and in the 1998 Radium Compliance Cost Study. The cost study gathered data from 29 systems in eight States to compare costs of different technologies. Reverse osmosis was the most expensive technology identified, and ion exchange was one of the least expensive. Additional information on costs of compliance are included in Section I-C.10 of this document and in the preamble to The Radionuclides Rule.

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[3] Regulatory detection limits, for the regulated radionuclides except uranium, are defined in 40 CFR 141.25(c). EPA will propose a detection limit for uranium in a future rulemaking before the compliance date of The Radionuclides Rule. The detection limit will be consistent with the sensitivity measures used for other radionuclides.

Variance and Exemptions

All systems are eligible for a variance from the MCLs for gross alpha, combined radium-226/228, uranium, and beta particle and photon emitters. However, to qualify for a variance a system must meet the requirements of SDWA Section 1415(a). Small system variances are not available, however, for any contaminant regulated under the Radionuclide Rule because EPA has identified affordable small system compliance technologies (SSCTs). See Section I-C.10 for a summary of SSCTs including a table that summarizes the compliance technologies by system size category. Additional information on variances appears in Section I-C.11.a.

The maximum exemption period is nine years from the effective date of an MCL. EPA retained the MCLs promulgated in 1976 for gross alpha, radium-226/228, total beta particle and photon emitters, so the exemption period has expired. Since the Agency has promulgated a new MCL for uranium, a State may issue a uranium exemption to a CWS if the system meets the criteria of SDWA Section 1416. See Section I-C.11.b for more information on exemptions.

I-B. Key Dates of the Rule

The effective date for the Radionuclides Rule is December 8, 2003. The 1976 Rule remains in effect then. Under the new Rule, all CWSs are required to complete the initial monitoring requirements by December 31, 2007 (40 CFR 141.26). A system that collects samples for gross alpha, radium-226/228, and uranium between June 2000 and December 8, 2003, may be able to grandfather this data under certain circumstances, and therefore may not have to conduct initial monitoring (40 CFR 141.26(a)(2)(ii)).

Unless the State allows a system to grandfather data, the system must monitor, in accordance with a State-specified plan, between December 8, 2003, and December 31, 2007. Monitoring during this time period will synchronize radionuclides monitoring with the standardized monitoring framework (specifically Phase II/V organic and inorganic monitoring) and help to alleviate potential laboratory capacity problems. Systems will be able to collect radionuclide samples in conjunction with the inorganic, synthetic organic, and volatile organic contaminant samples, which must be collected by December 31, 2007.

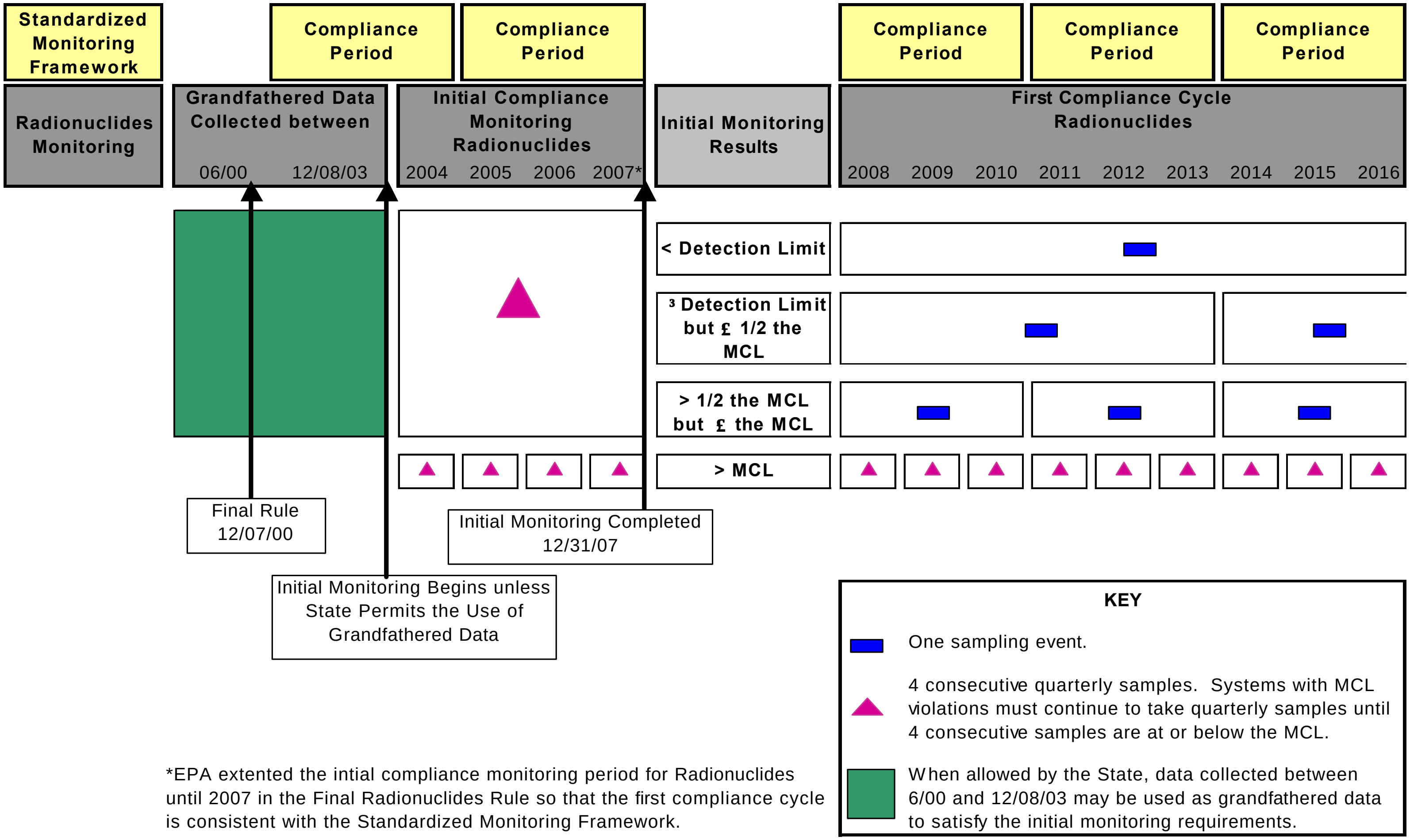
A timetable of key dates and a time line illustrating the radionuclides monitoring requirements within the standardized monitoring framework are presented in Table I-2 and Figure I-1, respectively.

Table I-2: Public Water System Timetable for the Radionuclides Requirements

Date	Radionuclides Requirements
July 9, 1976	1976 Radionuclides Drinking Water Regulation.
July 18, 1991	1991 Proposed Radionuclides Rule.
April 2000	Revised Radionuclides NODA.
June 2000	Under certain circumstances, data collected between June 2000 and December 8, 2003, may be eligible for use as grandfathered data to satisfy the initial monitoring requirements for gross alpha, radium-226/228 and uranium. (Note: The use of grandfathered data is at the State's discretion.)
December 7, 2000	The Final Radionuclides Rule.
September 8, 2002	EPA's suggested deadline for States' submission of complete and final primacy revision application packages.
December 8, 2002	Regulatory deadline for States to submit primacy revision application packages.
December 8, 2003	Systems must begin initial monitoring under a State specified monitoring plan unless the State permits the grandfathering of data collected between June 2000 and December 8, 2003.
December 8, 2003	Rule effective date.
December 8, 2004	State primacy revision application package due for States requesting two-year extensions.
December 31, 2007	All systems must complete initial monitoring.

Figure I-1: Applicability of the Standardized Monitoring Framework to Radionuclides

(Excluding the Beta Particle and Photon Emitters)



KEY

🟦 One sampling event.

▲ 4 consecutive quarterly samples. Systems with MCL violations must continue to take quarterly samples until 4 consecutive samples are at or below the MCL.

🟩 When allowed by the State, data collected between 6/00 and 12/08/03 may be used as grandfathered data to satisfy the initial monitoring requirements.

*EPA extented the intial compliance monitoring period for Radionuclides until 2007 in the Final Radionuclides Rule so that the first compliance cycle is consistent with the Standardized Monitoring Framework.

I-C. Rule Summary - Radionuclides Rule

I-C.1 Background

Regulations for radionuclides in drinking water were first promulgated in 1976 as interim regulations under the authority of the 1974 SDWA. The standards were set for three groups of radionuclides: beta and photon emitters, radium (radium-226 and radium-228), and gross alpha radiation. These standards became effective in 1977.

The 1986 SDWA Amendments identified 83 contaminants for EPA to regulate, including the already regulated radionuclides, which lacked MCLGs, and two additional radionuclides, uranium and radon. The 1986 Amendments also declared the 1976 interim standards to be final National Primary Drinking Water Regulations (NPDWRs) and provided a statutory deadline of June 1989 for EPA to promulgate a revised radionuclide rule.

In 1991, EPA proposed new regulations for uranium and radon and revisions to the existing radionuclides regulations. This proposal was not promulgated as a final rule. The 1996 amendments extended statutory deadlines or otherwise relieved EPA of the duty to issue regulations for most pending rules, although not for the radionuclides. All the cases were dismissed and EPA and the plaintiffs entered into a stipulation whereby EPA would promulgate the radionuclides in November 2000. EPA published the rule in December 2000.

I-C.2 Record Keeping

I-C.2.a State Record Keeping Requirements

The standard record keeping requirements for States under the SDWA apply to The Radionuclides Rule (40 CFR 142.14). Each State that has primary enforcement responsibility shall maintain records of tests, measurements, analyses, decisions, and determinations performed on each PWS to determine compliance with applicable provisions of State primary drinking water regulations. States must keep the following records for the stated period of time:

- Certifications of compliance with the public notification (PN) requirements received from PWSs, copies of the public notices received from PWSs, and records of any State determinations establishing alternative PN requirements for three years (40 CFR 142.14(f)).

- Records pertaining to each radionuclide variance and exemption determination for five years following the expiration of the variance or exemption (40 CFR 142.14(e)).

- Current inventory information for every PWS in the State for 12 years (40 CFR 142.14(c)).

- Records of any State approvals for 12 years (40 CFR 142.14(d)(2)).

- Records of any radionuclide enforcement action for 12 years (40 CFR 142.14(d)(3)).

- All current radionuclide monitoring requirements and the most recent monitoring frequency decision pertaining to each contaminant, including the monitoring results and other data supporting the decision, the State's findings based on the supporting data and any additional bases for such decision. This information shall be kept in perpetuity or until a more recent monitoring frequency decision has been issued (40 CFR 142.14(d)(5)).

- Records of determinations of a system's vulnerability to contamination from beta and photon emitters, including the monitoring results and other data supporting the determination, the State's findings based on the supporting data, and any additional bases for such decisions. This information must be kept in perpetuity or until a more recent vulnerability assessment has been issued (40 CFR 142.14(d)(4)).

I-C.2.b PWS Record Keeping Requirements

The standard record keeping requirements for PWSs under the SDWA apply to The Radionuclides Rule (40 CFR 141.33).

Owners and operators must keep the following records for the stated period of time:

- Records of action taken by the system to correct violations of the radionuclide regulation for at least three years after the last action taken with respect to the particular violation involved (40 CFR 141.33(b)).

ILLUSTRATION I-1
Reporting Analytical Results

A system samples for gross alpha at its one entry point to the distribution system (EPTDS) during 2005. The laboratory report sent to the system indicates that the gross alpha measurement for the sampling point is 18 ± 2 pCi/L.

The system reports the entire result (18 ± 2 pCi/L) to the State. The State reports to EPA that the system has violated the MCL because compliance, reduced monitoring, and reporting is calculated using a value

- Copies of radionuclide public notices and certifications made to the primacy agency must be kept for at least three years after their issuance (40 CFR 141.33 (e)).

- Records concerning a radionuclide variance or exemption granted to the system for at least five years following the expiration of such variance or exemption (40 CFR 141.33(d)).

- Records of analyses for at least 10 years. Data may be kept as laboratory reports or can be transferred to tabular summaries. The summaries should include the date, place, and time of sampling; the name of the person who collected the sample; identification of the sample as a routine distribution system sample, check sample, raw or process water sample, or other special purpose sample; date of analysis; laboratory and person responsible for performing analysis; the analytical technology/method used; and the results of the analysis (40 CFR 141.33(a)).

I-C.3 Reporting and Public Notification

I-C.3.a State Reporting Requirements

The standard reporting requirements for States under the SDWA apply to The Radionuclides Rule (40 CFR 142.15). States must submit, among other things, quarterly reports to EPA that detail:

- All violations of The Radionuclide Rule committed by PWSs during the previous quarter (40 CFR 142.15(a)(1)). The Agency recognizes that States have interpreted analytical results in a variety of ways. However, compliance and reduced monitoring frequencies should be calculated based solely on the analytical result not including (i.e. not adding or subtracting) the standard deviation. Therefore, the State should report MCL violations to EPA only if the analytical result (not taking the standard deviation into account) exceeds the MCL. See Illustration I-1.

- Enforcement actions taken by the State during the previous quarter to enforce State radionuclide regulations (40 CFR 142.15(a)(2)).

- The variances or exemptions granted during the previous quarter. The State must provide a statement of the reasons for granting the variance or exemption, including documentation of the need for the variance or exemption and the finding that the granting of the variance or exemption will not result in an unreasonable risk to health (40 CFR 142.15(a)(3)).

States must also submit an annual report that identifies any changes (additions, deletions, or corrections) to the State's PWS inventory and includes a summary of the status of each variance and exemption currently in effect (40 CFR 142.15(b)).

I-C.3.b PWS Reporting Requirements

The standard reporting requirements for PWS monitoring programs under the SDWA apply to The Radionuclides Rule (40 CFR 141.31).

- The laboratory or system must report analytical results to the State. Systems cannot round a result. In accordance with State regulations, the system must report results within either the first 10 days following the month in which the results are received, or the first 10 days following the end of the required monitoring period, whichever of these is shortest (40 CFR 141.31(a) & (c)).

- The laboratory or system must report to the State within 48 hours the failure to comply with any radionuclide MCL or monitoring requirement (40 CFR 141.31(b) & (c)).

- The water system must provide copies of each radionuclide public notice and a letter certifying that the system has met all the PN requirements. The copies and letter are required within 10 days of the completion of each public notice (40 CFR 141.31).

I-C.3.c PWS Public Notification Requirements

Systems must provide public notice for violations and in certain other circumstances. The revised PN Rule (40 CFR Part 141, Subpart Q) groups the public notice requirements into three tiers based on the seriousness of the violation or situation.[4] “Tier 1” applies to violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure. Notice is required within 24 hours of the violation. “Tier 2” applies to other violations and situations with the potential to have serious adverse effects on human health. Notice is required within 30 days. Primacy agencies may grant extensions of up to three months from the time of the violation under certain conditions. “Tier 3” applies to all other violations and situations requiring a public notice not included in Tier 1 or Tier 2. Notices for Tier 3 violations can be combined into one annual notice, including the consumer confidence report (CCR), if timing and delivery requirements can be met.

The Radionuclides Rule requires CWSs to provide a Tier 2 public notice for MCL violations and a Tier 3 public notice for violations of the monitoring and testing procedure requirements (40 CFR Part 141, Appendix A to Subpart Q).

I-C.3.d PWS Consumer Confidence Report Requirements

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[4] For Direct Implementation programs, the revised PN Rule went into effect October 31, 2000. Primacy States may set new compliance dates that shall be no later than May 6, 2002.

All CWSs must deliver a CCR to their customers by July 1 of each year (40 CFR 141.152(a)). The CCR provides a snapshot of water quality over the preceding year. CCRs must include water quality data, monitoring results and an explanation of their significance, and health effects language and "likely source" information for MCL and treatment technique violations.

The Radionuclides Rule updates the specific health effects language and likely source information for the regulated radionuclides (40 CFR Part 141, Appendix B to Subpart Q). The health effects language and likely sources for radionuclides are shown in Table I-3.

Table I-3: Standard Health Effects Language for CCR and Public Notification

Contaminant	Major Sources in Drinking Water	Standard Health Effects Language for CCR and PN
Beta/photon emitters	Decay of natural and man-made deposits.	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha Emitters	Erosion of natural deposits.	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined Radium-226/228	Erosion of natural deposits.	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	Erosion of natural deposits.	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

I-C.4 Monitoring for Gross Alpha, Radium-226, Radium-228, and Uranium

This section presents the initial, reduced, and increased monitoring requirements for gross alpha, radium-226, radium-228, and uranium. The Radionuclides Rule makes the radionuclides monitoring requirements consistent with monitoring for other inorganic contaminants regulated under the Phase II/V Rule's standard monitoring framework. For monitoring purposes, The Rule changes the point of compliance from a representative point in the distribution system to each entry point to the distribution system (EPTDS) (40 CFR 141.23(a)(1) and (2)). Systems that use an intermittent source of supply (i.e. a supply affected by seasonal variation) or that use more than one source and the sources are combined before distribution, must sample at an EPTDS during periods of normal operating conditions (i.e. when water is representative of all the sources being used) (40 CFR 141.23(a)(3)).

Systems do not have to sample at each EPTDS to satisfy the monitoring requirements if:

- The State has determined that conditions make another sampling point more representative of each source (40 CFR 141.26(a)(1)(i)).

- The State has modified the monitoring requirements of a PWS that supplies water to one or more other PWSs and the interconnection of the systems justifies treating them as a single system for monitoring purposes (i.e., consecutive PWSs) (40 CFR 141.29).

To satisfy the **INITIAL** monitoring requirements, systems do not have to sample at each EPTDS if:

- The State has determined, through examination of appropriate historical data and of monitoring data taken between June 2000 and December 8, 2003, that each EPTDS is expected to be in compliance (i.e., the State has allowed the system to grandfather data) (40 CFR 141.26(a)(2)(ii)). However, the system must take samples from each EPTDS in all future monitoring. The use of grandfathered data is further described below in the Section I-C.5.

Included in this Section are tables which summarize the monitoring framework for radionuclides (see Table I-4) and illustrations that help explain the initial and reduced monitoring requirements. Diagrams which illustrate initial and reduced monitoring scenarios are also included in Appendix A. While the figures and the examples help to illustrate many of the potential scenarios, States may encounter many additional situations because of the unique characteristics of individual systems. The tables, the illustrations, and the figures in Appendix A are only guides to help determine monitoring frequencies for some systems.

I-C.4.a. Radium-224

Recent studies have shown that there is a positive correlation (1:1) between radium-228 and radium-224. Since systems with high radium-224 levels will likely also have high radium-228 levels, EPA expects that the enforcement of a combined radium-226/228 MCL will mitigate the effects of high radium-224 levels. Although monitoring for radium-224 is not a requirement in this Rule, a State, at its own discretion, may require water systems to analyze for radium-224.

I-C.4.b Initial Monitoring for Gross Alpha, Radium-226/228, and Uranium

Systems are required to conduct initial monitoring at each EPTDS by December 31, 2007, for gross alpha, radium-226, radium-228, and uranium (40 CFR 141.26). The gross alpha particle activity measurement may be substituted for the required radium-226 measurement if the gross alpha particle activity does not exceed 5 pCi/L, and the gross alpha particle activity measurement may be substituted for the required uranium measurement if the gross alpha particle activity does not exceed 15 pCi/L (40 CFR 141.26(a)(5)). For additional information on substitution see Section I-C.4.e and Section I-C.4.f below.

Ideally, a system would establish initial compliance by collecting four consecutive quarterly samples at each EPTDS during the

ILLUSTRATION I-2
Consecutive Quarters

A groundwater system serving 5,000 people conducts all required monitoring for radionuclides at its one EPTDS during April, July, and November of 2005. The system did not monitor during the first quarter of 2005.

All sample results were between the detection limit and one-half the MCL.

The State:

- Determines that the system is in compliance since the running annual average at the EPTDS (based on the three samples) is below the MCL for each radionuclide.
- Requires the system to take the fourth sample in the first quarter of 2006 in order to satisfy the initial monitoring requirements of the Radionuclides Rule.

The system reports that the 2006 samples were all above the detection limit but less than one-half the MCL for each radionuclide. The State requires the system to sample once during the next six years.

initial round of monitoring.[5] The reason is to provide contaminant information during each of the four seasons. Strict adherence to this goal, however, could create a situation where systems that take a number of non-consecutive quarterly samples (all of which show no detects) still never satisfy the initial monitoring requirements. It is not EPA's intent to require this of systems.

EPA suggests that the State require the system to either collect the fourth quarterly sample as soon as possible, or collect the sample the following year in the quarter that was missed. Compliance must be based on the running annual average of the collected samples (40 CFR 141.26 (c)(3)(i)). Once the system satisfies the initial monitoring requirements, the State can determine the reduced monitoring schedule at that entry point. See Illustration I-2.

Systems that do not have previous radionuclide sampling data should sample for gross alpha, radium-226, and radium-228. Data collected during the first quarter may serve as a baseline indicator of what will need to be collected at each EPTDS in the following quarters. These systems will then collect subsequent quarterly samples concurrently with all other quarterly sampling events to determine compliance with the MCLs.[6] See Illustration I-3.

ILLUSTRATION I-3

A System Without Previous Sampling Results

A ground water system serving 500 people has never collected gross alpha, radium-226, and radium-228 samples. As a result of an enforcement action, the system monitors during the first two quarters of the initial monitoring period.

All of the samples are less than the regulatory detection limits.

The State waives the last two quarterly samples and sets up a reduced monitoring schedule of once every nine years for gross alpha, radium-226/228, and uranium.

I-C.4.c Reduced Monitoring for Gross Alpha, Combined Radium-226/228, and Uranium

Standard trigger levels (the method detection level, one-half the MCL, and the MCL) are used to guide the determination of a system's reduced monitoring frequency at each EPTDS. If an entry point's annual average from the initial four quarters of monitoring for gross alpha, uranium, and combined radium-226/228 is below the detection limit, the system would be allowed to reduce monitoring to one sample every nine years at that entry point (40 CFR 141.26(a)(3)(i)).[7] If an entry point's annual average for gross alpha, uranium, and combined radium-226/228 is at or above the detection limit but at or below one-half the MCL, the system could reduce monitoring to one sample every six years at that entry point (40 CFR 141.26(a)(3)(ii)). If an entry point's annual average for gross alpha, uranium, and combined radium-226/228 is above one-half the MCL but at or below the MCL, the system could reduce monitoring to one sample every three years at that entry point (40 CFR 141.26(a)(3)(iii)). Table I-4 and flow diagrams in Appendix A, in conjunction with the results from the initial sampling, can help determine a schedule for reduced monitoring.

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[5] States may waive the final two quarters of initial monitoring if the entry point's results of the first two quarters are below the detection limit. The system is then required, under the reduced monitoring requirements, to sample once every nine years at that entry point (40 CFR 141.26(a)(2)(iii)).

[6] For additional illustrations and examples see Appendix E: SDWIS/FED DTF Reporting Requirements Guidance.

[7] Since uranium was not previously regulated a detection limit is not listed in the Code of Federal Regulations. EPA will propose a detection limit for uranium in future rulemaking and before the compliance date of the Radionuclides Rule. The detection limit will be consistent with the sensitivity measures used for other radionuclides.

A system with an entry point sampling result that exceeds the MCL while on a reduced monitoring schedule must return to quarterly sampling (40 CFR 141.26(a)(3)(v)). A system's entry point is eligible for a reduced monitoring schedule only if the running annual average of the initial monitoring results are below the MCL, or grandfathered data supports the reduction. The State can also specify a different schedule as part of a formal enforcement action, variance, or exemption.

I-C.4.d Increased Monitoring for Gross Alpha, Radium-226/228, and Uranium

Systems with EPTDSs on a reduced monitoring schedule (i.e., collecting one sample every three, six, or nine years) may remain on that reduced schedule as long as the most recent sample results support that monitoring schedule. An increase in a contaminant concentration may increase the monitoring frequency for that contaminant. See Illustration I-4.

ILLUSTRATION I-4
Gross Alpha = 7 pCi/L (initial monitoring running annual average)
Gross Alpha = 8 pCi/L (reduced monitoring result)

A system collects four quarterly samples for gross alpha during the initial monitoring period. The annual average is 7 pCi/L (i.e., above the detection limit but at or below one-half the MCL). The state may allow the system to reduce sampling to one sample every six years for gross alpha (one sample between 2008 - 2013). The system collects its six-year sample and the results show an increase in the gross alpha concentration to 8 pCi/L. The system is required to increase the monitoring frequency to once every three years (one sample between 2014 - 2016) because the result was above one-half the MCL but at or below the MCL.

Any system that has an entry point monitoring result above the MCL while on reduced monitoring must increase the frequency of monitoring at that entry point to quarterly sampling. Quarterly sampling must continue until four consecutive quarterly samples are below the MCL (40 CFR 141.26(a)(3)(v)). As with the initial monitoring requirements, States may require a system that fails to take a quarterly sample to either collect the fourth sample as soon as possible, or collect the sample the following year in the quarter that was missed.

I-C.4.e Use of Gross Alpha Measurements for Radium-226

The standard monitoring framework for radionuclides is complex, in part, because of the inter-relationship of the analytes (i.e., the alpha emitters, radium-226 and uranium, contribute to gross alpha activity). Due to this relationship, gross alpha particle activity analytical results can be used to determine the reduced monitoring frequency for gross alpha, radium-226, and uranium. If the gross alpha particle activity result is less than the detection limit, one-half the detection limit (i.e., 1.5 pCi/L) is used for radium-226 and is added to the radium-228 activity. The combined radium-226/228 value must be used to determine compliance and future monitoring frequency. If the gross alpha particle activity result is above the detection limit, compliance and future monitoring frequency are determined using the whole gross alpha result (40 CFR 141.26(a)(5)).

ILLUSTRATION I-5
Use of Gross Alpha for Radium-226

The regulatory detection limit for gross alpha is 3 pCi/L. The Rule specifies that a system must use 1.5 pCi/L (one-half the detection limit for gross alpha) as the value to determine future monitoring frequency if the gross alpha result is less than the detection limit and the system substitutes this measurement for radium-226 (40 CFR 141.26(a)(5)).

Since 1.5 pCi/L is greater than the regulatory detection limit for radium-226 (1 pCi/L), the system would not be allowed to move to the reduced monitoring frequency of once every nine years for radium-226.

Systems that submit only gross alpha particle activity analytical results and do not sample for radium-226 may be required, under the reduced monitoring requirements, to sample once every three or six years rather than once every nine years. This is due to the fact that the detection limit for gross alpha will not allow confirmation that radium-226 is below the respective detection limit as measured individually. See Illustration I-5.

EPA is recommending that systems substitute gross alpha for radium-226 only if previous gross alpha results are less than the gross alpha detection limit (i.e., 3 pCi/L). With a gross alpha result at or above 3 pCi/L, the system is at risk for violating the combined radium-226/228 MCL of 5 pCi/L and therefore should monitor individually for radium-226/228.

I-C.4.f Use of Gross Alpha Measurements for Uranium

A gross alpha particle activity measurement may be substituted for the required uranium measurement if the gross alpha particle activity is less than or equal to 15 pCi/L. States should assume all of the gross alpha activity is due to uranium. If the gross alpha particle activity is greater than 15 pCi/L, then samples must be collected for uranium (40 CFR 141.26(a)(5)).

Uranium analysis will serve a dual purpose for systems with EPTDSs that have high levels of gross alpha activity. First, the uranium activity can be subtracted from gross alpha to determine compliance with an EPTDS's gross alpha MCL. Second, the results can be used to determine an entry point's future monitoring frequency for uranium.

I-C.4.g. Uranium Mass to Activity Ratios and Determining Compliance with the Gross Alpha MCL

States may subtract the uranium activity from the gross alpha particle activity to determine compliance with the gross alpha MCL, which is referred to in this section as "net alpha" (i.e. gross alpha particle activity minus the uranium activity). Unless an activity measurement has been analyzed and reported to the State by the laboratory, the State must convert the uranium mass measurement to activity using a conversion factor of 0.67 pCi/µg. States may also convert uranium activity values to mass by multiplying the uranium activity by 1.49 µg/pCi (40 CFR 141.25 Footnote 12). See Illustration I-6.

At this time, conversion factors that have been calculated by assessing the uranium mass to activity ratios for individual systems may not be used (40 CFR 141.25 Footnote 12). However, if the uranium analysis is reported in mass and activity, the laboratory-analyzed uranium activity level may be used for determining compliance with the "net alpha" MCL.

ILLUSTRATION I-6

Uranium Conversion and Calculation of "Net Alpha"

A system collects samples for gross alpha and uranium. The laboratory reports the following analytical results to the State.

- Gross alpha: 24 ± 3 pCi/L (EPA method 900.0)
- Uranium: 21 µg/L (EPA method 900.8)

Based on the above results, the State determines:

- The uranium mass was converted by multiplying the measured value by 0.67 pCi/µg (i.e. 21 µg/L x 0.67 pCi/µg = 14 pCi/L). The converted uranium activity (14 pCi/L) was subtracted from the measured gross alpha (24 pCi/L) yielding 10 pCi/L "net alpha". The "net alpha" value was used to determine compliance with the gross alpha MCL (15 pCi/L).

- The system is in compliance with the uranium MCL and is required to collect a uranium sample in the next three-year compliance period (i.e., one sample every three years for results >½ the MCL but ≤ MCL).

- The system is in compliance with the gross alpha MCL and is required to collect another gross alpha sample in the next three-year compliance period (i.e., the calculated "net alpha" value of 10 pCi/L is >½ the MCL but ≤ MCL).

Systems and laboratories must report the gross alpha particle activity and the uranium analytical results to the State. EPA recommends that the State subtract the uranium activity from the gross alpha particle activity to determine compliance with the “net alpha” MCL.

I-C.4.h Compositing

States may allow systems to collect up to four consecutive quarterly samples from a single EPTDS and have the laboratory composite them temporally (i.e., samples that are collected from a single entry point during different quarters). Temporal compositing is allowed for uranium, gross alpha, radium-226 (provided a detection limit of 1 pCi/L is met) and radium-228 (provided a detection limit of 1 pCi/L is met) for up to four consecutive quarterly samples if analysis is done within one year of the first sample.

Table I-4: Summary of Monitoring Frequencies for Gross Alpha, Uranium, and Radium-226/228

Initial **40 CFR 141.26(a)(2)**	**Reduced** **40 CFR 141.26(a)(3)**	
GROSS ALPHA AND URANIUM		
Four consecutive quarters of monitoring at each entry point.* * Systems may substitute the gross alpha results that are less than or equal to 15 pCi/L for uranium to determine compliance and the reduced monitoring frequency. Systems with a gross alpha result greater than 15 pCi/L must collect uranium sample(s) to determine compliance and reduced monitoring (40 CFR 141.26(a)(5)).	**One sample every:**	**Nine years** if the average of the initial monitoring for each contaminant is below the detection limit listed in 40 CFR 141.25(c).
		Six years if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below one-half the MCL.
		Three years if the average of the initial monitoring results for each contaminant is above one-half the MCL but at or below the MCL.
Systems may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample (40 CFR 141.26(a)(4)).	If the result from the composited samples is less than or equal to one-half the MCL, reduce in accordance with the above schedule. A State may require a system to take additional quarterly samples before allowing the system to reduce the frequency of monitoring if the result from the composited samples is greater than one-half the MCL (40 CFR 141.26(a)(4)).	
COMBINED RADIUM-226 AND RADIUM-228		
Four consecutive quarters of monitoring at each entry point.* * Systems may substitute the gross alpha results that are less than or equal to 5 pCi/L for radium-226 to determine compliance and the reduced monitoring frequency. Systems with a gross alpha result greater than 5 pCi/L must collect radium-226 samples to determine compliance and reduced monitoring (40 CFR 141.26(a)(5)).	**One sample every:**	**Nine years** if the average of the initial monitoring for combined radium-226/228 is below the detection limit listed in 40 CFR 141.25(c).
		Six years if the average of the combined initial monitoring results for combined radium-226/228 is at or above the detection limit but at or below one-half the MCL.
		Three years if the average of the initial monitoring results for combined radium-226/228 is above one-half the MCL but at or below the MCL.
Systems may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample (40 CFR 141.26(a)(4)).	If the result from the composited samples is less than or equal to one-half the MCL, reduce in accordance with the above schedule. A State may require a system to take additional quarterly samples before allowing the system to reduce the frequency of monitoring if the result from the composited samples is greater than one-half the MCL (40 CFR 141.26(a)(4)).	

I-C.5 Grandfathered Data

The Radionuclides Rule balances the need to ensure that the concentrations of regulated radionuclides are at or below the MCL at each EPTDS with the recognition that some systems have been monitoring for certain radionuclides for almost 25 years. The Rule also provides States the flexibility to decide, on a case-by-case analysis of a system's historical data or individual circumstances, whether to approve the use of grandfathered data and the number of samples required to provide a sufficient indication that the radionuclide activity will remain below the observed levels. A State must describe in its Primacy Application the procedures and criteria that it will use to determine the acceptability of grandfathered data (40 CFR 142.16(l)(1)).

States may allow systems to use grandfathered data to comply with the initial monitoring requirements for gross alpha, radium-226/228, and uranium under some circumstances, including the following:

- Systems with one EPTDS collect monitoring data between June 2000 and December 8, 2003 (see Illustration I-7);

- Systems with multiple EPTDS collect samples for each entry point between June 2000 and December 8, 2003; or,

- Systems collect data from a representative point in the distribution system between June 2000 and December 8, 2003. The State must make a written finding that the data are representative of each entry point based on the variability of historical contaminant monitoring results and other factors listed in the special primacy section of the State Primacy Program application (40 CFR 141.26(a)(2)(ii)).

ILLUSTRATION I-7

Use of Grandfathered Data to Satisfy the Initial Monitoring Requirements

A system with one EPTDS has collected gross alpha samples for the two previous compliance periods (1992-1996 and 1996-2000). The State tells the system that if it collects samples at the EPTDS for gross alpha, radium-226, radium-228, and uranium between June 2000 and December 8, 2003, it may be able to grandfather this data and will therefore not be subject to the initial quarterly monitoring requirements when the new Rule goes into effect. The system collects the samples during 2002 and finds concentrations of: 5 pCi/L for gross alpha, 2 pCi/L for radium-226, 3 pCi/L for radium-228, and does not detect uranium.

The State uses these data to set a compliance schedule of:

- One sample every six years for gross alpha since the result was greater than the detection level but less than one-half the MCL. The system would have to take the next sample between 2008 and 2013.

- One sample every three years for combined radium-226/228 since the combined result (2 pCi/L + 3 pCi/L) is greater than one-half the MCL but less than or equal to the MCL. The system must take the next sample between 2008 and 2010.

- One sample every nine years for uranium since the sample was less than the regulatory detection limit. The system must take the next sample between 2008 and 2016.

EPA is encouraging States to have systems monitor for uranium before the effective date of The Radionuclides Rule. A system that samples for uranium before December 8, 2003, and has a sampling result:

- Less than the 30 µg/L MCL, can grandfather the data if the State permits it.

- Greater than or equal 30 µg/L, must, when directed by the State, take four consecutive quarterly samples during the initial monitoring period. Even though the system has sampling results above the MCL, the system will not be in violation of the uranium standard on the effective date of the Rule (December 8, 2003). However, EPA is encouraging systems that have high levels of uranium to initiate plans to resolve the public health risk.

Systems are prohibited from using grandfathered data to satisfy the monitoring requirements for beta particle and photon radioactivity. This prohibition was established in the 1976 Radionuclides Rule and the revised Radionuclides Rule does not deviate from this standard (40 CFR 141.26(b)).

I-C.6 Monitoring Waivers

A State cannot allow a system to forego initial or reduced monitoring (40 CFR 141.26). A State has the authority to waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the two previous quarters are below the detection limit (40 CFR 141.26(a)(2)(iii)).

The State cannot allow a system to forego monitoring of beta and photon emitters if the system has been designated as “vulnerable” or “contaminated” (40 CFR 141.26(b)).

I-C.7 Requirements for New Systems/Sources

New CWSs and systems that begin using a new source of supply must conduct initial monitoring for gross alpha, radium-226/228, and uranium. [Systems have to collect sample(s) for uranium only if the gross alpha level is greater than 15 pCi/L.] In accordance with the initial monitoring requirements, this monitoring must begin within the first quarter after initiating use of the new source (40 CFR 141.26(a)(1)(ii)). New systems or systems using a new source of supply may also have to sample for beta particle and photon radioactivity if required by the State. See Appendix A for a flowchart that summarizes the monitoring requirements for new systems and sources.

States may require new PWSs, systems that bring on new water sources, or systems that have no prior history of radionuclide monitoring to develop an occurrence profile (i.e. collect one sample of gross alpha, radium-226, and radium-228) to determine if it is necessary to monitor for uranium. States can also use the profile to determine for which radionuclides the system must monitor during the initial monitoring period. All new systems must collect samples in accordance with the monitoring requirements outlined in Section I-C.4 of this document. See Illustration I-8.[8]

ILLUSTRATION I-8
New System Monitoring

A water system that commences operation in 2004 collects its first quarterly sample for gross alpha, radium-226, and radium-228. The results are:
Gross alpha = 1 pCi/L
Radium-226 = 0.5 pCi/L
Radium-228 = no detect

The system decides to collect only radium-228 and gross alpha in the remaining quarterly samples and substitute the gross alpha results for radium-226 and uranium.

The results for the next three quarters are all below the detection limit for gross alpha and radium-228. The State allows the system to reduce the monitoring frequency for gross alpha and uranium to one sample every nine years and one sample every six years for combined radium-226/228.

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[8] For additional illustrations and examples, please see Appendix E: SDWIS/FED DTF Reporting Requirements Guidance.

I-C.8 Monitoring for Beta Particle and Photon Radioactivity

This section presents the initial, reduced, and increased monitoring requirements for the beta particle and photon radioactivity. Only CWSs designated by the State as “vulnerable” or “contaminated” need to monitor for beta particle and photon radioactivity. EPA believes that the State is in the best position to determine which systems are vulnerable to, or contaminated by, beta and photon emitters. States should use existing vulnerability assessments (required under the 1976 Radionuclides Rule) to notify systems of their status (i.e., vulnerable or contaminated) and of the monitoring requirements. The beta particle and photon radioactivity monitoring requirements are summarized in Appendix A.

EPA is encouraging States to re-evaluate a system’s vulnerability to beta particle and photon emitting sources when conducting a system’s source water assessment (SWA) and to immediately notify systems that have been deemed vulnerable or contaminated. When using a SWA as a tool for identifying vulnerable systems, the time of travel for radioactive emitters that may be identified in the source area should be a minimum of three years. The Agency recommends that States use all available resources to determine a system’s vulnerability to beta particle and photon emitters, including the following:

- Evaluation of the quality and completeness of any historical beta particle and photon emitter monitoring results and the proximity of the results to the MCL. Systems with wide variations in the analytical results, or analytical results close to the MCL, should be considered to be contaminated by a radioactive source.
- The Nuclear Regulatory Commission’s list of licensees and locations in the State and surrounding States. (The State may want to eliminate facilities that only handle sealed sources of radioactive material.)
- Geology of the aquifer and/or hydrology of the watershed.
- The location and proximity of the drinking water facility to (list is not all inclusive):
    - Nuclear power facilities;
    - Department of Energy facilities;
    - Military bases (Department of Defense facilities);
    - National priority list facilities that have been identified as radiation-contaminated sites through the Comprehensive Environmental Response, Compensation, and Liability Act; and,
    - Leaking landfills.

I-C.8.a Initial Monitoring for Beta Particle and Photon Radioactivity

The Radionuclides Rule requires systems to monitor for beta particle and photon radioactivity under the following circumstances:

- The system is designated by the State as vulnerable. Vulnerable systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each EPTDS (40 CFR 141.26(b)(1)). Sampling must begin the quarter after the system is notified by the State.

- The system is designated by the State as utilizing waters contaminated by effluents from nuclear facilities. These systems must collect quarterly samples for beta emitters and iodine-131, and annual samples for tritium and strontium-90 at each EPTDS (40 CFR 141.26(b)(2)). More frequent monitoring is required if iodine-131 is found in finished water (40 CFR 141.26(b)(2)(ii)). Sampling must begin the quarter after the system is notified by the State.

  For the quarterly monitoring requirements for gross beta particle activity, samples must be collected and analyzed monthly or the composite of three monthly samples must be collected and analyzed (40 CFR 141.26(b)(2)(i)). For the quarterly monitoring requirements for iodine-131, samples must be collected for five consecutive days, composited, and analyzed (40 CFR 141.26(b)(2)(ii)).

  For the annual monitoring requirements for tritium and strontium-90, samples must be collected quarterly and analyzed or composited and analyzed (40 CFR 141.26(b)(2)(iii)). In all cases, laboratories should be responsible for compositing the samples prior to analysis.

- The State, at its own discretion, requires the system to collect samples (40 CFR 141.26(b)).

I-C.8.b Reduced Monitoring for Beta Particle and Photon Radioactivity

A State may allow a system to reduce the frequency of monitoring to once every three years if:

- In a vulnerable system, the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity has a running annual average (computed quarterly) less than or equal to 50 pCi/L (40 CFR 141.26(b)(1)(i)).

- In a system designated by the State as utilizing waters contaminated by effluents from nuclear facilities, the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity has a running annual average (computed quarterly) less than or equal to 15 pCi/L (40 CFR 141.26(b)(2)(iv)).

I-C.8.c Increased Monitoring for Beta Particle and Photon Radioactivity

A system that exceeds the gross beta particle activity screening level, excluding the naturally occurring potassium-40, must further analyze the sample for the major radioactive constituents[9] (40 CFR 141.26(b)(5)). The beta particle screening levels are 50 pCi/L for systems determined by the State to be vulnerable to contamination (40 CFR 141.26(b)(1)(i)) and 15 pCi/L for systems utilizing waters contaminated by effluents from nuclear facilities (40 CFR 141.26(b)(2)(iv)). The system must determine compliance with the MCLs for beta particle and photon radioactivity by using the calculation described in 40 CFR 141.66(d)(2). See also Section II-B.2.

If the results show an MCL violation for any of the constituents, the system must conduct monthly monitoring at any sampling point that exceeds the MCL beginning the month after the exceedance occurs. A system can resume quarterly monitoring if the rolling average of three months of samples is at or below the MCL (40 CFR 141.26(b)(6)).

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[9] A State should require a system to speciate the sample for the most likely emitters associated with the nearby source.

I-C.8.d Use of Environmental Surveillance Data for Beta Particle and Photon Radioactivity Measurements

States that allow systems to use environmental surveillance data collected by a nuclear facility in lieu of the water system's required beta particle and photon radioactivity monitoring should review the data to determine if they are applicable to the water system. If the surveillance data indicate that there has been a release, systems must begin collecting quarterly samples for beta particle and photon radioactivity at each EPTDS (40 CFR 141.26(b)(1)(ii) and 141.26(b)(2)(v)).

Table I-5: Monitoring Frequencies for Beta Particle and Photon Radioactivity

Initial **40 CFR 141.26(b)(1) & (b)(2)**	**Reduced** **40 CFR 141.26(b)(1)(i) & (b)(2)(iv)**	
BETA PARTICLE AND PHOTON RADIOACTIVITY		
Vulnerable CWSs (as designated by the State): Quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point, within one quarter after being notified by the State. Already designated systems must continue to sample in accordance with the compliance schedule (40 CFR 141.26(b)(1)).	**One sample every**:	**Three years** if the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity has a running annual average less than or equal to the screening level of 50 pCi/L (40 CFR 141.26(b)(1)(i)).
CWSs utilizing waters contaminated by effluents from nuclear facilities (as designated by the State): Quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point, within one quarter of being notified by the State. Already designated systems must continue to sample in accordance with the compliance schedule (40 CFR 141.26(b)(2)).		**Three years** if the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity has a running annual average less than or equal to the screening level of 15 pCi/L (40 CFR 141.26(b)(2)(iv)).

I-C.9 Laboratory Methods

This section summarizes the testing procedures that have been approved by EPA to provide reliable compliance monitoring of radionuclides in drinking water.

I-C.9.a Radionuclides Methods

In 1976, EPA published interim standards for radionuclides in drinking water and approved radiochemical methods to analyze for gross alpha-particle activity, radium-226, total gross radium alpha, gross beta-particle activity, strontium-89 and strontium-90, cesium-134, and NPDWRs Primary Drinking Water Regulations in the 1986 SDWA Amendments.

On July 18, 1991, EPA proposed to approve 56 additional methods to measure radionuclides (excluding radon) in drinking water (56 FR 33050). EPA approved 54 of the 56 methods in the March 5, 1997, final methods rule (62 FR 10168). In response to public comments on the 1991 proposed rule, EPA evaluated and approved an additional 12 techniques. In total, EPA approved 66 radiochemical methods on March 5, 1997 (62 FR 10168). Currently, approximately 90 radiochemical methods are approved for compliance monitoring of radionuclides in drinking water.

The approved radionuclide methods are listed in 40 CFR 141.25. EPA's laboratory certification manual describes each method's quality control requirements for sample handling, preservation, holding times, and instrumentation (*Manual for the Certification of Laboratories Analyzing Drinking Water*, EPA 815-B-97-001).

I-C.9.b Updates Regarding Analytical Techniques

EPA is currently reviewing :

- The use of an inductively coupled plasma mass spectrometry (ICP-MS) method for uranium analysis.

- The feasibility of using gamma spectrometry for radium-228 analysis.

I-C.9.c Externalization of the Performance Evaluation Program

On July 18, 1996, EPA proposed options for the externalization of the Performance Evaluation (PE) studies program (now referred to as the Proficiency Testing or PT program) (61 FR 37464). EPA issued a final notice on June 12, 1997, after evaluating public comment. The Agency

> "...decided on a program where EPA would issue standards for the operation of the program, the National Institute of Standards and Technology (NIST) would develop standards for private sector PE (PT) suppliers and would evaluate and accredit PE suppliers, and the private sector would develop and manufacture PE (PT) materials and conduct PE (PT) studies. In addition, as part of the program, the PE (PT) providers would report the results of the studies to the study participants and to those organizations that have responsibility for administering programs supported by the studies" (62 FR 32112).

The PT externalization may affect the implementation of the Radionuclides Rule by causing a short-term disruption in laboratory accreditation, laboratory capacity, cost of analysis, and workloads of laboratories. To alleviate concerns about the costs of PT samples, States have the option of approving their own PT sample providers that can be used instead of the independent third-party provider who will be accredited by NIST. EPA anticipates that radionuclide PT samples will be available in time to allow for laboratory certification before compliance monitoring is required.

To alleviate concerns about potential laboratory capacity problems, EPA extended the initial monitoring period from three to four years so that it would end on December 31, 2007. Also, EPA is allowing systems to grandfather and composite data under certain circumstances. In addition, EPA **is not** requiring nontransient noncommunity water systems (NTNCWSs) to monitor for radionuclides and **is not** requiring a 48-to-72 hour turn-around for gross alpha particle activity.

I-C.9.d The Detection Limits as the Required Measures of Sensitivity

In 1976, the NPDWRs defined the *detection limit* (DL) as "the concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96 σ, where σ is the standard deviation of the net counting rate of the sample)" (40 CFR 141.25(c)).

EPA maintained the DLs from the 1976 Rule. Table I-6 cites the DLs or the required sensitivity for the specific radioanalyses that were listed in the 1976 Rule and are also cited in 40 CFR 141.25.

Table I-6: Required Regulatory Detection Limits for the Various Radionuclide Emitters (40 CFR 141.25)

Contaminant	Detection Limit (pCi/L)
Gross Alpha	3
Gross Beta	4
Radium-226	1
Radium-228	1
Uranium	To be determined[10]
Cesium-134	10
Strontium-89	10
Strontium-90	2
Iodine-131	1
Tritium	1,000
Other Radionuclides	1/10th of the applicable limit

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[10] A DL for uranium is not listed in 40 CFR 141.25 and none was proposed in the 1991 proposal. EPA did propose a practical quantification level (PQL) and an acceptance limit but in order to be consistent with other regulated radionuclides, is not adopting the PQL. The Agency will propose a detection limit for uranium in future rulemaking and will set the limit before December 8, 2003 (the compliance date for the Rule).

I-C.10 Treatment Technologies and Cost Estimates

When promulgating an MCL, EPA must list:

- **Best Available Technologies (BATs).** The technologies, treatments, and techniques listed in the Radionuclides Rule (40 CFR 141.66(g)) were determined by EPA to be the BATs for the removal of radionuclides in drinking water based on a demonstration of efficacy under field condition taking cost into consideration. Table I-7, below, lists the BATs identified by EPA. EPA evaluated technologies and costs for radionuclides in drinking water in 1992. The evaluations were updated in a *Technologies and Costs* draft (1999) and a radium compliance cost study (1998).

Table I-7: BATs for Radionuclides in Drinking Water

Contaminant	BAT
Combined radium-226 and radium-228	Ion Exchange, Lime Softening, Reverse Osmosis
Gross alpha (excluding radon and uranium)	Reverse Osmosis
Beta particle and photon radioactivity	Ion Exchange and Reverse Osmosis
Uranium	Ion Exchange, Lime Softening; Reverse Osmosis, Enhanced Coagulation/Filtration*

* This assumes that a system already has coagulation/filtration in place.

Systems are not required to use BATs to achieve compliance with the MCL. Any technology that is accepted by the State primacy agency and achieves compliance with the MCL is allowed. However, if a system is unable to meet the MCL with its chosen technology, the system is not eligible for a variance unless it has installed a BAT and still cannot achieve compliance (40 CFR 142.65(a)(2)). For more information on variances and exemptions, see Section I-C.11 below.

- **Small System Compliance Technologies.** The technologies examined for BAT determinations were also evaluated as SSCTs. EPA must list SSCTs for three sizes of small systems: systems serving between 25 and 500 persons, systems serving between 501 and 3,300 persons, and systems serving between 3,301 and 10,000 persons. The listed SSCTs are affordable for small systems and will achieve compliance with the MCL.

Because EPA has listed SSCTs, small systems:

— Will have the latitude to choose the type of treatment technology that is most cost-effective and appropriate (from an operation and maintenance standpoint).

— Are not eligible for *small system variance*s since there are affordable technologies that will achieve compliance with the MCLs.

— May be eligible for a variance if it has installed or agreed to install the BAT or SSCT, but, due to source water quality, the system will not be in compliance with the MCL. (See Section I-A.11.c below.)

EPA evaluated the BATs, other technologies, and point-of-use (POU) and point-of-entry (POE) devices to determine the SSCTs. POE units treat all of the water entering a household or other building, so that treated water comes from any tap. POU treatment units treat water only at a particular tap or faucet. The result is treated water at that one tap and untreated water at the other taps. POE and POU treatment units often use the same technological concepts employed in the analogous central treatment processes, the main difference being the much smaller scale of the device itself and the flows being treated. However, POE technologies are not listed as small systems compliance technologies for radionuclides since they are considered emerging technologies and due to concerns regarding waste disposal and costs. (*Small System Compliance Technology Lists for Non-microbial Contaminants Regulated Before 1996*).

EPA believes that it is feasible for a small system to own, control, and maintain POU devices for radionuclide MCL compliance. To ensure that POU devices are as protective of public health as central treatment, SDWA requires that (SDWA §1412(b)(4)(E)(ii)):

- POU units be owned, controlled, and maintained by the PWS or by a contractor hired by the PWS to ensure proper operation and maintenance of the devices and compliance with the MCLs.

- POU units have mechanical warnings to automatically notify customers of operational problems.

The successful implementation of a POU treatment strategy will require a system to address several issues:

- As with any treatment technology, not all treatment devices are compatible with all sources of water. Pilot testing on the local source water is necessary prior to the implementation of a POU strategy.

- The system must be able to obtain regular access to POU units to perform necessary maintenance and monitoring. Some systems have successfully passed local ordinances requiring access to be granted as a condition of water delivery. Public education is also crucial to the success of a POU strategy.

- Implementing a POU treatment strategy will require a rigorous preventative maintenance program. Devices may also require frequent sampling. Systems should ensure, prior to implementation, that they have available staff to perform the necessary maintenance, monitoring, and record keeping, or they can make arrangements to contract out their maintenance and monitoring duties.

EPA is currently developing a *Centrally Managed Point-of-Entry and Point-of-Use Compliance Strategy* to further analyze some of the implementation issues surrounding the use of these devices. For additional information see the *Draft Implementation Guidance for the Arsenic Rule Appendix G* at www.epa.gov/safewater/ars/dimpappx.pdf.

Table I-8 lists the small system compliance technologies for radionuclides and the limitations of their use. Table I-9 lists the Small Systems Compliance Technologies for the currently regulated radionuclides that are appropriate for the three system size categories designated in the SDWA. The technology numbers in Table I-9 refer to the technologies listed in Table I-8.

Table I-8: List of Small Systems Compliance Technologies for Radionuclides and Limitations of Use

Unit Technologies	Limitations (see footnotes)	Operator Skill Level Required[1]	Raw Water Quality Range & Considerations[1]
1. Ion Exchange (IE)	(a)	Intermediate	All ground waters
2. Point of Use (POU[2]) IE	(b)	Basic	All ground waters
3. Reverse Osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration
4. POU[2] RO	(b)	Basic	Surface waters usually require pre-filtration
5. Lime Softening	(d)	Advanced	All waters
6. Green Sand Filtration	(e)	Basic	
7. Co-precipitation with Barium Sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality
8. Electrodialysis/Electrodialysis Reversal		Basic to Intermediate	All ground waters
9. Pre-formed Hydrous Manganese Oxide Filtration	(g)	Intermediate	All ground waters
10. Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency
11. Enhanced Coagulation/filtration	(i)	Advanced	Can treat a wide range of water qualities

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

[2] A POU, or “point-of-use,” technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000, NODA for more details.

Limitations Footnotes: Technologies for Radionuclides

[a] The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

[b] When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

[c] Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

[e] Removal efficiencies can vary depending on water quality.

[f] This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place

[g] This technology is most applicable to small systems that already have filtration in place.

[h] Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

[i] Assumes modification to a coagulation/filtration process already in place.

Table I-9: Compliance Technologies by System Size Category for Radionuclide NPDWRs (Affordability Not Considered, Except for Uranium, Due to Statutory Limitations)

	Compliance Technologies[1] for System Size Categories (Population Served)		
Contaminant	**25 - 500**	**501 - 3,300**	**3,301 - 10,000**
Combined radium-226 and radium-228	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9
Gross alpha particle activity	3, 4	3, 4	3, 4
Beta particle activity and photon activity	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4
Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11

[1] Numbers correspond to those technologies found listed in the Table I-8

I-C.10.a Waste Treatment, Handling and Disposal Guidance

EPA has developed guidance for system managers, engineers, and State agencies responsible for the safe handling and disposal of treatment wastes that, in many cases, are not specifically addressed by any statute ("Suggested Guidelines for Disposal of Drinking Water Treatment Wastes Containing Naturally-Occurring Radionuclides," EPA 1994, Updated November 2000. The guidelines will be posted on http://www.epa.gov). The guidance provides information on the following:

- Background on water treatment processes and characteristics of wastes generated;
- Rationale for radiation protection, including citation of programs and regulations affecting other sources of such waste;
- Guidelines for several methods of disposal of solid and liquid type wastes containing the subject radionuclides; and,
- The specification of practical guidance to protect workers and others who may handle or be exposed to water-treatment wastes containing radiation above background levels.

I-C.10.b Technology Cost Estimates

In accordance with federal rulemaking process, EPA estimated the costs and benefits of the changes to the 1976 Radionuclides Rule by preparing an *Economic Analysis of the Radionuclides National Primary Drinking Water Regulations* (November 2000). The Economic Analysis was an update to the Health Risk Reduction and Cost Analysis announced in the NODA.

States and systems are expected to incur costs for two requirements under the Radionuclides Rule: compliance with the uranium MCL and individually monitoring for radium-228. EPA estimates that these requirements will result in annual compliance costs of \$81 million and State implementation costs of \$0.6 million.[11] Table I-10 shows a breakdown of expected compliance costs.

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[11] All cost estimates are in 1999 dollars.

Table I-10: Summary of Cost Estimates

	Numbers of systems impacted (population exposed above MCL)[1]	**Best-estimate of annual compliance costs (in millions of $/year)**
Systems impacted by corrections to the monitoring deficiencies for combined radium-226 and -228		
Eliminate combined radium monitoring	295 systems (420,000 persons)	$25
Systems predicted to be out of compliance with proposed options for uranium MCL		
Uranium at 30 µg/L	500 systems (620,000 persons)	$51

Notes: Compliance costs do not include monitoring and reporting costs, which comprise an additional $5 million annually. Ranges based on directly proportional versus lognormal distribution approach.

[1] Compared to the initial baseline (i.e., occurrence data are adjusted to eliminate existing MCL violations) for combined radium. Occurrence data is unadjusted for uranium options.

I-C.11 Variances and Exemptions

I-C.11.a Variances

If a system cannot meet MCLs because of the characteristics of its raw water sources, it may be eligible for a variance under SDWA Section 1415(a) on condition that:

- The system install a BAT (all system sizes), an SSCT (systems serving fewer than 10,001 persons), or other means as determined by EPA; and,

- A State evaluation indicates that alternative sources of water are not reasonably available.

While a variance may allow a system to provide water that exceeds the MCL, it will only be granted if the quality of the water delivered under the variance will not result in an unreasonable risk to health.

Eligibility for a variance from the MCLs for gross alpha, combined radium-226/228, uranium, and beta particle and photon emitters requires that the system install, operate, and maintain a technology specified in the final Radionuclides Rule and enter into a compliance schedule with the State (40 CFR 142.65).

I-C.11.b Exemptions

While the primacy agency may grant exemptions from MCLs and/or treatment technique requirements in NPDWRs as provided for under SDWA Section 1416, these exemptions may only extend the applicable compliance date three years.[12] Since the MCLs for gross alpha, radium 226/228, and total beta particle and photon emitters were promulgated in 1976, no more exemptions may be granted.

However, exemptions may be granted from the MCL for uranium if:

- Due to compelling factors the PWS is unable to comply with the MCL or implement measures to develop an alterative source of water supply;

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[12] In the case of a system that serves 3,300 persons or fewer, or needs financial assistance for improvements, additional exemptions totaling no more than six years may be granted.

- The PWS was in operation on December 2003 or, if the system was not operating by this date, no reasonable alternative source of drinking water is available;

- The exemption will not result in an unreasonable risk to public health; and,

- Management and restructuring changes can not reasonably be made to lead to MCL compliance or improve the quality of water.

Exemptions from the uranium MCL may be granted to systems of all sizes. When granting an exemption, the State must issue a schedule requiring compliance as expeditiously as practicable but no later than December 8, 2016.

EPA is currently developing guidance on the implementation of the exemptions provisions for the Arsenic Rule. For additional information, and to review the draft guidance, see the *Draft Implementation Guidance for the Arsenic Rule Appendix H* at www.epa.gov/safewater/ars/dimpappx.pdf.

Section II.

SDWIS Reporting, Violation Determination, and SNC Definitions

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II-A. SDWIS Reporting

Table II-1 summarizes the Safe Drinking Water Information System/Federal (SDWIS/FED) reporting requirements for the Revised Radionuclides Final Rule. The summary contains SDWIS/FED violation and contaminant codes.

This table lists only potential federal violations. Appendix E provides SDWIS/FED Data Transfer Format (DTF) reporting guidance on how to place these violations in the appropriate structure so that SDWIS/FED can accept them, when reported.

Table II-1: Revised Radionuclides Final Rule Federal Reporting Violations

Contaminant Code	Contaminant	Violation
4000	Gross Alpha	02, 03, 08
4010	Combined Radium (-226 &-228)	02, 03, 08
4006	Combined Uranium	02, 03, 08
4100	Gross Beta Particle Activity	02, 03, 08
4102	Tritium	03, 08
4174	Strontium-90	03, 08
4264	Iodine-131	03, 08

Note: Violation Types and Definitions
02 - MCL, Average
03 - Failure to Monitor/Report
08 - Variance/Exemption/Other Compliance Schedule

II-B. Violation Determination

II-B.1 Violation/Compliance Determination for Gross Alpha, Radium-226/228, and Uranium

States must determine compliance based on the analytical result(s) obtained at each EPTDS (40 CFR 141.26(c)(3)). A system is in violation if:

- Any sampling point is in violation of an MCL (40 CFR 141.26(c)(3)).
- Any sample result will cause the running annual average to exceed the MCL at any EPTDS (i.e., the analytical result is greater than four times the MCL) (40 CFR 141.26(c)(3)(i)).

For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point. Systems that monitor annually or less frequently and whose sample result exceeds the MCL must revert to quarterly sampling for that contaminant during the next quarter. Systems are required to conduct quarterly monitoring only at the EPTDS at which the sample was collected and for the specific contaminant that triggered the system into the increased monitoring frequency. Systems triggered into increased monitoring will not be considered in violation of the MCL until they have completed one year of quarterly sampling (40 CFR 141.26(c)(3)).

If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running annual average of the samples collected (40 CFR 141.26(c)(3)(iv)). If a sample result is less than the method detection limit, zero will be used to calculate the annual average. However, if a gross alpha particle activity result is being used in lieu of radium-226 or uranium, then half the detection limit will be used to calculate the annual average (40 CFR 141.26(c)(3)(v)). States have the discretion to delete results of obvious sampling or analytic errors (40 CFR 141.26(c)(4)).

States still have the flexibility to require confirmation samples for positive or negative results.[13] States may require more than one confirmation sample to determine the average exposure over a three month period. Confirmation samples must be averaged with the original analytical result to calculate an average (40 CFR 141.26(c)(1)). The three-month average would be used as one of the quarterly concentrations for determining the running annual average. The running annual average must be used for compliance determinations (40 CFR 141.26(c)(1)).

The Rule requires that monitoring be conducted at all entry points to the distribution system. However, the State can require monitoring and determine compliance based on a case-by-case analysis of individual drinking water systems. EPA encourages drinking water systems to inform State regulators of their individual circumstances. Some systems have implemented elaborate plans including targeted, increased monitoring that is much more representative of the average annual mean contaminant concentration to which individuals are being exposed. (Some States determine compliance based on a time-or-flow weighted average.) In many cases, the State can demonstrate that compliance is being calculated based on scientific methods that are more representative of the true contaminant concentration to which individuals are being exposed over a year, but it substantially increases the sampling and analytical costs. Some States require that systems collect samples from wells that operate for only one month out of the year regardless of whether they are operating during scheduled sampling times. The

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[13] At a State's discretion, a system may be required to take additional samples to confirm sampling results.

State may determine compliance based on several factors including the quantity of water supplied by a source, the duration of service of the source, and contaminant concentration.

II-B.2 Violation/Compliance Determination for Gross Beta and Photon Emitters

The Radionuclides Rule uses a “sum-of-the-fractions” method to determine whether a system is in compliance with the MCL for beta particle and photon radioactivity (40 CFR 141.66(d)). This method is used because each photon emitter targets a different organ of the body, which results in a different magnitude of risk. The sum of the beta and photon emitters shall not exceed 4 millirems/year (40 CFR 141.66(d)(2)).

While the measure used in risk calculations is “millirems,” contaminants are analyzed in “pCi/L.” Therefore, to determine compliance, each beta and photon emitter must be converted from pCi/L to millirems using the conversion tables listed in “Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure” [National Bureau of Standards (NBS) Handbook 69 as amended August, 1963, U.S. Department of Commerce]. See Appendix I for the conversion tables.

The column titled “1976 limits based on critical organ at 4 mrem/yr” indicates what 4 mrem of exposure would be for that contaminant expressed as pCi/L. For each emitter that is detected by the laboratory, the system must divide the pCi/L found in the sample by the value in the conversion tables. This provides a fraction of how much the particular beta or photon emitter is providing towards the maximum of 4 mrem/year for all of the beta photon emitters.

$$\frac{\text{pCi/L found in sample (from laboratory results)}}{\text{pCi/L equivalent of 4 mrem of exposure (from conversion table)}} = \text{fraction of the maximum 4 mrem/year exposure limit}$$

Each fraction must then be converted to a dose equivalent of 4 mrem/year by multiplying the fraction by 4. The results for each emitter must be summed to determine compliance See Illustration II-1.

ILLUSTRATION II-1
Conversion of Beta Particle and Photon Emitters

A water system near a nuclear power facility collects a sample which the laboratory speciates by EPA method 902.0 (gamma spectrometry analysis). The laboratory also analyses for strontium-90 using EPA method 905.0. The analysis indicates the following:

Cesium-134 (Cs-134):	5,023 pCi/L
Cesium-137 (Cs-137):	30 pCi/L
Strontium-90 (Sr-90):	4 pCi/L
Iodine-131 (I-131):	2 pCi/L

To determine compliance the following calculations are completed:

Emitter	**(X)** **Lab Analysis (pCi/L)**	**(Y)** **Conversion from table (pCi/4mrem)**	**(X/Y=A)** **Calculated Fraction**[1]	**(A*4)** **Calculated Total mrem**[2]
Cs-134	5,023	20,000	0.25115	
I-131	2	3	0.7	
Cs-137	30	200	0.150	
Sr-90	4	8	0.5	
Sum-of-the-fractions			1.60115	7

[1] To ensure accuracy, the results were rounded to the number of figures in the conversion table. See Appendix I.

[2] Since data reported to the State or EPA should be in a form containing the same number of significant digits as the MCL, the results were rounded to one significant digit. The last significant digit was increased by one unit if the digit dropped was a 5, 6, 7, 8, or 9; and was not altered if the preceding number was a 0, 1, 2, 3, or 4.

The system is in violation of the MCL because the "sum-of-the-fractions" is 7 mrem, which means that the sum of the annual dose equivalent to the total body, or to any internal organ, exceeds 4 mrems/year.

II-C. SNC Definitions

EPA's Office of Enforcement Compliance Assurance (OECA) is in the process of developing new guidance in an effort to update its significant noncomplier (SNC) definitions. However, at this time, we will use the following definition to remain consistent with the Arsenic Rule and OECA draft guidance.

A system is characterized as a SNC if it has a violation result twice the MCL (30 pCi/L for gross alpha, 10 pCi/L for combined radium-226 and radium-228, 60 µg/L for uranium, and 8 mrem/year for man made beta particle and photon emitters).

A system monitoring once a year or more is characterized as a SNC if it fails to monitor or report analytical results for radionuclides for two consecutive monitoring periods. A system monitoring less than once a year is characterized as a SNC if it fails to monitor or report the analytical results for radionuclides in one monitoring period.

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Section III.

Primacy Revision Applications

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III-A. State Primacy Program Revision

40 CFR Part 142 sets out requirements for States to obtain or retain primary enforcement responsibility (primacy) for the Public Water System Supervision (PWSS) program as authorized by SDWA Section 1413. The 1996 SDWA Amendments update the process for States to obtain or retain primacy. On April 28, 1998, EPA promulgated the Primacy Rule to reflect these statutory changes (63 FR 23361).

Pursuant to 40 CFR 142.12, complete and final requests for approval of program revisions to adopt new or revised EPA regulations must be submitted to the Administrator no later than two years after promulgation of the new or revised federal regulations (see Table III-1). Until those applications are approved, EPA Regions have responsibility for directly implementing The Radionuclides Rule. The State and EPA can agree to implement the Rule together during this period. EPA anticipates that, for The Radionuclides Rule, those responsibilities will involve only outreach to ensure that systems desiring flexibility for initial monitoring are able to grandfather appropriate data. However, if a State is eligible for interim primacy, once it submits a complete and final revision package, it will have full implementation and enforcement authority. A State may be granted an extension of up to two years to submit its application package. During any extension period, an agreement outlining the State's and EPA's responsibilities is required.

Table III-1: State Rule Implementation and Revision Timetable for Radionuclides Rule

EPA/State Action	Time Frame
Rule published by EPA	December 7, 2000
State and Region establish a process and agree upon a schedule for application review and approval	May 2001
State, at its option, submits *draft* program revision package including: Preliminary Approval Request Draft State Regulations and/or Statutes Regulation Crosswalk	September 2001 (Suggested)
EPA Regional office (and Headquarters, if necessary) review draft	Completed within 90 days of State submittal of Draft
State submits final program revision package including: Adopted State Regulations Regulation Crosswalk 40 CFR 142.10 Primacy Update Checklist 40 CFR 142.14 and 142.15 Reporting and Recordkeeping 40 CFR 142.16 Special Primacy Requirements Attorney General's Enforceability Certification	by September 8, 2002*
EPA conducts final review of State submittal: Regional review (program and ORC) Headquarters concurrence and waivers (OGWDW, OECA, OGC) Public Notice Opportunity for hearing EPA's Determination	Completed within 90 days of State submittal of final package 45 days Region 45 days Headquarters
Rule Effective Date	December 8, 2003

* EPA suggests submitting an application by September 2002, to ensure timely approval. EPA regulations allow until December 8, 2002, for this submittal. An extension of up to two additional years may be requested by the State.

III-A.1 The Revision Process

The approval of State program revisions is recommended to be a two-step process comprising the submission of a draft request (optional) followed by the submission of a complete and final request for program approval. Figure III-1 diagrams these processes and their timing.

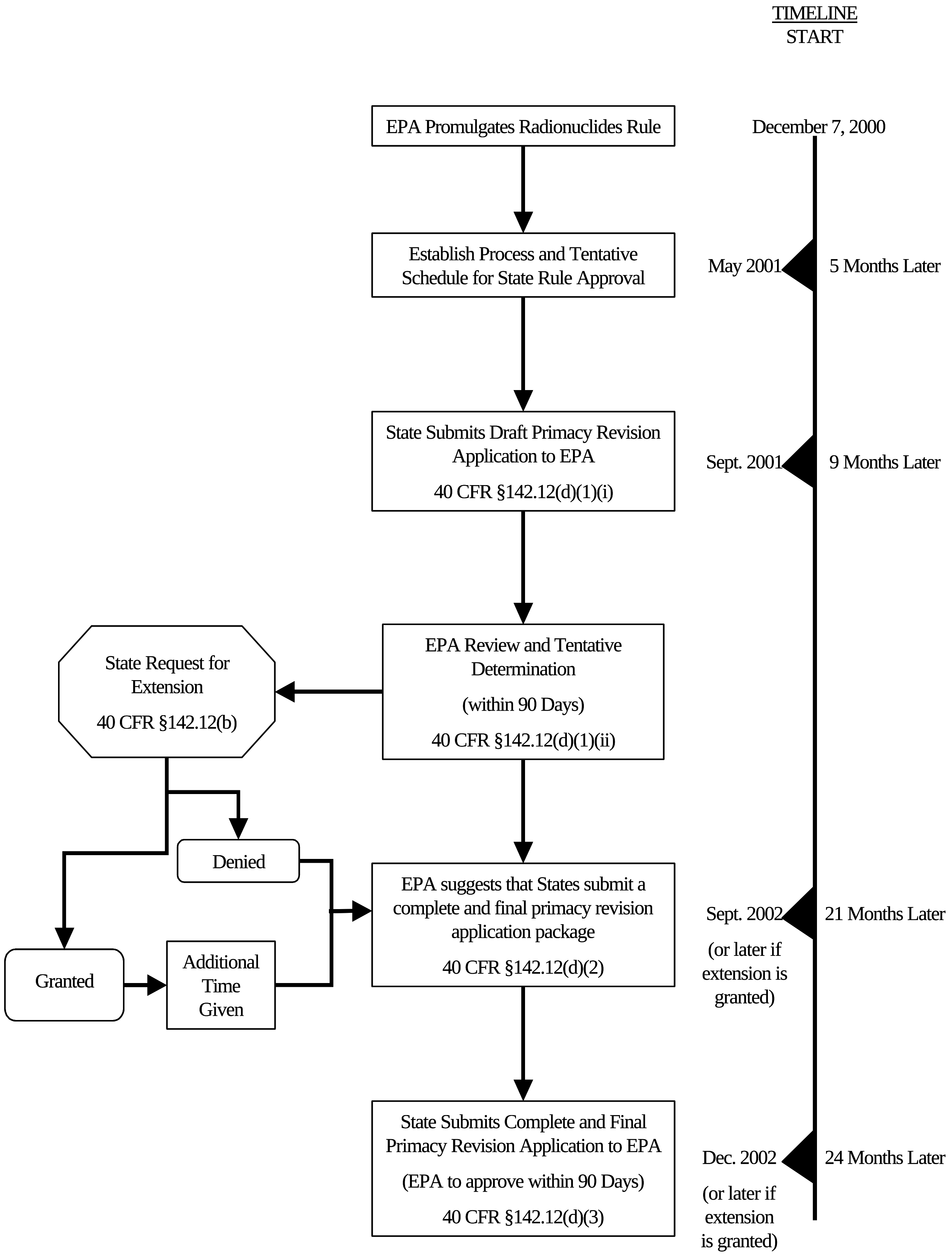
Draft Request — A State may submit a draft request for EPA review and tentative determination. The request should contain drafts of all required primacy application materials. A draft request should be submitted within nine months after Rule promulgation. EPA will make a tentative determination on whether the State program meets the applicable requirements. The tentative determination should be made within 90 days.

Complete and Final Request — This submission must be in accordance with 40 CFR 142.12(c)(1) and (2) and include the Attorney General's statement. The State should also include its response to any comments or program deficiencies identified in the tentative determination (if applicable). EPA Regions should make States aware that submission of only a final request may make it more difficult for the States to address any necessary changes within the time available for State rule adoption.

EPA requests that States submit their complete and final revision package within 21 months of Rule promulgation. This will ensure that States will have interim primacy within 24 months and will prevent States from becoming backlogged with revision applications to adopt future federal requirements.

The State and EPA Region should agree to a plan and timetable for submitting the State primacy revision application as soon as possible after rule promulgation—ideally within five months after promulgation.

Figure III-1: Recommended Review Process for State Request for Approval of Program Revisions



III-A.2 The Final Review Process

Once a State application is complete and final, EPA has a regulatory (and statutory) deadline of 90 days to review and approve or disapprove of the revised program. The Office of Ground Water and Drinking Water (OGWDW) will conduct detailed reviews of the first State package from each Region. We ask that the Region submit its comments with the State's package for Headquarters review. Where the Region has identified all significant issues, OGWDW will waive concurrence on all other State programs in that Region, although they will retain the option to review additional State programs with cause. The Office of General Counsel (OGC) and the OECA has delegated its review and approval to the Office of Regional Counsel (ORC).

To meet the 90-day deadline for packages undergoing Headquarters review, the review period will be equally split giving both the Regions and Headquarters 45 days to conduct their respective reviews. For the first package in each Region, EPA Regional offices should forward copies of the primacy revision applications to the Drinking Water Protection Division Director in OGWDW, which will take the lead on the review process.

III-B. State Primacy Program Revision Extensions

III-B.1 The Extension Process

Under 40 CFR 142.12(b), States may ask that the two-year deadline for submitting the complete and final request for EPA approval of program revisions be extended for up to two additional years in certain circumstances. The extension request must be submitted to EPA within two years of the date that EPA published the regulation. The Regional Administrator has been delegated authority to approve extension applications: Headquarters concurrence on extensions is not required.

III-B.2 Extension Request Criteria

For an extension to be granted, the State must demonstrate that it is requesting the extension because it cannot meet the original deadline for reasons beyond its control, despite a good faith effort to do so. A critical part of the extension application is the State's proposed schedule for submitting of its complete and final request for approval of a revised primacy program. The application must also demonstrate at least one of the following:

(i) The State currently lacks the legislative or regulatory authority to enforce the new or revised requirements;

(ii) The State currently lacks adequate program capability to implement the new or revised requirements; or,

(iii) The State is requesting the extension to group two or more program revisions in a single legislative or regulatory action.

In addition, the State must be implementing the EPA requirements to be adopted in its program revision within the scope of its current authority and capabilities.

III-B.3 Conditions of the Extension

To be granted an extension, the State must agree to certain conditions that must be met during the extension period. These conditions will be negotiated by the Region and the State during the extension approval process and decided on a case-by-case basis. The conditions must be included in an extension agreement between the State and the EPA Regional office. Appendix C contains a sample extension agreement.

Conditions of an extension agreement may include:

- Informing PWSs of the new EPA (and upcoming State) requirements and that the Region will be overseeing implementation of the requirements until it approves the State program revisions or until the State submits a complete and final revision package if the State qualifies for interim primacy.

- Collecting, storing, and managing laboratory results, public notices, and other compliance and operation data required by the EPA regulations.

- Assisting the Region in the development of the technical aspects of enforcement actions and conducting informal follow-up on violations (telephone calls, letters, etc.).

- Providing technical assistance to PWSs.

- For States whose extension is based on a lack of program capability adequate to implement the new requirements, taking steps agreed to by the Region and the State during the extension period to remedy the deficiency.

- Providing the Region with all the information required under 40 CFR 142.15 State reporting.

Table III-2 provides a checklist the Region can use to review State extensions.

Table III-2: Extension Request Checklist

I. Reason for State Request

- ______ Clustering of Program Revisions
- ______ Statutory Barrier
- ______ Regulatory Barrier
- ______ Lack of Program Capability
  - ______ Insufficient Resources
  - ______ Funding Level
  - ______ Staffing
  - ______ Lack of Adequately Trained Staff
  - ______ Inadequate Procedures, Guidelines, and Policies
- ______ Other ____

II. Actions Taken by the State to Justify an Extension

	Schedule Dates (or attachments)
______ Seeking Increases in Program Resources	______________
______ Training Existing Personnel/Revising Training Programs	______________
______ Revising State Regulations or Statutes	______________
______ Developing Revised/New Procedures, Guidelines, Policies	______________
______ Other ____________________________________ ____________________________________	______________

III. Extension Decision

______ Extension Request Approved Date: ___/___/___

______ Period of Extension Request: ___/___/___ to ___/___/___

______ Extension Request Denied Date: ___/___/___

______ Reason Cited:____________________________________

IV. Conditions of the Extension

During the extension period the State will (check all that apply):

- ______ Inform public water systems of the new requirements and the fact that EPA will be overseeing their implementation until the State's program is approved or submitted if the State qualifies for interim primacy
- ______ Collect and store laboratory results and other compliance data
- ______ Provide technical assistance to public water systems
- ______ Provide EPA with the information required under section 142.15 of the primacy rule
- ______ Other ____

III-C. State Primacy Package

The Primacy Revision Application package should consist of the following sections discussed below:

III-C.1 The State Primacy Revision Checklist (40 CFR 142.10)

This section is a checklist of general primacy requirements, taken from 40 CFR 142.10, as shown in Table III-3. In completing this checklist, the State must identify the program elements that it has revised in response to new federal requirements. If an element has been revised the State should indicate a "Yes" answer in the second column next to the list of program elements and should submit appropriate documentation. For elements that need not be revised, the State need only list the citation and date of adoption in the second column. During the application review process, EPA will insert findings and comments in the third column.

Table III-3: State Primacy Revision Checklist

Required Program Elements		Revision to State Program	EPA Findings/Comments
142.10	Primary Enforcement -- Definition of Public Water System*		
142.10(a)	Regulations No Less Stringent		
142.10(b)(1)	Maintain Inventory		
142.10(b)(2)	Sanitary Survey Program		
142.10(b)(3)	Laboratory Certification Program		
142.10(b)(4)	Laboratory Capability		
142.10(b)(5)	Plan Review Program		
142.10(b)(6)(i)	Authority to apply regulations		
142.10(b)(6)(ii)	Authority to sue in courts of competent jurisdiction		
142.10(b)(6)(iii)	Right of Entry		
142.10(b)(6)(iv)	Authority to require records		
142.10(b)(6)(v)	Authority to require public notification		
142.10(b)(6)(vi)	Authority to assess civil and criminal penalties		
142.10(b)(6)(vii)	Authority to Require CWSs to Provide CCRs**		
142.10(c)	Maintenance of Records		
142.10(d)	Variance/Exemption Conditions (if applicable)***		
142.10(e)	Emergency Plans		
142.10(f)	Administrative Penalty Authority*		

* New requirement from the 1996 Amendments. Regulations published in the April 28, 1998 *Federal Register*.
** New regulation published in the August 19, 1998 *Federal Register*.
*** New regulations published in the August 14, 1998 *Federal Register*.

The 1996 SDWA Amendments include new provisions for PWS definition and administrative penalty authority. States must adopt provisions at least as stringent as these new provisions, now codified at 40 CFR 142.2 and 142.10. Failure to revise primacy for these new provisions can affect primacy for the

Radionuclides Rule. However, States may still receive interim primacy for The Radionuclides Rule even if they have not yet revised their base program to comply with the new statutory requirements provided that the State has received an extension to adopt these requirements and that this extension period has not expired (up to April 2002 with full extension).

Rule Bundling — States may bundle the primacy revision packages for multiple rules so long as the submittal date (two years plus a two-year extension) has not lapsed. The Attorney General statement should reference the new requirements.

III-C.2 Text of the State's Regulation

Each primacy application package must include a citation to the applicable State regulation (40 CFR 142(c)(l)(i)).

III-C.3 Primacy Revision Crosswalk

The Primacy Revision Crosswalk, found in Appendix D, should be completed by States to identify their statutory or regulatory provisions that correspond to each federal requirement. If a State's provisions differ from federal requirements, the State should explain how its requirements are "no less stringent."

III-C.4 State Reporting and Recordkeeping (40 CFR 142.14 and 142.15)

There are no new State recordkeeping requirements (40 CFR 142.14) under The Radionuclides Rule. However, States must continue to comply with existing reporting and recordkeeping requirements that pertain to Radionuclides.

III-C.5 Special Primacy Requirements (40 CFR 142.16)

Section III-D provides guidance on how States may choose to meet each special primacy requirement.

III-C.6 Attorney General's Statement of Enforceability

The complete and final primacy revision application must include an Attorney General statement certifying that the State regulations were duly adopted and are enforceable. The Attorney General's statement should also certify that the State does not have any audit privilege or immunity laws, or if it has such laws, that these laws do not prevent the State from meeting the requirements of SDWA. If a State has submitted this certification with a previous revision package, then it should indicate the date of submittal and the Attorney General need only certify that the status of the audit laws has not changed since the prior submittal. An example of an Attorney General's statement for The Radionuclides Rule is presented in Table III-5.

III-C.7 Variances and Exemptions

States that want to have the ability to grant general variances or exemptions for uranium under this Rule must also adopt 40 CFR 142.65. (See Section I-C.11 for more information on variances and exemptions.)

Table III-4: Example of Attorney General Statement

Model Language

I hereby certify, pursuant to my authority as (1) and in accordance with the Safe Drinking Water Act as amended, and (2), that in my opinion the laws of the [State / Commonwealth of (3)] [or tribal ordinances of (4)] to carry out the program set forth in the "Program Description" submitted by the (5) have been duly adopted and are enforceable. The specific authorities provided are contained in statutes or regulations that are lawfully adopted at the time this Statement is approved and signed, and will be fully effective by the time the program is approved.

Guidance For States on Audit Privilege and/or Immunity Laws

In order for EPA to properly evaluate the State's request for approval, the State Attorney General or independent legal counsel should certify that the State's environmental audit immunity and/or privilege and immunity law does not affect its ability to meet enforcement and information gathering requirements under the Safe Drinking Water Act. This certification should be reasonably consistent with the wording of the State audit laws and should demonstrate how State program approval criteria are satisfied.

EPA will apply the criteria outlined in its "Statement of Principles" memo issued on February 14, 1997 (see Appendix F), in determining whether States with audit laws have retained adequate enforcement authority for any authorized federal programs. The principles articulated in the guidance are based on the requirements of federal law, specifically the enforcement and compliance and State program approval provisions of environmental statutes and their corresponding regulations. The principles provide that if provisions of State law are ambiguous, it will be important to obtain opinions from the State Attorney General or independent legal counsel interpreting the law as meeting specific federal requirements. If the law cannot be so interpreted, changes to the State law may be necessary to obtain federal program approval. Before submitting a package for approval, States with audit privilege and/or immunity laws should initiate communications with appropriate EPA Regional Offices to identify and discuss the issues raised by the State's audit privilege and/or immunity law.

Model Language

I. **For States with No Audit Privilege and/or Immunity Laws**

Furthermore, I certify that the [State / Commonwealth of (3)] has not enacted any environmental audit privilege and/or immunity laws.

II. **For States with Audit Laws that do Not Apply to the State Agency Administering the Safe Drinking Water Act**

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State / Commonwealth of (3)] does not affect (3) ability to meet enforcement and information gathering requirements under the Safe Drinking Water Act because the [audit privilege and/or immunity law] does not apply to the program set forth in the "Program Description." The Safe Drinking Water Act program set forth in the "Program Description" is administered by (5); the [audit privilege and/or immunity law] does not affect programs implemented by (5), thus the program set forth in the "Program Description" is unaffected by the provisions of the [State / Commonwealth of (3)] [audit privilege and/or immunity law].

III. For States with Audit Privilege and/or Immunity Laws that Worked with EPA to Satisfy Requirements for Federally Authorized, Delegated or Approved Environmental Programs

Furthermore, I certify that the environmental [audit privilege and/or immunity law] of the [State / Commonwealth of (3)] does not affect (3) ability to meet enforcement and information gathering requirements under the Safe Drinking Water Act because the [State / Commonwealth of (3)] has enacted statutory revisions and/or issued a clarifying Attorney General's statement to satisfy requirements for federally authorized, delegated or approved environmental programs.

____

Seal of Office

____
Signature

____
Name and Title

____
Date

(1)State Attorney General or attorney for the primacy agency if it has independent legal counsel
(2)40 CFR 142.11(a)(6)(i) for initial primacy applications or 142.12(c)(1)(iii) for primacy program revision applications..
(3)Name of State or Commonwealth
(4)Name of Tribe
(5)Name of Primacy Agency

III-D. Guidance for Special Primacy Requirements

This section contains guidance States can use when addressing the special primacy requirements of 40 CFR 142.16. It specifically addresses the special primacy conditions added for implementation of The Radionuclides Rule. The guidance addresses special primacy conditions in the order that they occur in the Rule.

States should note that, in several sections, the guidance makes suggestions and offers alternatives that go beyond the minimum requirements indicated by reading the subsections of 40 CFR 142.16. EPA does this to provide States with information or suggestions that may be helpful to States' implementation efforts. Such suggestions are prefaced by "may" or "should" and are not required elements of States' applications for program revision.

III-D.1 Special Primacy Requirements

III-D.1.a. Special primacy requirements: 40 CFR 142.16(l)

40 CFR 142.16(l) states:

> An application for approval of a State program revision for Radionuclides which adopts the requirements specified in 141.26(a)(2)(ii)(C) must contain the following (in addition to the general primacy requirements enumerated in this part, including that State regulations be at least as stringent as the Federal requirements):
>
> (1) If a State chooses to use grandfathered data in the manner described in 141.26(a)(2)(ii)(C), then the State must describe the procedures and criteria which it will use to make these determinations (whether distribution system or entry point sampling points are used).
>
> (i) The decision criteria that the State will use to determine that data collected in the distribution system are representative of the drinking water supplied from each entry point to the distribution system. These determinations must consider:
>
> (A) All previous monitoring data.
> (B) The variation in reported activity levels.
> (C) Other factors affecting the representativeness of the data (e.g., geology).

III-D.1.b. Guidance 40 CFR 142.16(l)

The Revised Radionuclides Rule requires systems to collect compliance samples from each EPTDS. 40 CFR 141.26(a)(2)(ii)(E) gives States the flexibility to allow systems to use monitoring data collected from the distribution system to satisfy the initial monitoring requirements.

EPA believes that requests for use of grandfathered data are best handled by States on a case-by-case basis. Therefore, to meet this special primacy requirement, State applications for program revision must demonstrate that each request for use of previously collected data will be evaluated on its merits. The application must include an explanation of how the State will use all previous monitoring data and the variation in reported activity levels. It must also explain what other factors affecting the representativeness of the data the State will use to determine if the data can be used for the initial monitoring requirement.

For example, a State may find that the distribution samples are representative of each entry point for a system that has:

- Three wells, drawing from the same aquifer, that are from different parts of a well field;
- Three EPTDSs; and ,
- Good historical data showing low to no uniform radionuclide occurrence from the raw water and the distribution system samples.

III-D.1.c. Special primacy requirements: 40 CFR 142.16(l)(2)

40 CFR 142.16(l)(2) states:

> A monitoring plan by which the State will ensure all systems complete the required monitoring within the regulatory deadlines. States may update their existing monitoring plans or use the monitoring plans submitted for the requirements in 40 CFR 142.16(e)(5) under the National Primary Drinking Water Regulations for the inorganic and organic contaminants (i.e. the Phase II/V Rules). States may note in their applications any revision to an existing monitoring plan or note that the same monitoring plan will be used. The State must demonstrate that the monitoring plan is enforceable under State law.

III-D.1.d. Guidance 40 CFR 142.16(l)(2)

For 40 CFR 142.16(l)(2), States should simply explain how they will modify their monitoring plans for radionuclides to fit within their existing monitoring plans for Phase II/V organic and inorganic contaminants. EPA recommends that States without Phase II/V primacy establish a schedule for initial monitoring for all of their systems. Some States may choose to phase-in the monitoring over the three-year compliance period based on system size or source of water. Other States may simply require one-third of their systems to monitor during each year of the three-year compliance period. States may prepare and submit such schedules with their primacy revision applications. States could also specify that they will use the schedule they developed for implementing the Phase II/V Rules (standardized monitoring framework) for inorganic and organic contaminants. The Revised Radionuclides Rule was developed so that radionuclides monitoring would fit into the standardized monitoring framework. The State must also describe how the schedule will be enforced and the authority that will allow the State to enforce the schedule.

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Section IV.

Other Resources and Guidance

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IV-A. Fact Sheet

EPA United States Environmental Protection Agency
Office of Water

Ground Water and Drinking Water

EPA 815-F-00-014
November 2000

Final Radionuclides
National Primary Drinking Water Regulations

EPA has revised the current radionuclides regulation, which has been in effect since 1977, by requiring new monitoring provisions that will ensure that all customers of community water systems will receive water that meets the Maximum Contaminant Levels for radionuclides in drinking water and has promulgated a standard for uranium as required by the 1986 amendments to the Safe Drinking Water Act. The current standards are: combined radium 226/228 of 5 pCi/L; a gross alpha standard for all alphas of 15 pCi/L, not including radon and uranium; a combined standard of 4 mrem/year for beta emitters. The new MCL for uranium is 30 µg/L. This final rule will provide improved health protection for 420,000 persons through monitoring improvements for the combined radium-226/-228 standard (a carcinogen) and for an additional 620,000 persons through a new standard for uranium (a kidney toxin and carcinogen) in drinking water.

Final Standards

The regulated radioactive drinking water contaminants are:

Contaminant	MCL	Source	Health Effect (Year Promulgated)
Combined radium-226/-228	5 pCi/L (1976)	Naturally occurs in some drinking water sources.	Some people who drink water containing radium -226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
(Adjusted) Gross Alpha	15 pCi/L (not including radon or uranium)	Naturally occurs in some drinking water sources.	Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer. (1976)
Beta Particle and Photon Radioactivity	4 mrem/year (look-up table)	May occur due to contamination from facilities using or producing radioactive materials.	Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer. (1976)
Uranium	30 µg/L	Naturally occurs in some drinking water sources.	Exposure to uranium in drinking water may result in toxic effects to the kidney. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer. (2000)

Background

Radionuclides emit "ionizing radiation," a known human carcinogen, when they radioactively decay. Long-term exposure to radionuclides (see table above) in drinking water may cause cancer. As described in the Notice of Data Availability published on April 21, 2000, EPA has performed new health effects analyses based on improved scientific models and data. These new analyses demonstrate that the health effects analyses performed in 1991 generally understated the risks associated with the proposed Maximum Contaminant Level(MCL) changes. In fact, the new health effects analytical results indicate that radionuclides in drinking water are as risky (in some cases riskier) than originally estimated in 1976. For this reason, EPA has retained the more stringent 1976 MCLs in the final rule, since the proposed MCL changes were determined to be insufficiently protective of human health.

In addition, exposure to uranium in drinking water may cause toxic effects to the kidney. In 1991, EPA proposed an MCL of 20 µg/L, which was determined to be as close as feasible to the Maximum Contaminant Level Goal (MCLG). Based on human kidney toxicity data collected since then and on its estimate of the costs and benefits of regulating uranium in drinking water, EPA has determined that the benefits of a uranium MCL of 20 µg/L do not justify the costs. Instead, EPA has determined that 30 µg/L is the appropriate MCL, since it maximizes the net benefits (benefits minus costs), while being protective of kidney toxicity and carcinogenicity with an adequate margin of safety.

Provisions of the Final Radionuclides Rule

In addition to the MCLs discussed above, this final rule requires community water systems to ensure that all water served to all customers meets the MCLs for radionuclides in drinking water. This provision will be accomplished by the requirement that all future monitoring be performed such that all water entering the distribution system is tested. Under the old rule, community water systems only tested water from a "representative point" in the distribution system. The old monitoring requirements did not protect every customer, since water quality may vary significantly within the distribution system.

The monitoring frequency requirements have changed to be more consistent with the "Standardized Monitoring Framework" that are used for other drinking water standards. This improvement will result in increased consistency in monitoring requirements and will provide monitoring relief for those water systems that have very low contaminant levels.

In addition, the new rule corrects a monitoring deficiency in the 1976 framework for monitoring for combined radium-226 and -228. Under the old rule, it was assumed that radium-226 and gross alpha levels could be used to screen for radium-228. Since then, EPA has collected substantial evidence that this assumption is false. The correction involves separate monitoring requirements for radium-228 and radium-226, further ensuring that drinking water system customers will be protected from harmful radioactive contaminant levels.

This final rule will apply only to community water systems, which are water systems with at least 15 service connections or that serve 25 or more persons year-round. EPA will further consider whether or not to regulate radionuclides levels in drinking water served by non-transient non-community water systems, which are water systems that serve at least 25 of the same people more than six months per year, such as schools, churches, nursing homes, and factories that supply their own water. EPA is consulting with the National Drinking Water Advisory Council to determine the best course of action to take with respect to regulating chronic contaminant levels for non-transient non-community water systems, including radionuclides.

Occurrence of Radionuclides in Drinking Water

Most drinking water sources have very low levels of radioactive contaminants ("radionuclides"). These very low levels are not considered to be a public health concern. Of the small percentage of drinking water systems with radioactive contaminant levels high enough to be of concern, most of the radioactivity is naturally occurring. Certain rock types have naturally occurring trace amounts of "mildly radioactive" elements (radioactive elements with very long half-lives) that serve as the "parent" of other radioactive contaminants ("daughter products"). These radioactive contaminants, depending on their chemical properties, may accumulate in drinking water sources at levels of concern. The "parent radionuclide" often behaves very differently from the "daughter radionuclide" in the environment. Because of this, parent and daughter radionuclides may have very different drinking water occurrence patterns. For example, ground water with high radium levels tend to have low uranium levels and vice versa, even though uranium-238 is the parent of radium-226.

Most parts of the United States have very low "average radionuclide occurrence" in drinking water sources. However, some parts of the country have, on average, elevated levels of particular radionuclides compared to the national average. For example, some parts of the mid-West have significantly higher average combined radium-226/-228 levels. On the other hand, some Western States have elevated average uranium levels compared to the national average. However, in general, average uranium levels are very low compared to the MCL throughout the United States. While there are other radionuclides that have been known to occur in a small number of drinking water supplies, their occurrence is thought to be rare compared to radium-226, radium-228, and uranium.

A very small percentage of drinking water systems are located in areas that have potential sources of man-made radioactive contamination from facilities that use, manufacture, or dispose of radioactive substances. Drinking water contamination may occur through accidental releases of radioactivity or through improper disposal practices. Water systems that are vulnerable to this type of contamination are required to perform extensive monitoring for radioactive contamination to ensure that their drinking water is safe. These radionuclides are regulated under the "beta particle and photon radioactivity" standard.

Costs

For the small percentage of households that are served by water systems that will be required to take corrective actions because of this rule, it is estimated that households served by typical large water systems will experience increased water bills of less than $30 per year and that households served by typical small water systems (those serving 10,000 persons or fewer) will experience increased water bills of $50 - $100 per year. Over 96 percent of the cost to water systems comes from mitigation of radionuclide levels through treatment, purchasing water, developing alternative water sources, and other compliance measures.

Since 1996, EPA's drinking water State revolving fund program has made available $3.6 billion to assist drinking water systems with projects to improve their infrastructure. EPA has funded over 1000 loans for projects around the country.

For More Information

For general information on radionuclides in drinking water, contact the Safe Drinking Water Hotline, at 1-800-426-4791, or visit the EPA Safewater website at http://www.epa.gov/safewater/ or the radionuclides website at http://www.epa.gov/safewater/radionuc.html.

IV-B. Question and Answers

EPA United States Environmental Protection Agency
Office of Water

Ground Water and Drinking Water

EPA 815-F-00-013
November 2000

Technical Fact Sheet:
Final Rule for (Non-Radon) Radionuclides in Drinking Water

1. What are we announcing?

EPA is promulgating the final drinking water standards for (non-radon) radionuclides in drinking water: combined radium-226/-228, (adjusted) gross alpha, beta particle and photon radioactivity, and uranium. This promulgation consists of revisions to the 1976 rule, as proposed in 1991.

2. What are the requirements of this final rule?

Community water systems (CWSs), which are public water systems that serve at least 15 locations or 25 residents regularly year round, are required to meet the final MCLs and to meet the requirements for monitoring and reporting.

Non-transient, non-community water systems (NTNCWSs) will not be regulated at this time. EPA will further consider this matter and may propose to regulate radionuclides at these systems in the future. NTNCWSs are public water systems that are not a CWS and serve at least 25 of the same people more than 6 months per year (e.g. schools and nursing homes).

The final rule requires that all new monitoring be conducted at each EPTDS under a schedule designed to be consistent with the Standardized Monitoring Framework.

3. How soon after publishing the final rule will the changes take effect?

The rule will become effective three years after the December 7, 2000 promulgation date (December 8, 2003). New monitoring requirements will be phased-in between that date and the beginning of the next Standardized Monitoring Framework period, December 31 of 2007. "Phased-in monitoring" refers to the fact that States will require some fraction of water systems to complete their initial monitoring requirements each year of the period between the effective date (December 8, 2003) and the beginning of the new cycle (December 31, 2007). Water systems will determine initial compliance under the new monitoring requirements using the average of four quarterly samples or, at State discretion, using appropriate grandfathered data. Compliance will be determined immediately based on the annual average of the quarterly samples for that fraction of systems required by the State to monitor in any given year or based on the results from the grandfathered data. Water systems with existing radionuclides monitoring data demonstrating that the system is out of compliance with new provisions will be out of compliance on the effective date of December 8, 2003. Water systems with existing data that demonstrates non-compliance with the current (1976) rule are currently in violation of the radionuclides National Primary Drinking Water Regulations.

4. Why is this rule significant?

This rule promulgates new monitoring provisions that will ensure that all customers of community water systems will receive water that meets the Maximum Contaminant Levels for radionuclides in drinking water. Under the 1976 rule, water systems with multiple entry points to the distribution system were not required to test at every entry point, but rather to test at a "representative point to the distribution system." While the 1976 requirement did ensure that the "average customer" was protected, it did not ensure that all customers were protected. Under the new rule, all entry points will be tested and all CWS customers will be ensured of receiving water that meets the MCLs for radionuclides in drinking water. In addition, this requirement is more consistent with the monitoring requirements for other comparable drinking water contaminants.

This rule promulgates a new standard for uranium in drinking water, which will result in reduced uranium exposures for 620,000 persons. The uranium standard, which is required by the Safe Drinking Water Act, will protect drinking water customers from uranium levels that may cause toxic effects to the kidney and will reduce cancer risk. In addition, the new rule promulgates separate monitoring requirements for radium-228, which is expected to result in reduced exposure to 420,000 persons. This monitoring correction is based on sound science and is necessary for ensuring compliance with the combined radium-226/-228 standard.

5. What health effects are associated with exposure to radionuclides from drinking water?

Exposure to radionuclides from drinking water results in the increased risk of cancer. The radioactive particles (alpha, beta and gamma particles) emitted by radionuclides are called "ionizing radiation" because they ionize ("destabilize") nearby atoms as they travel through a cell or other material. In living tissue, this ionization process can damage chromosomes or other parts of the cell. This cellular damage can lead to the death of the cell or to unnatural reproduction of the cell. When a cell reproduces uncontrollably, it becomes a cancer. Certain elements accumulate in specific organs: radium (like calcium) accumulates in the bones and iodine accumulates in the thyroid.

For uranium, we must consider not only the carcinogenic health effects from its radioactive decay and the decay of its daughter products ("radiotoxicity"), but also damage to the kidneys from exposure to the uranium itself ("chemical toxicity"). Exposure to elevated uranium levels in drinking water has been shown to lead to changes in kidney function that are indicators of potential future kidney failure.

6. What are the sources of radionuclides in water?

Most drinking water sources have very low levels of radioactive contaminants ("radionuclides"), levels low enough not to be considered a public health concern. Of the radionuclides that have been observed to occur in drinking water sources, most are naturally occurring. However, contamination of drinking water sources by anthropogenic ("human-made") nuclear materials also occurs. Naturally occurring radionuclides are found in the Earth's crust and are created in the upper atmosphere. For example, trace amounts of long-lived isotopes (e.g., uranium-238, which has a half-life of almost five billion years) have been present in earth's crust since the crust first formed. As these long-lived trace radionuclides decay, shorter-lived ("more radioactive") daughter products are formed. Of particular concern are naturally occurring uranium and the naturally occurring radium isotopes, radium-226 and radium-228, which have been observed to accumulate to levels of concern in drinking water sources.

Most of the naturally occurring radionuclides are alpha particle emitters (e.g., the uranium isotopes and radium-226), but naturally occurring beta particle emitters do occur (e.g., radium-228 and potassium-40). Certain rock types contain trace amounts of the radioactive isotopes of uranium, thorium, and/or actinium. As these parent rocks weather, the resulting clays and other aquifer-forming materials may become a source of naturally-occurring radionuclides to drinking water sources. Other naturally occurring radionuclides include tritium, a beta particle emitter, which forms in the upper atmosphere through interactions between cosmic rays (nuclear particles coming from outer space) and the gases comprising the atmosphere. Tritium can be deposited from the atmosphere onto surface waters via rain or snow and can accumulate in ground water via seepage. Tritium is also formed from human activities, as described below. Natural tritium tends not to occur at levels of concern, but contamination from human activities can result in relatively high levels.

The man-made radionuclides, which are primarily beta and photon emitters, are produced by any of a number activities that involve the use of concentrated radioactive materials. These radioactive materials are used in various ways in the production of electricity, nuclear weapons, nuclear medicines used in therapy and diagnosis, and various commercial products (such as televisions or smoke detectors), as well as in various academic and government research activities. Release of man-made radionuclides to the environment, which may include drinking water sources, are primarily the result of improper waste storage, leaks, or transportation accidents.

7. How many people and how many systems will be affected by this rule?

Higher levels of radionuclides tend to be found more in ground water sources than in surface water sources, likes rivers and lakes. While most water systems do not have detectable radionuclide activities, there are some areas of the country that have levels significantly higher than the national average levels. For example, some areas of the Mid-West have elevated radium-226 levels and some Western States have elevated uranium levels compared to the rest of the United States. Separate monitoring for radium is expected to result in roughly half of one percent of the nation's 54,000 CWSs needing to take measures to lower radium in their drinking water. The uranium standard is expected to result in slightly less than one percent of CWSs needing to take measures to reduce uranium in their drinking water. Table 1 below shows the estimated number of CWSs that would be affected by this rule and the estimated population served by these public water systems.

Table 1. Estimates of the Community Water Systems That Would Need to Mitigate Contaminant Levels and the Population Served by These CWSs

Regulatory Action	Number of CWSs Affected	Total Population Served
Radium-228 Monitoring Correction	~ 300	~ 420 thousand
Uranium MCL of 30 µg/L	~ 500	~ 620 thousand

8. How much will this rule cost?

Over 96% of the cost of this final rule is expected to come from the mitigation of radionuclide levels through treatment, purchasing water, developing alternate water sources, and other compliance measures. Table 2 below shows the total annualized costs of mitigation, monitoring, reporting, recordkeeping, and administration for this rule.

Table 2. Total National Annualized Costs of the Radionuclides Rule (Mitigation, monitoring, reporting, recordkeeping, and administration)	
Regulatory Action	**Annual Costs**
Radium-228 Monitoring Correction, Mitigation Costs	~ $ 26 million
Uranium MCL of 30 µg/L, Mitigation Costs	~ $ 50 million
New Monitoring, Reporting, Record Keeping, and Administration Costs for all Radionuclides	~ $ 5 million

- For systems that need to take corrective action to comply with the new rule, the annual costs per system will range from $9,000 per year for the smallest community water systems to over $150,000 annually for systems serving 3,300 to 10,000, and over $0.5 million annually for larger systems.

- For the small percentage of households that are served by water systems that will be required to take corrective actions because of this rule, it is estimated that households served by typical large water systems will experience increased water bills of less than $30 per year and that households served by typical small water systems (those serving 10,000 persons or fewer) will experience increased water bills of $50 - $100 per year. Costs will vary depending on the system size.

9. What are the benefits of this rule?

- The requirement for separate radium-228 monitoring is expected to result in the avoidance of 0.4 cancer cases per year, with estimated monetized health effects benefits of $2 million annually. Water mitigation for radium also tends to reduce iron and manganese levels and hardness, which also has significant associated benefits.

- The kidney toxicity benefits for the uranium standard can not be quantified because limitations in existing health effects models at levels near the MCL. In addition to these non-quantified kidney toxicity benefits, 0.8 cancer cases per year are expected to be avoided, with estimated monetized cancer health effects benefits of $3 million annually. Water mitigation for uranium also removes other contaminants, which has associated benefits.

10. Is there funding associated with this rule?

Since 1996, the Drinking Water State Revolving Loan Fund has made over $3.6. billion available for loans to help water systems improve their infrastructure. This program has now made over 1000 loans. EPA also provides funding to States that have primary enforcement responsibility for their drinking water programs through the Public Water Systems Supervision (PWSS) grants program. Other federal funds are available through Housing and Urban Development's Community Development Block Grant Program, and the Rural Utilities Service of the U.S. Department of Agriculture.

11. How did EPA consult with stakeholders?

In 1997, EPA conducted a public meeting regarding the finalization of portions of the 1991 radionuclides proposal. This meeting was advertised in the *Federal Register*. During the meeting, we discussed a range of regulation development issues with the stakeholders, including the statutory requirements, court stipulated agreement, MCLs for each of the radionuclides, the current and proposed monitoring frameworks, and new scientific information regarding health effects, occurrence, analytical methods, and treatment technologies. The presentations generated useful discussion and provided us with feedback regarding technical issues, stakeholder concerns and possible regulatory options. Participants in the stakeholder meeting included representatives from water utilities, environmental and citizens groups, State drinking water programs and health departments, other federal agencies, and other groups.

In addition, during the regulation development process, we gave presentations on the radionuclides regulation at various professional conferences, meetings between State programs and EPA Regions, the American Water Works Association's Technical Advisory Workgroup (TAW), and at Tribal meetings in Nevada, Alaska, and California. Finally, we held a one-day meeting with associations that represent State, county, and local government elected officials on May 30, 2000 and discussed five upcoming drinking water regulations, including radionuclides.

Stakeholders were also asked to comment on a variety of issues in the April 21, 2000 Notice of Data Availability. We utilized the feedback received from the stakeholders during all these meetings and comments from the NODA in developing the final radionuclides rule.

12. Where can the public get more information about the final radionuclides rule?

For general information on radionuclides in drinking water, contact the Safe Drinking Water Hotline, at (800) 426-4791, or visit the EPA Safewater website at http://www.epa.gov/safewater/ or the radionuclides website at http://www.epa.gov/safewater/radionuc.html.

In addition to this technical fact sheet, the following documents and fact sheets are available to the public at EPA's web site on radionuclides in drinking water:

- *Federal Register* notice of the Notice of Data Availability
- A Technical Support Document
- Consumer Fact Sheet on Radionuclides in Drinking Water
- The Economic Analysis for the final rule

A copy of the *Federal Register* notice of the final regulation, the Notice of Data Availability, or supporting material can be obtained by contacting the Safe Drinking Water Hotline at (800) 426-4791. The Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 9:00 a.m. to 5:30 p.m. Eastern Time.

with a notice of proposed rulemaking, and then shall proceed in accordance with 5 U.S.C. 553. If the Administrator's finding is that a complete prohibition covering a more restricted or more expanded area than that applied for by the State is appropriate, he or she shall also include a statement of the reasons why the finding differs in scope from that requested in the State's application.

(3) If the Administrator finds that a complete prohibition is inappropriate under this paragraph, he or she shall deny the application and state the reasons for such denial.

(4) For the following waters the discharge from a vessel of any sewage, whether treated or not, is completely prohibited pursuant to CWA section 312(f)(4)(B):

(i) Two portions of the Hudson River in New York State, the first is bounded by an east-west line through the most northern confluence of the Mohawk River which will be designated by the Troy-Waterford Bridge (126th Street Bridge) on the south and Lock 2 on the north, and the second of which is bounded on the north by the southern end of Houghtaling Island and on the south by a line between the Village of Roseton on the western shore and Low Point on the eastern shore in the vicinity of Chelsea, as described in Items 2 and 3 of 6 NYCRR Part 858.4.

(ii) [Reserved]

[41 FR 4453, Jan. 29, 1976, as amended at 42 FR 43837, Aug. 31, 1977; 60 FR 63945, Dec. 13, 1995; 63 FR 1320, Jan. 8, 1998; 67 FR 35743, May 21, 2002; 77 FR 11411, Feb. 27, 2012]

§ 140.5 Analytical procedures.

In determining the composition and quality of effluent discharge from marine sanitation devices, the procedures contained in 40 CFR part 136, ''Guidelines Establishing Test Procedures for the Analysis of Pollutants,'' or subsequent revisions or amendments thereto, shall be employed.

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AUTHORITY: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

SOURCE: 40 FR 59570, Dec. 24, 1975, unless otherwise noted.

EDITORIAL NOTE: Nomenclature changes to part 141 appear at 69 FR 18803, Apr. 9, 2004.

NOTE: For community water systems serving 75,000 or more persons, monitoring must begin 1 year following promulgation and the effective date of the MCL is 2 years following promulgation. For community water systems serving 10,000 to 75,000 persons, monitoring must begin within 3 years from the date of promulgation and the effective date of the MCL is 4 years from the date of promulgation. Effective immediately, systems that plan to make significant modifications to their treatment processes for the purpose of complying with the TTHM MCL are required to seek and obtain State approval of their treatment modification plans. This note affects §§ 141.2, 141.6, 141.12, 141.24 and 141.30. For additional information see 44 FR 68641, Nov. 29, 1979.

Subpart A—General

§ 141.1 Applicability.

This part establishes primary drinking water regulations pursuant to section 1412 of the Public Health Service Act, as amended by the Safe Drinking Water Act (Pub. L. 93–523); and related regulations applicable to public water systems.

§ 141.2 Definitions.

As used in this part, the term:

Act means the Public Health Service Act, as amended by the Safe Drinking Water Act, Public Law 93–523.

Action level, is the concentration of lead or copper in water specified in § 141.80(c) which determines, in some cases, the treatment requirements contained in subpart I of this part that a water system is required to complete.

Bag filters are pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed of a non-rigid, fabric filtration media housed in a pressure vessel in which the direction of flow is from the inside of the bag to outside.

Bank filtration is a water treatment process that uses a well to recover surface water that has naturally infiltrated into ground water through a river bed or bank(s). Infiltration is typically enhanced by the hydraulic gradient imposed by a nearby pumping water supply or other well(s).

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

Cartridge filters are pressure-driven separation devices that remove particulate matter larger than 1 micrometer using an engineered porous filtration media. They are typically constructed as rigid or semi-rigid, self-supporting filter elements housed in pressure vessels in which flow is from the outside of the cartridge to the inside.

Clean compliance history is, for the purposes of subpart Y, a record of no MCL violations under § 141.63; no monitoring violations under § 141.21 or subpart Y; and no coliform treatment technique trigger exceedances or treatment technique violations under subpart Y.

Coagulation means a process using coagulant chemicals and mixing by which colloidal and suspended materials are destabilized and agglomerated into flocs.

Combined distribution system is the interconnected distribution system consisting of the distribution systems of wholesale systems and of the consecutive systems that receive finished water.

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

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

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

Comprehensive performance evaluation (CPE) is a thorough review and analysis of a treatment plant's performance-based capabilities and associated administrative, operation and maintenance practices. It is conducted to identify factors that may be adversely impacting a plant's capability to achieve compliance and emphasizes approaches that can be implemented without significant capital improvements. For purpose of compliance with subparts P and T of this part, the comprehensive performance evaluation must consist of at least the following components: Assessment of plant performance; evaluation of major unit processes; identification and prioritization of performance limiting factors; assessment of the applicability of comprehensive technical assistance; and preparation of a CPE report.

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

Consecutive system is a public water system that receives some or all of its finished water from one or more wholesale systems. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

Contaminant means any physical, chemical, biological, or radiological substance or matter in water.

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

Corrosion inhibitor means a substance capable of reducing the corrosivity of water toward metal plumbing materials, especially lead and copper, by forming a protective film on the interior surface of those materials.

CT or *CTcalc* is the product of ''residual disinfectant concentration'' (C) in mg/1 determined before or at the first customer, and the corresponding ''disinfectant contact time'' (T) in minutes, *i.e.*, ''C'' × ''T''. If a public water system applies disinfectants at more than one point prior to the first customer, it must determine the CT of each disinfectant sequence before or at the first customer to determine the total percent inactivation or ''total inactivation ratio.'' In determining the total inactivation ratio, the public water system must determine the residual disinfectant concentration of each disinfection sequence and corresponding contact time before any subsequent disinfection application point(s). ''$CT_{99.9}$'' is the CT value required for 99.9 percent (3–log) inactivation of *Giardia lamblia* cysts. $CT_{99.9}$ for a variety of disinfectants and conditions appear in tables 1.1–1.6, 2.1, and 3.1 of §141.74(b)(3).

$$\frac{\mathrm{CTcalc}}{\mathrm{CT}_{99.9}}$$

is the inactivation ratio. The sum of the inactivation ratios, or total inactivation ratio shown as

$$\sum \frac{(\mathrm{CTcalc})}{(\mathrm{CT}_{99.9})}$$

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

Diatomaceous earth filtration means a process resulting in substantial particulate removal in which (1) a precoat cake of diatomaceous earth filter media is deposited on a support membrance (septum), and (2) while the water is filtered by passing through the cake on the septum, additional filter media known as body feed is continuously added to the feed water to maintain the permeability of the filter cake.

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

Disinfectant means any oxidant, including but not limited to chlorine, chlorine dioxide, chloramines, and ozone added to water in any part of the treatment or distribution process, that is intended to kill or inactivate pathogenic microorganisms.

Disinfectant contact time (''T'' in CT calculations) means the time in minutes that it takes for water to move from the point of disinfectant application or the previous point of disinfectant residual measurement to a point before or at the point where residual disinfectant concentration (''C'') is measured. Where only one ''C'' is measured, ''T'' is the time in minutes that it takes for water to move from the point of disinfectant application to a point before or at where residual disinfectant concentration (''C'') is measured. Where more than one ''C'' is measured, ''T'' is (a) for the first measurement of ''C'', the time in minutes that it takes for water to move from the first or only point of disinfectant application to a point before or at the point where the first ''C'' is measured and (b) for subsequent measurements of ''C'', the time in minutes that it takes for water to move from the previous ''C'' measurement point to the ''C'' measurement point for which the particular ''T'' is being calculated. Disinfectant contact time in pipelines must be calculated based on ''plug flow'' by dividing the internal volume of the pipe by the maximum hourly flow rate through that pipe. Disinfectant contact time within mixing basins and storage reservoirs must be determined by tracer studies or an equivalent demonstration.

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

Disinfection profile is a summary of *Giardia lamblia* inactivation through the treatment plant. The procedure for developing a disinfection profile is contained in § 141.172 (Disinfection profiling and benchmarking) in subpart P and §§ 141.530–141.536 (Disinfection profile) in subpart T of this part.

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

Dose equivalent means the product of the absorbed dose from ionizing radiation and such factors as account for differences in biological effectiveness due to the type of radiation and its distribution in the body as specified by the International Commission on Radiological Units and Measurements (ICRU).

Dual sample set is a set of two samples collected at the same time and same location, with one sample analyzed for TTHM and the other sample analyzed for HAA5. Dual sample sets are collected for the purposes of conducting an IDSE under subpart U of this part and determining compliance with the TTHM and HAA5 MCLs under subpart V of this part.

Effective corrosion inhibitor residual, for the purpose of subpart I of this part only, means a concentration sufficient to form a passivating film on the interior walls of a pipe.

Enhanced coagulation means the addition of sufficient coagulant for improved removal of disinfection byproduct precursors by conventional filtration treatment.

Enhanced softening means the improved removal of disinfection byproduct precursors by precipitative softening.

Filter profile is a graphical representation of individual filter performance, based on continuous turbidity measurements or total particle counts versus time for an entire filter run, from startup to backwash inclusively, that includes an assessment of filter performance while another filter is being backwashed.

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

Finished water is water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals).

First draw sample means a one-liter sample of tap water, collected in accordance with §141.86(b)(2), that has been standing in plumbing pipes at least 6 hours and is collected without flushing the tap.

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

Flowing stream is a course of running water flowing in a definite channel.

GAC10 means granular activated carbon filter beds with an empty-bed contact time of 10 minutes based on average daily flow and a carbon reactivation frequency of every 180 days, except that the reactivation frequency for GAC10 used as a best available technology for compliance with subpart V MCLs under §141.64(b)(2) shall be 120 days.

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

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

Gross alpha particle activity means the total radioactivity due to alpha particle emission as inferred from measurements on a dry sample.

Gross beta particle activity means the total radioactivity due to beta particle emission as inferred from measurements on a dry sample.

Haloacetic acids (five) (HAA5) mean the sum of the concentrations in milligrams per liter of the haloacetic acid compounds (monochloroacetic acid, dichloroacetic acid, trichloroacetic acid, monobromoacetic acid, and dibromoacetic acid), rounded to two significant figures after addition.

Halogen means one of the chemical elements chlorine, bromine or iodine.

Initial compliance period means the first full three-year compliance period which begins at least 18 months after promulgation, except for contaminants listed at §141.61(a) (19)–(21), (c) (19)–(33), and §141.62(b) (11)–(15), initial compliance period means the first full three-year compliance period after promulgation for systems with 150 or more service connections (January 1993–December 1995), and first full three-year compliance period after the effective date of the regulation (January 1996–December 1998) for systems having fewer than 150 service connections.

Lake/reservoir refers to a natural or man made basin or hollow on the Earth's surface in which water collects or is stored that may or may not have a current or single direction of flow.

Large water system, for the purpose of subpart I of this part only, means a water system that serves more than 50,000 persons.

Lead service line means a service line made of lead which connects the water main to the building inlet and any lead pigtail, gooseneck or other fitting which is connected to such lead line.

Legionella means a genus of bacteria, some species of which have caused a type of pneumonia called Legionnaires Disease.

Level 1 assessment is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. It is conducted by the system operator or owner. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

Level 2 assessment is an evaluation to identify the possible presence of sanitary defects, defects in distribution system coliform monitoring practices, and (when possible) the likely reason that the system triggered the assessment. A Level 2 assessment provides a more detailed examination of the system (including the system's monitoring and operational practices) than does a Level 1 assessment through the use of more comprehensive investigation and review of available information, additional internal and external resources, and other relevant practices. It is conducted by an individual approved by the State, which may include the system operator. Minimum elements include review and identification of atypical events that could affect distributed water quality or indicate that distributed water quality was impaired; changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., whether a ground water system is disinfected); existing water quality monitoring data; and inadequacies in sample sites, sampling protocol, and sample processing. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system. The system must comply with any expedited actions or additional actions required by the State in the case of an *E. coli* MCL violation.

Locational running annual average (LRAA) is the average of sample analytical results for samples taken at a particular monitoring location during the previous four calendar quarters.

Man-made beta particle and photon emitters means all radionuclides emitting beta particles and/or photons listed in Maximum Permissible Body Burdens and Maximum Permissible Concentration of Radionuclides in Air or Water for Occupational Exposure, NBS Handbook 69, except the daughter products of thorium–232, uranium–235 and uranium–238.

Maximum contaminant level means the maximum permissable level of a contaminant in water which is delivered to any user of a public water system.

Maximum contaminant level goal or *MCLG* means the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. Maximum contaminant level goals are nonenforceable health goals.

Maximum residual disinfectant level (MRDL) means a level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. For chlorine and chloramines, a PWS is in compliance with the MRDL when the running annual average of monthly averages of samples taken in the distribution system, computed quarterly, is less than or equal to the MRDL. For chlorine dioxide, a PWS is in compliance with the MRDL when daily samples are taken at the entrance to the distribution system and no two consecutive daily samples exceed the MRDL. MRDLs are enforceable in the same manner as maximum contaminant levels under Section 1412 of the Safe Drinking Water Act. There is convincing evidence that addition of a disinfectant is necessary for control of waterborne microbial contaminants. Notwithstanding the MRDLs listed in §141.65, operators may increase residual disinfectant levels of chlorine or chloramines (but not chlorine dioxide) in the distribution system to a level and for a time necessary to protect public health to address specific microbiological contamination problems caused by circumstances such as distribution line breaks, storm runoff events, source water contamination, or cross-connections.

Maximum residual disinfectant level goal (MRDLG) means the maximum level of a disinfectant added for water treatment at which no known or anticipated adverse effect on the health of persons would occur, and which allows an adequate margin of safety. MRDLGs are nonenforceable health goals and do not reflect the benefit of the addition of the chemical for control of waterborne microbial contaminants.

Maximum Total Trihalomethane Potential (MTP) means the maximum concentration of total trihalomethanes produced in a given water containing a disinfectant residual after 7 days at a temperature of 25 °C or above.

Medium-size water system, for the purpose of subpart I of this part only, means a water system that serves greater than 3,300 and less than or equal to 50,000 persons.

Membrane filtration is a pressure or vacuum driven separation process in which particulate matter larger than 1 micrometer is rejected by an engineered barrier, primarily through a size-exclusion mechanism, and which has a measurable removal efficiency of a target organism that can be verified through the application of a direct integrity test. This definition includes the common membrane technologies of microfiltration, ultrafiltration, nanofiltration, and reverse osmosis.

Near the first service connection means at one of the 20 percent of all service connections in the entire system that are nearest the water supply treatment facility, as measured by water transport time within the distribution system.

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

Non-transient non-community water system or *NTNCWS* means a public water system that is not a community water system and that regularly serves at least 25 of the same persons over 6 months per year.

Optimal corrosion control treatment, for the purpose of subpart I of this part only, means the corrosion control treatment that minimizes the lead and copper concentrations at users' taps while insuring that the treatment does not cause the water system to violate any national primary drinking water regulations.

Performance evaluation sample means a reference sample provided to a laboratory for the purpose of demonstrating that the laboratory can successfully analyze the sample within limits of performance specified by the Agency. The true value of the concentration of the reference material is unknown to the laboratory at the time of the analysis.

Person means an individual; corporation; company; association; partnership; municipality; or State, Federal, or tribal agency.

Picocurie (pCi) means the quantity of radioactive material producing 2.22 nuclear transformations per minute.

Plant intake refers to the works or structures at the head of a conduit through which water is diverted from a source (e.g., river or lake) into the treatment plant.

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

Point-of-entry treatment device (POE) is a treatment device applied to the drinking water entering a house or building for the purpose of reducing contaminants in the drinking water distributed throughout the house or building.

Point-of-use treatment device (POU) is a treatment device applied to a single tap used for the purpose of reducing contaminants in drinking water at that one tap.

Presedimentation is a preliminary treatment process used to remove gravel, sand and other particulate material from the source water through settling before the water enters the primary clarification and filtration processes in a treatment plant.

Public water system means a system for the provision to the public of water for human consumption through pipes or, after August 5, 1998, other constructed conveyances, if such system has at least fifteen service connections or regularly serves an average of at least twenty-five individuals daily at least 60 days out of the year. Such term includes: any collection, treatment, storage, and distribution facilities under control of the operator of such system and used primarily in connection with such system; and any collection or pretreatment storage facilities not under such control which are used primarily in connection with such system. Such term does not include any ‘‘special irrigation district.’’ A public water system is either a ‘‘community water system’’ or a ‘‘noncommunity water system.’’

Rem means the unit of dose equivalent from ionizing radiation to the total body or any internal organ or organ system. A ‘‘millirem (mrem)’’ is 1⁄1000 of a rem.

Repeat compliance period means any subsequent compliance period after the initial compliance period.

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

Sanitary defect is a defect that could provide a pathway of entry for microbial contamination into the distribution system or that is indicative of a failure or imminent failure in a barrier that is already in place.

Sanitary survey means an onsite review of the water source, facilities, equipment, operation and maintenance of a public water system for the purpose of evaluating the adequacy of such source, facilities, equipment, operation and maintenance for producing and distributing safe drinking water.

Seasonal system is a non-community water system that is not operated as a public water system on a year-round basis and starts up and shuts down at the beginning and end of each operating season.

Sedimentation means a process for removal of solids before filtration by gravity or separation.

Service connection, as used in the definition of *public water system,* does not include a connection to a system that delivers water by a constructed conveyance other than a pipe if:

(1) The water is used exclusively for purposes other than residential uses (consisting of drinking, bathing, and cooking, or other similar uses);

(2) The State determines that alternative water to achieve the equivalent level of public health protection provided by the applicable national primary drinking water regulation is provided for residential or similar uses for drinking and cooking; or

(3) The State determines that the water provided for residential or similar uses for drinking, cooking, and bathing is centrally treated or treated at the point of entry by the provider, a pass-through entity, or the user to achieve the equivalent level of protection provided by the applicable national primary drinking water regulations.

Service line sample means a one-liter sample of water collected in accordance with §141.86(b)(3), that has been standing for at least 6 hours in a service line.

Single family structure, for the purpose of subpart I of this part only, means a building constructed as a single-family residence that is currently used as either a residence or a place of business.

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

Small water system, for the purpose of subpart I of this part only, means a water system that serves 3,300 persons or fewer.

Special irrigation district means an irrigation district in existence prior to May 18, 1994 that provides primarily agricultural service through a piped water system with only incidental residential or similar use where the system or the residential or similar users of the system comply with the exclusion provisions in section 1401(4)(B)(i)(II) or (III).

Standard sample means the aliquot of finished drinking water that is examined for the presence of coliform bacteria.

State means the agency of the State or Tribal government which has jurisdiction over public water systems. During any period when a State or Tribal government does not have primary enforcement responsibility pursuant to section 1413 of the Act, the term ''State'' means the Regional Administrator, U.S. Environmental Protection Agency.

Subpart H systems means public water systems using surface water or ground water under the direct influence of surface water as a source that are subject to the requirements of subpart H of this part.

Supplier of water means any person who owns or operates a public water system.

Surface water means all water which is open to the atmosphere and subject to surface runoff.

SUVA means Specific Ultraviolet Absorption at 254 nanometers (nm), an indicator of the humic content of water. It is a calculated parameter obtained by dividing a sample's ultraviolet absorption at a wavelength of 254 nm (UV_{254}) (in m^{-1}) by its concentration of dissolved organic carbon (DOC) (in mg/L).

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

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

Total Organic Carbon (TOC) means total organic carbon in mg/L measured using heat, oxygen, ultraviolet irradiation, chemical oxidants, or combinations of these oxidants that convert organic carbon to carbon dioxide, rounded to two significant figures.

Total trihalomethanes (TTHM) means the sum of the concentration in milligrams per liter of the trihalomethane compounds (trichloromethane [chloroform], dibromochloromethane, bromodichloromethane and tribromomethane [bromoform]), rounded to two significant figures.

Transient non-community water system or *TWS* means a non-community water system that does not regularly serve at least 25 of the same persons over six months per year.

Trihalomethane (THM) means one of the family of organic compounds, named as derivatives of methane, wherein three of the four hydrogen atoms in methane are each substituted by a halogen atom in the molecular structure.

Two-stage lime softening is a process in which chemical addition and hardness precipitation occur in each of two distinct unit clarification processes in series prior to filtration.

Uncovered finished water storage facility is a tank, reservoir, or other facility used to store water that will undergo no further treatment to reduce microbial pathogens except residual disinfection and is directly open to the atmosphere.

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

Waterborne disease outbreak means the significant occurrence of acute infectious illness, epidemiologically associated with the ingestion of water from a public water system which is deficient in treatment, as determined by the appropriate local or State agency.

Wholesale system is a public water system that treats source water as necessary to produce finished water and then delivers some or all of that finished water to another public water system. Delivery may be through a direct connection or through the distribution system of one or more consecutive systems.

[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting § 141.2, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

§ 141.3 Coverage.

This part shall apply to each public water system, unless the public water system meets all of the following conditions:

(a) Consists only of distribution and storage facilities (and does not have any collection and treatment facilities);

(b) Obtains all of its water from, but is not owned or operated by, a public water system to which such regulations apply:

(c) Does not sell water to any person; and

(d) Is not a carrier which conveys passengers in interstate commerce.

§ 141.4 Variances and exemptions.

(a) Variances or exemptions from certain provisions of these regulations may be granted pursuant to sections 1415 and 1416 of the Act and subpart K of part 142 of this chapter (for small system variances) by the entity with primary enforcement responsibility, except that variances or exemptions from the MCLs for total coliforms and *E. coli* and variances from any of the treatment technique requirements of subpart H of this part may not be granted.

(b) EPA has stayed the effective date of this section relating to the total coliform MCL of § 141.63(a) for systems that demonstrate to the State that the violation of the total coliform MCL is due to a persistent growth of total coliforms in the distribution system rather than fecal or pathogenic contamination, a treatment lapse or deficiency, or a problem in the operation or maintenance of the distribution system. This is stayed until March 31, 2016, at which time the total coliform MCL is no longer effective.

NOTE TO PARAGRAPH (a): As provided in § 142.304(a), small system variances are not available for rules addressing microbial contaminants, which would include subparts H, P, S, T, W, and Y of this part.

[78 FR 10346, Feb. 13, 2013]

§ 141.5 Siting requirements.

Before a person may enter into a financial commitment for or initiate construction of a new public water system or increase the capacity of an existing public water system, he shall notify the State and, to the extent practicable, avoid locating part or all of the new or expanded facility at a site which:

(a) Is subject to a significant risk from earthquakes, floods, fires or other disasters which could cause a breakdown of the public water system or a portion thereof; or

(b) Except for intake structures, is within the floodplain of a 100–year flood or is lower than any recorded high tide where appropriate records exist. The U.S. Environmental Protection Agency will not seek to override land use decisions affecting public water systems siting which are made at the State or local government levels.

§ 141.6 Effective dates.

(a) Except as provided in paragraphs (b) through (k) of this section, and in § 141.80(a)(2), the regulations set forth in this part shall take effect on June 24, 1977.

(b) The regulations for total trihalomethanes set forth in § 141.12(c) shall take effect 2 years after the date of promulgation of these regulations for community water systems serving 75,000 or more individuals, and 4 years after the date of promulgation for communities serving 10,000 to 74,999 individuals.

(c) The regulations set forth in §§ 141.11(d); 141.21(a), (c) and (i); 141.22(a) and (e); 141.23(a)(3) and (a)(4); 141.23(f); 141.24(e) and (f); 141.25(e); 141.27(a); 141.28(a) and (b); 141.31(a), (d) and (e); 141.32(b)(3); and 141.32(d) shall take effect immediately upon promulgation.

(d) The regulations set forth in § 141.41 shall take effect 18 months from the date of promulgation. Suppliers must complete the first round of sampling and reporting within 12 months following the effective date.

(e) The regulations set forth in § 141.42 shall take effect 18 months from the date of promulgation. All requirements in § 141.42 must be completed within 12 months following the effective date.

(f) The regulations set forth in § 141.11(c) and § 141.23(g) are effective May 2, 1986. Section 141.23(g)(4) is effective October 2, 1987.

(g) The regulations contained in § 141.6, paragraph (c) of the table in 141.12, and 141.62(b)(1) are effective July 1, 1991. The regulations contained in §§ 141.11(b), 141.23, 141.24, 142.57(b), 143.4(b)(12) and (b)(13), are effective July 30, 1992. The regulations contained in the revisions to §§ 141.32(e) (16), (25) through (27) and (46); 141.61(c)(16); and 141.62(b)(3) are effective January 1, 1993. The effective date of regulations contained in § 141.61(c) (2), (3), and (4) is postponed.

(h) Regulations for the analytic methods listed at § 141.23(k)(4) for measuring antimony, beryllium, cyanide, nickel, and thallium are effective August 17, 1992. Regulations for the analytic methods listed at § 141.24(f)(16) for dichloromethane, 1,2,4-trichlorobenzene, and 1,1,2-trichloroethane are effective August 17, 1992. Regulations for the analytic methods listed at § 141.24(h)(12) for measuring dalapon, dinoseb, diquat, endothall, endrin, glyphosate, oxamyl, picloram, simazine, benzo(a)pyrene, di(2-ethylhexyl)adipate, di(2-ethylhexyl)phthalate, hexachlorobenzene, hexachlorocyclopentadiene, and 2,3,7,8-TCDD are effective August 17, 1992. The revision to § 141.12(a) promulgated on July 17, 1992 is effective on August 17, 1992.

(i) [Reserved]

(j) The arsenic maximum contaminant levels (MCL) listed in § 141.62 is effective for the purpose of compliance on January 23, 2006. Requirements relating to arsenic set forth in §§ 141.23(i)(4), 141.23(k)(3) introductory text, 141.23(k)(3)(ii), 141.51(b), 141.62(b), 141.62(b)(16), 141.62(c), 141.62(d), and 142.62(b) revisions in Appendix A of subpart O for the consumer confidence rule, and Appendices A and B of subpart Q for the public notification rule are effective for the purpose of compliance on January 23, 2006. However, the consumer confidence rule reporting requirements relating to arsenic listed in § 141.154(b) and (f) are effective for the purpose of compliance on February 22, 2002.

(k) Regulations set forth in §§ 141.23(i)(1), 141.23(i)(2), 141.24(f)(15), 141.24(f)(22), 141.24(h)(11), 141.24(h)(20), 142.16(e), 142.16(j), and 142.16(k) are effective for the purpose of compliance on January 22, 2004.

[44 FR 68641, Nov. 29, 1979, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 30274, July 1, 1991; 57 FR 22178, May 27, 1992; 57 FR 31838, July 17, 1992; 59 FR 34322, July 1, 1994; 61 FR 24368, May 14, 1996; 66 FR 7061, Jan. 22, 2001; 66 FR 28350, May 22, 2001]

Subpart B—Maximum Contaminant Levels

§ 141.11 Maximum contaminant levels for inorganic chemicals.

(a) The maximum contaminant level for arsenic applies only to community water systems. The analyses and determination of compliance with the 0.05 milligrams per liter maximum contaminant level for arsenic use the requirements of § 141.23.

(b) The maximum contaminant level for arsenic is 0.05 milligrams per liter for community water systems until January 23, 2006.

(c) [Reserved]

(d) At the discretion of the State, nitrate levels not to exceed 20 mg/l may be allowed in a non-community water system if the supplier of water demonstrates to the satisfaction of the State that:

(1) Such water will not be available to children under 6 months of age; and

(2) The non-community water system is meeting the public notification requirements under § 141.209, including continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure; and

(3) Local and State public health authorities will be notified annually of nitrate levels that exceed 10 mg/l; and

(4) No adverse health effects shall result.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57342, Aug. 27, 1980; 47 FR 10998, Mar. 12, 1982; 51 FR 11410, Apr. 2, 1986; 56 FR 3578, Jan. 30, 1991; 56 FR 26548, June 7, 1991; 56 FR 30274, July 1, 1991; 56 FR 32113, July 15, 1991; 60 FR 33932, June 29, 1995; 65 FR 26022, May 4, 2000; 66 FR 7061, Jan. 22, 2001]

§ 141.12 [Reserved]

§ 141.13 Maximum contaminant levels for turbidity.

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

(a) One turbidity unit (TU), as determined by a monthly average pursuant to § 141.22, except that five or fewer turbidity units may be allowed if the supplier of water can demonstrate to the State that the higher turbidity does not do any of the following:

(1) Interfere with disinfection;

(2) Prevent maintenance of an effective disinfectant agent throughout the distribution system; or

(3) Interfere with microbiological determinations.

(b) Five turbidity units based on an average for two consecutive days pursuant to § 141.22.

[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: At 54 FR 27527, June 29, 1989, § 141.13 was amended by adding introductory text; however, the amendment could not be incorporated because introductory text already exists.

Subpart C—Monitoring and Analytical Requirements

§ 141.21 Coliform sampling.

(a) *Routine monitoring.* (1) Public water systems must collect total coliform samples at sites which are representative of water throughout the distribution system according to a written sample siting plan. These plans are subject to State review and revision.

(2) The monitoring frequency for total coliforms for community water systems is based on the population served by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR COMMUNITY WATER SYSTEMS

Population served	Minimum number of samples per month
25 to 1,000[1]	1
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

[1] Includes public water systems which have at least 15 service connections, but serve fewer than 25 persons.

If a community water system serving 25 to 1,000 persons has no history of total coliform contamination in its current configuration and a sanitary survey conducted in the past five years shows that the system is supplied solely by a protected groundwater source and is free of sanitary defects, the State may reduce the monitoring frequency specified above, except that in no case may the State reduce the monitoring frequency to less than one sample per quarter. The State must approve the reduced monitoring frequency in writing.

(3) The monitoring frequency for total coliforms for non-community water systems is as follows:

(i) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer must monitor each calendar quarter that the system provides water to the public, except that the State may reduce this monitoring frequency, in writing, if a sanitary survey shows that the system is free of sanitary defects. Beginning June 29, 1994, the State cannot reduce the monitoring frequency for a non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 persons or fewer to less than once/year.

(ii) A non-community water system using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving more than 1,000 persons during any month must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, except the State may reduce this monitoring frequency, in writing, for any month the system serves 1,000 persons or fewer. The State cannot reduce the monitoring frequency to less than once/year. For systems using ground water under the direct influence of surface water, paragraph (a)(3)(iv) of this section applies.

(iii) A non-community water system using surface water, in total or in part, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section, regardless of the number of persons it serves.

(iv) A non-community water system using ground water under the direct influence of surface water, as defined in §141.2, must monitor at the same frequency as a like-sized community water system, as specified in paragraph (a)(2) of this section. The system must begin monitoring at this frequency beginning six months after the State determines that the ground water is under the direct influence of surface water.

(4) The public water system must collect samples at regular time intervals throughout the month, except that a system which uses only ground water (except ground water under the direct influence of surface water, as defined in §141.2), and serves 4,900 persons or fewer, may collect all required samples on a single day if they are taken from different sites.

(5) A public water system that uses surface water or ground water under the direct influence of surface water, as defined in §141.2, and does not practice filtration in compliance with Subpart H must collect at least one sample near the first service connection each day the turbidity level of the source water, measured as specified in §141.74(b)(2), exceeds 1 NTU. This sample must be analyzed for the presence of total coliforms. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection. Sample results from this coliform monitoring must be included in determining compliance with the MCL for total coliforms in §141.63.

(6) Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, shall not be used to determine compliance with the MCL for total coliforms in §141.63. Repeat samples taken pursuant to paragraph (b) of this section are not considered special purpose samples, and must be used to determine compliance with the MCL for total coliforms in §141.63.

(b) *Repeat monitoring.* (1) If a routine sample is total coliform-positive, the public water system must collect a set of repeat samples within 24 hours of being notified of the positive result. A system which collects more than one routine sample/month must collect no fewer than three repeat samples for each total coliform-positive sample found. A system which collects one routine sample/month or fewer must collect no fewer than four repeat samples for each total coliform-positive sample found. The State may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. In the case of an extension, the State must specify how much time the system has to collect the repeat samples.

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

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

(4) If one or more repeat samples in the set is total coliform-positive, the public water system must collect an additional set of repeat samples in the manner specified in paragraphs (b) (1)–(3) of this section. The additional samples must be collected within 24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (b)(1) of this section. The system must repeat this process until either total coliforms are not detected in one complete set of repeat samples or the system determines that the MCL for total coliforms in §141.63 has been exceeded and notifies the State.

(5) If a system collecting fewer than five routine samples/month has one or more total coliform-positive samples and the State does not invalidate the sample(s) under paragraph (c) of this section, it must collect at least five routine samples during the next month the system provides water to the public, except that the State may waive this requirement if the conditions of paragraph (b)(5) (i) or (ii) of this section are met. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (b) (1)–(4) of this section.

(i) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

(ii) The State may waive the requirement to collect five routine samples the next month the system provides water to the public if the State has determined why the sample was total coliform-positive and establishes that the system has corrected the problem or will correct the problem before the end of the next month the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem. The State cannot waive the requirement to collect five routine samples the next month the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. Under this paragraph, a system must still take at least one routine sample before the end of the next month it serves water to the public and use it to determine compliance with the MCL for total coliforms in §141.63, unless the State has determined that the system has corrected the contamination problem before the system took the set of repeat samples required in paragraphs (b) (1)–(4) of this section, and all repeat samples were total coliform-negative.

(6) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(7) Results of all routine and repeat samples not invalidated by the State must be included in determining compliance with the MCL for total coliforms in §141.63.

(c) *Invalidation of total coliform samples.* A total coliform-positive sample invalidated under this paragraph (c) does not count towards meeting the minimum monitoring requirements of this section.

(1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1) (i), (ii), or (iii) of this section are met.

(i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.

(ii) The State, on the basis of the results of repeat samples collected as required by paragraphs (b) (1) through (4) of this section, determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected within five service connections of the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the public water system has only one service connection).

(iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition which does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under paragraphs (b) (1)–(4) of this section, and use them to determine compliance with the MCL for total coliforms in §141.63. To invalidate a total coliform-positive sample under this paragraph, the decision with the rationale for the decision must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

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

(d) *Sanitary surveys.* (1)(i) Public water systems which do not collect five or more routine samples/month must undergo an initial sanitary survey by June 29, 1994, for community public water systems and June 29, 1999, for non-community water systems. Thereafter, systems must undergo another sanitary survey every five years, except that non-community water systems using only protected and disinfected ground water, as defined by the State, must undergo subsequent sanitary surveys at least every ten years after the initial sanitary survey. The State must review the results of each sanitary survey to determine whether the existing monitoring frequency is adequate and what additional measures, if any, the system needs to undertake to improve drinking water quality.

(ii) In conducting a sanitary survey of a system using ground water in a State having an EPA-approved wellhead protection program under section 1428 of the Safe Drinking Water Act, information on sources of contamination within the delineated wellhead protection area that was collected in the course of developing and implementing the program should be considered instead of collecting new information, if the information was collected since the last time the system was subject to a sanitary survey.

(2) Sanitary surveys must be performed by the State or an agent approved by the State. The system is responsible for ensuring the survey takes place.

(3) Sanitary surveys conducted by the State under the provisions of §142.16(o)(2) of this chapter may be used to meet the sanitary survey requirements of this section.

(e) *Fecal coliforms/Escherichia coli (E. coli) testing.* (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if fecal coliforms are present, except that the system may test for *E. coli* in lieu of fecal coliforms. If fecal coliforms or *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed, in which case the system must notify the State before the end of the next business day.

(2) The State has the discretion to allow a public water system, on a case-by-case basis, to forgo fecal coliform or *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is fecal coliform-positive or *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (e)(1) of this section and the provisions of §141.63(b) apply.

(f) *Analytical methodology.* (1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 ml.

(2) Public water systems need only determine the presence or absence of total coliforms; a determination of total coliform density is not required.

(3) Public water systems must conduct total coliform analyses in accordance with one of the analytical methods in the following table or one of the alternative methods listed in appendix A to subpart C of this part.

Organism	Methodology [12]	Citation [1]
Total Coliforms [2]	Total Coliform Fermentation Technique [3,4,5]	9221A, B.
	Total Coliform Membrane Filter Technique [6]	9222A, B, C.
	Presence-Absence (P-A) Coliform Test [5,7]	9221D.
	ONPG-MUG Test [8]	9223.
	Colisure Test. [9]	
	E*Colite® Test. [10]	
	m-ColiBlue24® Test. [11]	
	Readycult® Coliforms 100 Presence/Absence Test. [13]	
	Membrane Filter Technique using Chromocult® Coliform Agar. [14]	
	Colitag® Test. [15]	

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1, 6, 8, 9, 10 , 11, 13, 14 and 15 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800–426–4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

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

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

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

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

[5] No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

[6] MI agar also may be used. Preparation and use of MI agar is set forth in the article, ''New medium for the simultaneous detection of total coliform and *Escherichia coli* in water'' by Brenner, K.P., *et. al.,* 1993, Appl. Environ. Microbiol. 59:3534–3544. Also available from the Office of Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460, EPA/600/J–99/225. Verification of colonies is not required.

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

[8] The ONPG-MUG Test is also known as the Autoanalysis Collect System.

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

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

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

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

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

[14] Membrane Filter Technique using Chromocult® Coliform Agar is described in the document, ''Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichla coli* in Finished Waters'', November 2000, Version 1.0, available from EM Science (an affiliate of Merck KGgA, Darmstadt Germany), 480 S. Democrat Road, Gibbstown, NJ 08027–1297. Telephone number is (800) 222–0342, e-mail address is: *adellenbusch@emscience.com.*

[15] Colitag® product for the determination of the presence/absence of total coliforms and *E. coli* is described in ''Colitag® Product as a Test for Detection and Identification of Coliforms and *E. coli* Bacteria in Drinking Water and Source Water as Required in National Primary Drinking Water Regulations,'' August 2001, available from CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403, telephone (800) 878–7654, Fax (707) 545–7901, Internet address *http://www.cpiinternational.com.*

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(4) [Reserved]

(5) Public water systems must conduct fecal coliform analysis in accordance with the following procedure. When the MTF Technique or Presence-Absence (PA) Coliform Test is used to test for total coliforms, shake the lactose-positive presumptive tube or P-A vigorously and transfer the growth with a sterile 3-mm loop or sterile applicator stick into brilliant green lactose bile broth and EC medium to determine the presence of total and fecal coliforms, respectively. For EPA-approved analytical methods which use a membrane filter, transfer the total coliform-positive culture by one of the following methods: remove the membrane containing the total coliform colonies from the substrate with a sterile forceps and carefully curl and insert the membrane into a tube of EC medium (the laboratory may first remove a small portion of selected colonies for verification), swab the entire membrane filter surface with a sterile cotton swab and transfer the inoculum to EC medium (do not leave the cotton swab in the EC medium), or inoculate individual total coliform-positive colonies into EC Medium. Gently shake the inoculated tubes of EC medium to insure adequate mixing and incubate in a waterbath at 44.5 ±0.2 °C for 24 ±2 hours. Gas production of any amount in the inner fermentation tube of the EC medium indicates a positive fecal coliform test. The preparation of EC medium is described in Method 9221E (paragraph 1a) in Standard Methods for the Examination of Water and Wastewater, 18th edition (1992), 19th edition (1995), and 20th edition (1998); the cited method in any one of these three editions may be used. Public water systems need only determine the presence or absence of fecal coliforms; a determination of fecal coliform density is not required.

(6) Public water systems must conduct analysis of Escherichia coli in accordance with one of the following analytical methods or one of the alternative methods listed in appendix A to subpart C of this part.

(i) EC medium supplemented with 50 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used. Alternatively, the 18th edition (1992) may be used if at least 10 mL of EC medium, as described in paragraph (f)(5) of this section, is supplemented with 50 µg/mL of MUG before autoclaving. The inner inverted fermentation tube may be omitted. If the 18th edition is used, apply the procedure in paragraph (f)(5) of this section for transferring a total coliform-positive culture to EC medium supplemented with MUG, incubate the tube at 44.5 ±0.2 °C for 24 ±2 hours, and then observe fluorescence with an ultraviolet light (366 nm) in the dark. If fluorescence is visible, E. coli are present.

(ii) Nutrient agar supplemented with 100 µg/mL of 4-methylumbelliferyl-beta-D-glucuronide (MUG) (final concentration), as described in Method 9222G in Standard Methods for the Examination of Water and Wastewater, 19th edition (1995) and 20th edition (1998). Either edition may be used for determining if a total coliform-positive sample, as determined by a membrane filter technique, contains E. coli. Alternatively, the 18th edition (1992) may be used if the membrane filter containing a total coliform-positive colony(ies) is transferred to nutrient agar, as described in Method 9221B (paragraph 3) of Standard Methods (18th edition), supplemented with 100 µg/mL of MUG. If the 18th edition is used, incubate the agar plate at 35 °C for 4 hours and then observe the colony(ies) under ultraviolet light (366 nm) in the dark for fluorescence. If fluorescence is visible, E. coli are present.

(iii) Minimal Medium ONPG-MUG (MMO-MUG) Test, as set forth in the article ''National Field Evaluation of a Defined Substrate Method for the Simultaneous Detection of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with Presence-Absence Techniques'' (Edberg et al.), Applied and Environmental Microbiology, Volume 55, pp. 1003–1008, April 1989. (Note: The Autoanalysis Colilert System is an MMO-MUG test). If the MMO-MUG test is total coliform-positive after a 24-hour incubation, test the medium for fluorescence with a 366-nm ultraviolet light (preferably with a 6-watt lamp) in the dark. If fluorescence is observed, the sample is *E. coli*-positive. If fluorescence is questionable (cannot be definitively read) after 24 hours incubation, incubate the culture for an additional four hours (but not to exceed 28 hours total), and again test the medium for fluorescence. The MMO-MUG Test with hepes buffer in lieu of phosphate buffer is the only approved formulation for the detection of *E. coli*.

(iv) *The Colisure Test*. A description of the Colisure Test may be obtained from the Millipore Corporation, Technical Services Department, 80 Ashby Road, Bedford, MA 01730.

(v) The membrane filter method with MI agar, a description of which is cited in footnote 6 to the table in paragraph (f)(3) of this section.

(vi) E*Colite® Test, a description of which is cited in footnote 10 to the table at paragraph (f)(3) of this section.

(vii) m-ColiBlue24® Test, a description of which is cited in footnote 11 to the table in paragraph (f)(3) of this section.

(viii) Readycult® Coliforms 100 Presence/Absence Test, a description of which is cited in footnote 13 to the table at paragraph (f)(3) of this section.

(ix) Membrane Filter Technique using Chromocult® Coliform Agar, a description of which is cited in footnote 14 to the table at paragraph (f)(3) of this section.

(x) Colitag®, a description of which is cited in footnote 15 to the table at paragraph (f)(3) of this section.

(7) As an option to paragraph (f)(6)(iii) of this section, a system with a total coliform-positive, MUG-negative, MMO-MUG test may further analyze the culture for the presence of *E. coli* by transferring a 0.1 ml, 28-hour MMO-MUG culture to EC Medium + MUG with a pipet. The formulation and incubation conditions of EC Medium +

MUG, and observation of the results are described in paragraph (f)(6)(i) of this section.

(8) The following materials are incorporated by reference in this section with the approval of the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the analytical methods cited in Standard Methods for the Examination of Water and Wastewater (18th, 19th, and 20th editions) may be obtained from the American Public Health Association *et al.*; 1015 Fifteenth Street, NW., Washington, DC 20005–2605. Copies of the MMO-MUG Test, as set forth in the article ''National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and Escherichia coli from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method'' (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. Copies of the MMO-MUG Test as set forth in the article ''National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Escherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method'' (Edberg *et al.*) may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, CO 80235. A description of the Colisure Test may be obtained from the Millipore Corp., Technical Services Department, 80 Ashby Road, Bedford, MA 01730. Copies may be inspected at EPA's Drinking Water Docket; 401 M St., SW.; Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html.*

(g) *Response to violation.* (1) A public water system which has exceeded the MCL for total coliforms in §141.63 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with subpart Q.

(2) A public water system which has failed to comply with a coliform monitoring requirement, including the sanitary survey requirement, must report the monitoring violation to the State within ten days after the system discovers the violation, and notify the public in accordance with subpart Q.

(h) The provisions of paragraphs (a) and (d) of this section are applicable until March 31, 2016. The provisions of paragraphs (b), (c), (e), (f), and (g) of this section are applicable until all required repeat monitoring under paragraph (b) of this section and fecal coliform or *E. coli* testing under paragraph (e) of this section that was initiated by a total coliform-positive sample taken before April 1, 2016 is completed, as well as analytical method, reporting, recordkeeping, public notification, and consumer confidence report requirements associated with that monitoring and testing. Beginning April 1, 2016, the provisions of subpart Y of this part are applicable, with systems required to begin regular monitoring at the same frequency as the system-specific frequency required on March 31, 2016.

[54 FR 27562, June 29, 1989]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.21, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov.*

§ 141.22 Turbidity sampling and analytical requirements.

The requirements in this section apply to unfiltered systems until December 30, 1991, unless the State has determined prior to that date, in writing pursuant to section 1412(b)(7)(iii), that filtration is required. The requirements in this section apply to filtered systems until June 29, 1993. The requirements in this section apply to unfiltered systems that the State has determined, in writing pursuant to section 1412(b)(7)(C)(iii), must install filtration, until June 29, 1993, or until filtration is installed, whichever is later.

(a) Samples shall be taken by suppliers of water for both community and non-community water systems at a representative entry point(s) to the water distribution system at least once per day, for the purposes of making turbidity measurements to determine compliance with § 141.13. If the State determines that a reduced sampling frequency in a non-community will not pose a risk to public health, it can reduce the required sampling frequency. The option of reducing the turbidity frequency shall be permitted only in those public water systems that practice disinfection and which maintain an active residual disinfectant in the distribution system, and in those cases where the State has indicated in writing that no unreasonable risk to health existed under the circumstances of this option. Turbidity measurements shall be made as directed in § 141.74(a)(1).

(b) If the result of a turbidity analysis indicates that the maximum allowable limit has been exceeded, the sampling and measurement shall be confirmed by resampling as soon as practicable and preferably within one hour. If the repeat sample confirms that the maximum allowable limit has been exceeded, the supplier of water shall report to the State within 48 hours. The repeat sample shall be the sample used for the purpose of calculating the monthly average. If the monthly average of the daily samples exceeds the maximum allowable limit, or if the average of two samples taken on consecutive days exceeds 5 TU, the supplier of water shall report to the State and notify the public as directed in § 141.31 and subpart Q.

(c) Sampling for non-community water systems shall begin within two years after the effective date of this part.

(d) The requirements of this § 141.22 shall apply only to public water systems which use water obtained in whole or in part from surface sources.

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

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57344, Aug. 27, 1980; 47 FR 8998, Mar. 3, 1982; 47 FR 10998, Mar. 12, 1982; 54 FR 27527, June 29, 1989; 59 FR 62466, Dec. 5, 1994; 65 FR 26022, May 4, 2000]

§ 141.23 Inorganic chemical 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 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 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 at 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:

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 [5]
		ICP-Mass Spectrometry	0.0004
		Hydride-Atomic Absorption	0.001
Arsenic	0.010 [6]	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform—Stabilized Temperature	0.0005 [7]
		Atomic Absorption; Gaseous Hydride	0.001
		ICP-Mass Spectrometry	0.0014 [8]
Asbestos	7 MFL [1]	Transmission Electron Microscopy	0.01 MFL
Barium	2	Atomic Absorption; furnace technique	0.002
		Atomic Absorption; direct aspiration	0.1
		Inductively Coupled Plasma	0.002 (0.001)
Beryllium	0.004	Atomic Absorption; Furnace	0.0002
		Atomic Absorption; Platform	0.00002 [5]
		Inductively Coupled Plasma [2]	0.0003
		ICP-Mass Spectrometry	0.0003
Cadmium	0.005	Atomic Absorption; furnace technique	0.0001
		Inductively Coupled Plasma	0.001
Chromium	0.1	Atomic Absorption; furnace technique	0.001
		Inductively Coupled Plasma	0.007 (0.001)
Cyanide	0.2	Distillation, Spectrophotometric [3]	0.02
		Distillation, Automated, Spectrophotometric [3]	0.005
		Distillation, Amenable, Spectrophotometric [4]	0.02
		Distillation, Selective Electrode [3] [4]	0.05
		UV, Distillation, Spectrophotometric [9]	0.0005
		Micro Distillation, Flow Injection, Spectrophotometric [3]	0.0006
		Ligand Exchange with Amperometry [4]	0.0005
Mercury	0.002	Manual Cold Vapor Technique	0.0002
		Automated Cold Vapor Technique	0.0002
Nickel	xl	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0006 [5]
		Inductively Coupled Plasma [2]	0.005
		ICP-Mass Spectrometry	0.0005
Nitrate	10 (as N)	Manual Cadmium Reduction	0.01
		Automated Hydrazine Reduction	0.01
		Automated Cadmium Reduction	0.05
		Ion Selective Electrode	1
		Ion Chromatography	0.01
		Capillary Ion Electrophoresis	0.076
Nitrite	1 (as N)	Spectrophotometric	0.01
		Automated Cadmium Reduction	0.05
		Manual Cadmium Reduction	0.01
		Ion Chromatography	0.004
		Capillary Ion Electrophoresis	0.103
Selenium	0.05	Atomic Absorption; furnace	0.002
		Atomic Absorption; gaseous hydride	0.002
Thallium	0.002	Atomic Absorption; Furnace	0.001
		Atomic Absorption; Platform	0.0007 [5]
		ICP-Mass Spectrometry	0.0003

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[1] MFL = million fibers per liter >10 μm.

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

[3] Screening method for total cyanides.

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

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

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

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

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

[9] Measures total cyanides when UV-digestor is used, and "free" cyanides when UV-digestor is bypassed.

(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 sample 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 after completing analysis of the composite sample, provided the holding time of the sample is not exceeded.

(5) The frequency of monitoring for asbestos shall be in accordance with paragraph (b) of this section: the frequency of monitoring for antimony, arsenic, 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 §141.23(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) of this section 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 §141.23(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, arsenic, 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 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 §141.23(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) of this section 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.

(9) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

(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 groundwater systems shall be quarterly for at least one year following any one sample in which the concentration is ≥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 ≥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 ≥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.

(f) Confirmation samples:

(1) Where the results of sampling for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium indicate an exceedance of the maximum contaminant level, the 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 persons served by the public water system in accordance with § 141.202 and meet other Tier 1 public notification requirements under subpart Q of this part. 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, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium is determined by a running annual average at any 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. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(2) For systems which are monitoring annually, or less frequently, the system is out of compliance with the maximum contaminant levels for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, selenium or thallium if the level of a contaminant is greater than the MCL. If confirmation samples are required by the State, the determination of compliance will be based on the annual average of the initial MCL exceedance and any State-required confirmation samples. If a system fails to collect the required number of samples, compliance (average concentration) will be based on the total number of samples collected.

(3) Compliance with the maximum contaminant levels for nitrate and nitrate is determined based on one sample if the levels of these contaminants are below the MCLs. If the levels of nitrate and/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) Arsenic sampling results will be reported to the nearest 0.001 mg/L.

(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 following contaminants shall be conducted in accordance with the methods in the following table, or the alternative methods listed in appendix A to subpart C of this part, or their equivalent as determined by EPA. Criteria for analyzing arsenic, barium, beryllium, cadmium, calcium, chromium, copper, lead, nickel, selenium, sodium, and thallium with digestion or directly without digestion, and other analytical test procedures are contained in *Technical Notes on Drinking Water Methods,* EPA–600/R–94–173, October 1994. This document is available from the National Service Center for Environmental Publications (NSCEP), P.O. Box 42419, Cincinnati, OH 45242–0419 or *http://www.epa.gov/nscep/.*

Contaminant	Methodology[13]	EPA	ASTM[3]	SM[4] (18th, 19th ed.)	SM[4] (20th ed.)	SM Online[22]	Other
1. Alkalinity	Titrimetric		D1067–92, 02 B	2320 B	2320 B	2320 B–97.	
	Electrometric titration					I–1030–85[5].	
2. Antimony	Inductively Coupled Plasma (ICP)—Mass Spectrometry.	200.8[2]					
	Hydride-Atomic Absorption.		D3697–92, 02.				
	Atomic Absorption; Platform.	200.9[2]					
	Atomic Absorption; Furnace.			3113 B		3113 B–99.	
3. Arsenic[14]	ICP-Mass Spectrometry	200.8[2].					
	Atomic Absorption; Platform.	200.9[2].					
	Atomic Absorption; Furnace.		D2972–97, 03 C	3113 B		3113 B–99.	
	Hydride Atomic Absorption.		D1972–97, 03 B	3114 B		3114 B–97.	
4. Asbestos	Transmission Electron Microscopy.	100.1[9]					
	Transmission Electron Microscopy.	100.2[10]					
5. Barium	Inductively Coupled Plasma.	200.7[2]		3120 B	3120 B	3120 B–99.	
	ICP-Mass Spectrometry	200.8[2]					
	Atomic Absorption; Direct.			3111D		3111 D–99.	
	Atomic Absorption; Furnace.			3113 B		3113 B–99.	
6. Beryllium	Inductively Coupled Plasma.	200.7[2]		3120 B	3120 B	3120 B–99.	
	ICP-Mass Spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2]					
	Atomic Absorption; Furnace.		D3645–97, 03 B	3113 B		3113 B–99.	
7. Cadmium	Inductively Coupled Plasma.	200.7[2]					
	ICP-Mass Spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2]					

Contaminant	Methodology [13]	EPA	ASTM [3]	SM [4] (18th, 19th ed.)	SM [4] (20th ed.)	SM Online [22]	Other
	Atomic Absorption; Furnace.			3113 B		3113 B–99.	
8. Calcium	EDTA titrimetric		D511–93, 03 A	3500–Ca D	3500–Ca B	3500–Ca B–97.	
	Atomic Absorption; Direct Aspiration.		D511–93, 03 B	3111 B		3111 B–99.	
	Inductively Coupled Plasma.	200.7 [2]		3120 B	3120 B	3120 B–99.	
	Ion Chromatography		D6919–03.				
9. Chromium	Inductively Coupled Plasma.	200.7 [2]		3120 B	3120 B	3120 B–99.	
	ICP-Mass Spectrometry	200.8 [2]					
	Atomic Absorption; Platform.	200.9 [2]					
	Atomic Absorption; Furnace.			3113 B		3113 B–99.	
10. Copper	Atomic Absorption; Furnace.		D1688–95, 02 C	3113 B		3113 B–99.	
	Atomic Absorption; Direct Aspiration.		D1688–95, 02 A	3111 B		3111 B–99.	
	Inductively Coupled Plasma.	200.7 [2]		3120 B	3120 B	3120 B–99.	
	ICP-Mass spectrometry	200.8 [2]					
	Atomic Absorption; Platform.	200.9 [2]					
11. Conductivity	Conductance		D1125–95 (Reapproved 1999) A.	2510 B	2510 B	2510 B–97.	
12. Cyanide	Manual Distillation followed by		D2036–98 A	4500–CN^- C	4500–CN^- C.		
	Spectrophotometric, Amenable.		D2036–98 B	4500–CN^- G	4500–CN^- G	4500–CN^- G–99.	
	Spectro-photometric Manual.		D2036–98 A	4500–CN^- E	4500–CN^- E	4500–CN^- E–99.	I–3300–85 [5]
	Spectro-photometric Semi-automated.	335.4 [6]					
	Selective Electrode			4500–CN^- F	4500–CN^- F	4500–CN^- F–99.	
	UV, Distillation, Spectrophotometric.						Kelada–01 [17]

	Micro Distillation, Flow Injection, Spectrophotometric.						QuikChem 10–204–00–1–X[18]
	Ligand Exchange and Amperometry[21].		D6888–04				OIA–1677, DW[20]
13. Fluoride	Ion Chromatography	300.0[6], 300.1[19]	D4327–97, 03	4110 B	4110 B	4110 B–00.	
	Manual Distill.; Color. SPADNS.			4500–F$^-$ B, D.	4500–F$^-$ B, D.	4500–F$^-$ B, D–97.	
	Manual Electrode		D1179–93, 99 B	4500–F$^-$ C	4500–F$^-$ C	4500–F$^-$ C–97.	
	Automated Electrode						380–75WE[11]
	Automated Alizarin			4500–F$^-$ E	4500–F$^-$ E	4500–F$^-$ E–97.	129–71W[11]
	Capillary Ion Electrophoresis.						D6508, Rev. 2[23]
14. Lead	Atomic Absorption; Furnace.		D3559–96, 03 D	3113 B		3113 B–99.	
	ICP–Mass spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2]					
	Differential Pulse Anodic Stripping Voltametry.						Method 1001[16]
15. Magnesium	Atomic Absorption		D511–93, 03 B	3111 B		3111 B–99.	
	ICP	200.7[2]		3120 B	3120 B	3120 B–99.	
	Complexation Titrimetric Methods.		D511–93, 03 A	3500–Mg E	3500–Mg B	3500–Mg B–97.	
	Ion Chromatography		D6919–03.				
16. Mercury	Manual, Cold Vapor	245.1[2]	D3223–97, 02	3112 B		3112 B–99.	
	Automated, Cold Vapor	245.2[1]					
	ICP–Mass Spectrometry	200.8[2]					
17. Nickel	Inductively Coupled Plasma.	200.7[2]		3120 B	3120 B	3120 B–99.	
	ICP–Mass Spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2]					
	Atomic Absorption; Direct.			3111 B		3111 B–99.	
	Atomic Absorption; Furnace.			3113 B		3113 B–99.	
18. Nitrate	Ion Chromatography	300.0[6], 300.1[19]	D4327–97, 03	4110 B	4110 B	4110 B–00	B–1011[8]
	Automated Cadmium Reduction.	353.2[6]	D3867–90 A	4500–NO$_3^-$ F	4500–NO$_3^-$ F	4500–NO$_3^-$ F–00	

Contaminant	Methodology[13]	EPA	ASTM[3]	SM[4] (18th, 19th ed.)	SM[4] (20th ed.)	SM Online[22]	Other
	Ion Selective Electrode			4500–NO_3^- D.	4500–NO_3^- D.	4500–NO_3^- D–00.	601[7]
	Manual Cadmium Reduction.		D3867–90 B	4500–NO_3^- E	4500–NO_3^- E	4500–NO_3^- E–00	
	Capillary Ion Electrophoresis.		D6508–00.				
19. Nitrite	Ion Chromatography	300.0[6], 300.1[19].	D4327–97, 03	4110 B	4110 B	4110 B–00	B–1011[8]
	Automated Cadmium Reduction.	353.2[6]	D3867–90 A	4500–NO_3^- F	4500–NO_3^- F	4500–NO_3^- F–00	
	Manual Cadmium Reduction.		D3867–90 B	4500–NO_3^- E	4500–NO_3^- E	4500–NO_3^- E–00	
	Spectrophotometric			4500–NO_2^- B	4500–NO_2^- B	4500–NO_2^- B–00	
	Capillary Ion Electrophoresis.		D6508–00				
20. Ortho-phosphate	Colorimetric, Automated, Ascorbic Acid.	365.1[6]		4500–P F	4500–P F		
	Colorimetric, ascorbic acid, single reagent.		D515–88 A	4500–P E	4500–P E		
	Colorimetric Phosphomolybdate; Automated-segmented flow; Automated Discrete.						I–1601–85[5] I–2601–90[5] I–2598–85[5]
	Ion Chromatography	300.0[6], 300.1[19].	D4327–97, 03	4110 B	4110 B	4110 B–00	
	Capillary Ion Electrophoresis.		D6508–00				
21. pH	Electrometric	150.1, 150.2[1]	D1293–95, 99	4500–H^+ B	4500–H^+ B	4500–H^+ B–00.	
22. Selenium	Hydride-Atomic Absorption.		D3859–98, 03 A	3114 B		3114 B–97.	
	ICP–Mass Spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2]					
	Atomic Absorption; Furnace.		D3859–98, 03 B	3113 B		3113 B–99.	
23. Silica	Colorimetric, Molybdate Blue.						I–1700–85[5]

	Automated-segmented Flow.						I–2700–85[5]
	Colorimetric		D859–94, 00.				
	Molybdosilicate			4500–Si D	4500–SiO_2 C	4500–SiO_2 C–97.	
	Heteropoly blue			4500–Si E	4500–SiO_2 D	4500–SiO_2 D–97.	
	Automated for Molybdate-reactive Silica.			4500–Si F	4500–SiO_2 E	4500–SiO_2 E–97.	
	Inductively Coupled Plasma.	200.7[2]		3120 B	3120 B	3120 B–99.	
24. Sodium	Inductively Coupled Plasma.	200.7[2]					
	Atomic Absorption; Direct Aspiration.			3111 B		3111 B–99.	
	Ion Chromatography		D6919–03.				
25. Temperature	Thermometric			2550	2550	2550–00.	
26. Thallium	ICP–Mass Spectrometry	200.8[2]					
	Atomic Absorption; Platform.	200.9[2].					

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1–11, 16–20, and 22–23 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800–426–4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., Room 3334, Washington, DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html.*

[1] "Methods for Chemical Analysis of Water and Wastes," EPA/600/4–79/020, March 1983. Available at NTIS, PB84–128677.

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

[3] *Annual Book of ASTM Standards,* ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, *http://www.astm.org.;* Annual Book of ASTM Standards 1994, Vols. 11.01 and 11.02; Annual Book of ASTM Standards 1996, Vols. 11.01 and 11.02; Annual Book of ASTM Standards 1999, Vols. 11.01 and 11.02; Annual Book of ASTM Standards 2003, Vols. 11.01 and 11.02.

[4] *Standard Methods for the Examination of Water and Wastewater,* American Public Health Association, 800 I Street NW., Washington, DC 20001–3710; *Standard Methods for the Examination of Water and Wastewater,* 18th edition (1992); *Standard Methods for the Examination of Water and Wastewater,* 19th edition (1995); *Standard Methods for the Examination of Water and Wastewater,* 20th edition (1998).The following methods from this edition cannot be used: 3111 B, 3111 D, 3113 B, and 3114 B.

[5] U.S. Geological Survey, Federal Center, Box 25286, Denver, CO 80225–0425; Methods for Analysis by the U.S. Geological Survey National Water Quality Laboratory—Determination of Inorganic and Organic Constituents in Water and Fluvial Sediment, Open File Report 93–125, 1993; Techniques of Water Resources Investigation of the U.S. Geological Survey, Book 5, Chapter A–1, 3rd edition, 1989.

[6] "Methods for the Determination of Inorganic Substances in Environmental Samples," EPA/600/R–93/100, August 1993. Available as Technical Report PB94–120821 at National Technical Information Service (NTIS), 5301 Shawnee Road, Alexandria, VA 22312. *http://www.ntis.gov.*

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

[8] Method B–1011. "Waters Test Method for Determination of Nitrite/Nitrate in Water Using Single Column Ion Chromatography," August, 1987. Copies may be obtained from Waters Corporation, Technical Services Division, 34 Maple Street, Milford, MA 01757, Telephone: 508/482–2963, Fax: 508/482–4056.

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

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

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

[12] Unfiltered, no digestion or hydrolysis.

[13] Because MDLs reported in EPA Methods 200.7 and 200.9 were determined using a 2x preconcentration step during sample digestion, MDLs determined when samples are analyzed by direct analysis (*i.e.,* no sample digestion) will be higher. For direct analysis of cadmium and arsenic by Method 200.7, and arsenic by Method 3120 B, sample preconcentration using pneumatic nebulization may be required to achieve lower detection limits. Preconcentration may also be required for direct analysis of antimony, lead, and thallium by Method 200.9; antimony and lead by Method 3113 B; and lead by Method D3559–90D, unless multiple in-furnace depositions are made.

[14] If ultrasonic nebulization is used in the determination of arsenic by Method 200.8, the arsenic must be in the pentavalent state to provide uniform signal response. For direct analysis of arsenic with Method 200.8 using ultrasonic nebulization, samples and standards must contain 1 mg/L of sodium hypochlorite.

[15] [Reserved]

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

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

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

[19] ''Methods for the Determination of Organic and Inorganic Compounds in Drinking Water,'' Vol. 1, EPA 815–R–00–014, August 2000. Available as Technical Report PB2000–106981 at National Technical Information Service (NTIS), 5301 Shawnee Road, Alexandria, VA 22312. *http://www.ntis.gov.*

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

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

[22] Standard Methods Online, American Public Health Association, 800 I Street NW., Washington, DC 20001, available at *http://www.standardmethods.org.* The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

(2) Sample collection for antimony, arsenic, 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:

Contaminant	Preservative[1]	Container[2]	Time[3]
Antimony	HNO^3	P or G	6 months
Arsenic	Conc HNO_3 to pH <2.	P or G	6 months
Asbestos	4 °C	P or G	48 hours[4]
Barium	HNO^3	P or G	6 months
Beryllium	HNO^3	P or G	6 months
Cadmium	HNO^3	P or G	6 months
Chromium	HNO^3	P or G	6 months
Cyanide	4 °C, NaOH	P or G	14 days
Fluoride	None	P or G	1 month
Mercury	HNO^3	P or G	28 days
Nickel	HNO^3	P or G	6 months
Nitrate	4 °C	P or G	48 hours[5]
Nitrate-Nitrite[6]	H^2SO^4	P or G	28 days
Nitrite	4 °C	P or G	48 hours
Selenium	HNO^3	P or G	6 months
Thallium	HNO^3	P or G	6 months

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

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

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

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

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

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

(3) 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 certification to conduct analyses for antimony, arsenic, asbestos, barium, beryllium, cadmium, chromium, cyanide, fluoride, mercury, nickel, nitrate, nitrite and selenium and thallium, the laboratory must:

(i) Analyze Performance Evaluation (PE) samples provided by EPA, the State or by a third party (with the approval of the State or EPA) at least once a year.

(ii) For each contaminant that has been included in the PE sample and for each method for which the laboratory desires certification achieve quantitative results on the analyses that are within the following acceptance limits:

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

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

(4) 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.

(m) If the result 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 subpart Q. 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 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 subpart Q.

(p) For the initial analyses 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 3 years prior to the effective date of this part may be substituted at the discretion of the State.

(q) [Reserved]

[56 FR 3579, Jan. 30, 1991]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.23, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

§141.24 Organic chemicals, sampling and analytical requirements.

(a)–(d) [Reserved]

(e) Analyses for the contaminants in this section shall be conducted using the methods listed in the following table, or the alternative methods listed in appendix A to subpart C of this part, or their equivalent as determined by EPA.

(1) The following documents are incorporated by reference. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room 3334, Washington, DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html*. Method 508A and 515.1 are in *Methods for the Determination of Organic Compounds in Drinking Water*, EPA/600/4–88–039, December 1988, Revised, July 1991. Methods 547, 550 and 550.1 are in *Methods for the Determination of Organic Compounds in Drinking Water—Supplement I*, EPA/600–4–90–020, July 1990. Methods 548.1, 549.1, 552.1 and 555 are in *Methods for the Determination of Organic Compounds in Drinking Water—Supplement II*, EPA/600/R–92–129, August 1992. Methods 502.2, 504.1, 505, 506, 507, 508, 508.1, 515.2, 524.2 525.2, 531.1, 551.1 and 552.2 are in *Methods for the Determination of Organic Compounds in Drinking Water—Supplement III*, EPA/600/R–95–131, August 1995. Method 1613 is titled ''Tetra-through Octa-Chlorinated Dioxins and Furans by Isotope-Dilution HRGC/HRMS,'' EPA/821–B–94–005, October 1994. These documents are available from the National Technical Information Service, NTIS PB91–231480, PB91–146027, PB92–207703, PB95–261616 and PB95–104774, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll free number is: 800–553–6847. Method 6651 shall be followed in accordance with *Standard Methods for the Examination of Water and Wastewater*, 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association (APHA); any of these three editions may be used. Method 6610 shall be followed in accordance with *Standard Methods for the Examination of Water and Wastewater*, (18th Edition Supplement) (1994), or with the 19th edition (1995) or 20th edition (1998) of *Standard Methods for the Examination of Water and Wastewater;*

any of these publications may be used. The APHA documents are available from APHA, 1015 Fifteenth Street NW., Washington, DC 20005. Other required analytical test procedures germane to the conduct of these analyses are contained in *Technical Notes on Drinking Water Methods*, EPA/600/R–94–173, October 1994, NTIS PB95–104766. EPA Methods 515.3 and 549.2 are available from U.S. Environmental Protection Agency, National Exposure Research Laboratory (NERL)–Cincinnati, 26 West Martin Luther King Drive, Cincinnati, OH 45268. ASTM Method D 5317–93, 98 (Reapproved 2003) is available in the *Annual Book of ASTM Standards*, (1999), Vol. 11.02, ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428, any edition containing the cited version of the method may be used. EPA Method 515.4, ''Determination of Chlorinated Acids in Drinking Water by Liquid-Liquid Microextraction, Derivatization and Fast Gas Chromatography with Electron Capture Detection,'' Revision 1.0, April 2000, EPA/815/B–00/001 and EPA Method 552.3, ''Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection,'' Revision 1.0, July 2003, EPA 815–B–03–002, can be accessed and downloaded directly online at *http://www.epa.gov/safewater/methods/sourcalt.html*. Syngenta Method AG–625, ''Atrazine in Drinking Water by Immunoassay,'' February 2001, is available from Syngenta Crop Protection, Inc., 410 Swing Road, P.O. Box 18300, Greensboro, NC 27419. Telephone: 336–632–6000. Method 531.2 ''Measurement of N-methylcarbamoyloximes and N-methylcarbamates in Water by Direct Aqueous Injection HPLC with Postcolumn Derivatization,'' Revision 1.0, September 2001, EPA 815–B–01–002, can be accessed and downloaded directly online at *http://www.epa.gov/safewater/methods/sourcalt.html*.

Contaminant	EPA method	Standard methods	ASTM	Other
1. Benzene	502.2, 524.2.			
2. Carbon tetrachloride	502.2, 524.2, 551.1.			
3. Chlorobenzene	502.2, 524.2.			
4. 1,2-Dichlorobenzene	502.2, 524.2.			
5. 1,4-Dichlorobenzene	502.2, 524.2.			
6. 1,2-Dichloroethane	502.2, 524.2.			
7. cis-Dichloroethylene	502.2, 524.2.			
8. trans-Dichloroethylene	502.2, 524.2.			
9. Dichloromethane	502.2, 524.2.			
10. 1,2-Dichloropropane	502.2, 524.2.			
11. Ethylbenzene	502.2, 524.2.			
12. Styrene	502.2, 524.2.			
13. Tetrachloroethylene	502.2, 524.2, 551.1.			
14. 1,1,1-Trichloroethane	502.2, 524.2, 551.1.			
15. Trichloroethylene	502.2, 524.2, 551.1.			
16. Toluene	502.2, 524.2.			
17. 1,2,4-Trichlorobenzene	502.2, 524.2.			
18. 1,1-Dichloroethylene	502.2, 524.2.			
19. 1,1,2-Trichloroethane	502.2, 524.2, 551.1.			
20. Vinyl chloride	502.2, 524.2.			
21. Xylenes (total)	502.2, 524.2.			
22. 2,3,7,8-TCDD (dioxin)	1613.			
23. 2,4–D[4] (as acids, salts, and esters)	515.2, 555, 515.1, 515.3, 515.4		D5317–93, 98 (Reapproved 2003).	
24. 2,4,5–TP[4] (Silvex)	515.2, 555, 515.1, 515.3, 515.4		D5317–93, 98 (Reapproved 2003).	
25. Alachlor[2]	507, 525.2, 508.1, 505, 551.1.			
26. Atrazine[2]	507, 525.2, 508.1, 505, 551.1			Syngenta[5] AG–625
27. Benzo(a)pyrene	525.2, 550, 550.1.			
28. Carbofuran	531.1, 531.2	6610.		
29. Chlordane	508, 525.2, 508.1, 505.			
30. Dalapon	552.1 515.1, 552.2, 515.3, 515.4, 552.3.			

Contaminant	EPA method	Standard methods	ASTM	Other
31. Di(2-ethylhexyl)adipate	506, 525.2.			
32. Di(2-ethylhexyl)phthalate	506, 525.2.			
33. Dibromochloropropane (DBCP)	504.1, 551.1.			
34. Dinoseb[4]	515.2, 555, 515.1, 515.3, 515.4.			
35. Diquat	549.2.			
36. Endothall	548.1.			
37. Endrin	508, 525.2, 508.1, 505, 551.1.			
38. Ethylene dibromide (EDB)	504.1, 551.1.			
39. Glyphosate	547	6651.		
40. Heptachlor	508, 525.2, 508.1, 505, 551.1.			
41. Heptachlor Epoxide	508, 525.2, 508.1, 505, 551.1.			
42. Hexachlorobenzene	508, 525.2, 508.1, 505, 551.1.			
43. Hexachlorocyclopentadiene	508, 525.2, 508.1, 505, 551.1.			
44. Lindane	508, 525.2, 508.1, 505, 551.1.			
45. Methoxychlor	508, 525.2, 508.1, 505, 551.1.			
46. Oxamyl	531.1, 531.2	6610.		
47. PCBs[3] (as decachlorobiphenyl)	508A.			
48. PCBs[3] (as Aroclors)	508.1, 508, 525.2, 505.			
49. Pentachlorophenol	515.2, 525.2, 555, 515.1, 515.3, 515.4		D5317–93, 98 (Reapproved 2003).	
50. Picloram[4]	515.2, 555, 515.1, 515.3, 515.4		D5317–93, 98 (Reapproved 2003).	
51. Simazine[2]	507, 525.2, 508.1, 505, 551.1.			
52. Toxaphene	508, 508.1, 525.2, 505.			
53. Total Trihalomethanes	502.2, 524.2, 551.1.			

[1] [Reserved]

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

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

[4] Accurate determination of the chlorinated esters requires hydrolysis of the sample as described in EPA Methods 515.1, 515.2, 515.3, 515.4 and 555 and ASTM Method D5317–93.

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

(2) [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 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 (8) 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 contaiminant listed in §141.61(a) to take one sample during each compliance period.

(7) Each community and non-transient non-community ground water 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 purposes of this section, detection is defined as ≥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 (f)(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) (1) through (21) may apply to the State for a waiver from the requirements of (f)(5) of this section after completing the initial monitoring. 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 criterion 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 speci fied in paragraph (f)(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 times 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 greater than or equal to 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 sample 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 after completing analysis of the composite sample, provided the holding time of the sample is not exceeded.

(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.

(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 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. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

(i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.

(ii) Systems monitoring annually or less frequently whose sample result exceeds the MCL must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

(iii) If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.

(iv) If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.

(v) If a sample result is less than the detection limit, zero will be used to calculate the annual average.

(16) [Reserved]

(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 (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.

(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 contaminants included in the PE sample.

(C) Achieve quantitative results on the analyses performed under paragraph (f)(17)(i)(A) of this section that are within ±20% of the actual amount of the substances in the Performance Evaluation sample when the actual amount is greater than or equal to 0.010 mg/l.

(D) Achieve quantitative results on the analyses performed under paragraph (f)(17)(i)(A) of this section that are within ±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 to conduct analyses for vinyl chloride, the laboratory must:

(A) Analyze Performance Evaluation (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.

(B) Achieve quantitative results on the analyses performed under paragraph (f)(17)(ii)(A) of this section that are within ±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 of 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 contaminant listed §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.

(22) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

(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, with the exception that no monitoring is required for aldicarb, aldicarb sulfoxide or aldicarb sulfone:

(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 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.

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

(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) *Monitoring frequency:* (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 (h)(18) 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 (h)(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 the monitoring results in detection of one or more of certain related contaminants (heptachlor and 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 (h)(11) of this section. 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 sample 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 after completion of the composite analysis or before the holding time for the initial sample is exceeded whichever is sooner.

(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. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

(i) For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.

(ii) Systems monitoring annually or less frequently whose sample result exceeds the regulatory detection level as defined by paragraph (h)(18) of this section must begin quarterly sampling. The system will not be considered in violation of the MCL until it has completed one year of quarterly sampling.

(iii) If any sample result will cause the running annual average to exceed the MCL at any sampling point, the system is out of compliance with the MCL immediately.

(iv) If a system fails to collect the required number of samples, compliance will be based on the total number of samples collected.

(v) If a sample result is less than the detection limit, zero will be used to calculate the annual average.

(12) [Reserved]

(13) Analysis for PCBs shall be conducted as follows using the methods in paragraph (e) of this section:

(i) Each system which monitors for PCBs shall analyze each sample using either Method 508.1, 525.2, 508 or 505. Users of Method 505 may have more difficulty in achieving the required Aroclor detection limits than users of Methods 508.1, 525.2 or 508.

(ii) If PCBs (as one of seven Aroclors) are detected (as designated in this paragraph) in any sample analyzed using Method 505 or 508, the system shall reanalyze the sample using Method 508A to quantitate PCBs (as decachlorobiphenyl).

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 § 141.24(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.

Contaminant	Detection limit (mg/l)
Alachlor	.0002
Aldicarb	.0005
Aldicarb sulfoxide	.0005
Aldicarb sulfone	.0008
Atrazine	.0001
Benzo[a]pyrene	.00002
Carbofuran	.0009

Contaminant	Detection limit (mg/l)
Chlordane	.0002
Dalapon	.001
1,2–Dibromo–3–chloropropane (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) Anaylsis 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 (PE) samples provided by EPA, the State, or by a third party (with the approval of the State or EPA) at least once a year by each method for which the laboratory desires certification.

(B) For each contaminant that has been included in the PE sample achieve quantitative results on the analyses that are within the following acceptance limits:

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.
Hexachloro- cyclopentadiene	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.
2,4,5-TP (Silvex)	±50.

(ii) [Reserved]

(20) All new systems or systems that use a new source of water that begin operation after January 22, 2004 must demonstrate compliance with the MCL within a period of time specified by the State. The system must also comply with the initial sampling frequencies specified by the State to ensure a system can demonstrate compliance with the MCL. Routine and increased monitoring frequencies shall be conducted in accordance with the requirements in this section.

(Approved by the Office of Management and Budget under control number 2040–0090)

[40 FR 59570, Dec. 24, 1975]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §141.24, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at *www.govinfo.gov*.

§ 141.25 Analytical methods for radioactivity.

(a) Analysis for the following contaminants shall be conducted to determine compliance with §141.66 (radioactivity) in accordance with the methods in the following table, or the alternative methods listed in appendix A to subpart C this part, or their equivalent determined by EPA in accordance with §141.27.

Contaminant	Methodology	Reference (Method of Page Number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other
Naturally Occurring:										
Gross alpha[11] and beta ..	Evaporation	900.0	p. 1 ...	00–01	p. 1	302, 7110 B, 7110 B–00.	....	R–1120–76.		
Gross alpha[11]	Coprecipitation	....	....	00–02	....	7110 C, 7110 C–00.				
Radium 226	Radon emanation	903.1	p. 16	Ra–04	p. 19	305, 7500–Ra C, 7500–Ra C–01.	D3454–97	R–1141–76	Ra-04	NY[9],
	Radiochemical	903.0	p. 13	Ra-03	....	304, 7500–Ra B, 7500–Ra B–01.	D2460–97	R–1140–76	....	GA[14]
Radium 228	Radiochemical	904.0	p. 24	Ra-05	p. 19	7500–Ra D, 7500–Ra D–01.	....	R–1142–76	....	NY[9], NJ[10], GA[14]
Uranium[12]	Radiochemical	908.0	....	....	....	7500–U B, 7500–U B–00.				
	Fluorometric	908.1	....	....	....	7500–U C (17th Ed.).	D2907–97	R–1180–76, R–1181–76.	U–04.	
	ICP–MS	200.8[13]	....	....	....	3125	D5673–03.			
	Alpha Spectrometry.	....	....	00–07	p. 33	7500–U C (18th, 19th, or 20th Ed.), 7500–U C–00.	D3972–97, 02.	R–1182–76	U–02.	
	Laser Phosphorimetry.	....	....	....	....	....	D5174–97, 02.			
Man-Made:										
Radioactive Cesium	Radiochemical	901.0	p. 4 ...	....	....	7500–Cs B, 7500–Cs B–00.	D2459–72	R–1111–76.		
	Gamma Ray Spectrometry.	901.1	....	....	p. 92	7120, 7120–97.	D3649–91, 98a.	R–1110–76	4.5.2.3.	
Radioactive Iodine	Radiochemical	902.0	p. 6 ...	....	....	7500–I B, 7500–I B–00.				
			p. 9 ...	....	....	7500–I C, 7500–I C–00.				

						7500–I D, 7500–I D–00.	D3649–91, 98a.			
	Gamma Ray Spectrometry.	901.1	....	....	p. 92	7120, 7120–97.	D4785–93, 00a.	....	4.5.2.3.	
Radioactive Strontium 89, 90.	Radiochemical	905.0	p. 29	Sr–04	p. 65	303, 7500–Sr B, 7500–Sr B–01.	....	R–1160–76	Sr–01, Sr–02.	
Tritium	Liquid Scintillation	906.0	p. 34	H–02 ..	p. 87	306, 7500–^{3}H B, 7500–^{3}H B–00.	D4107–91, 98 (Reapproved 2002).	R–1171–76.		
Gamma Emitters	Gamma Ray Spectrometry.	901.1	....	....	p. 92	7120, 7120–97.	D3649–91, 98a.	R–1110–76	Ga–01–R.	
		902.0	....	....	....	7500–Cs B, 7500–Cs B–00.	D4785–93, 00a.			
		901.0	....	....	....	7500–I B, 7500–I B–00.				

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of documents 1 through 10 and 13 through 14 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800–426–4791. Documents may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., Room 3334 , Washington, DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

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

[2] "Interim Radiochemical Methodology for Drinking Water," EPA 600/4–75–008 (revised), March 1976. Available NTIS, ibid.

[3] "Radiochemistry Procedures Manual," EPA 520/5–84–006, December 1987. Available NTIS, ibid.

[4] "Radiochemical Analytical Procedures for Analysis of Environmental Samples," March 1979. Available at NTIS, ibid. EMSL LV 053917.

[5] "Standard Methods for the Examination of Water and Wastewater," 13th, 17th, 18th, 19th or 20th edition, 1971, 1989, 1992, 1995, 1998. Available at American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7500–Ra B, 7500–Ra C, 7500–Ra D, 7500–U B, 7500–Cs B, 7500–I B, 7500–I C, 7500–I D, 7500–Sr B, and 7500–^{3}H B are in the 17th, 18th, 19th and 20th editions. Method 7110 C is in the 18th, 19th and 20th editions. Method 7500–U C Fluorometric Uranium is only in the 17th Edition, and 7500–U C Alpha spectrometry is only in the 18th, 19th and 20th editions. Method 7120 is only in the 19th and 20th editions. Method 3125 is only in the 20th edition. Methods 7110 B–00, 7110 C–00, 7500–Ra B–01, 7500–Ra C–01, 7500–Ra D–01, 7500–U B–00, 7500–U C–00, 7500–I B–00, 7500–I C–00, 7500–I D–00, 7120–97, 7500–Sr B–01, and 7500–^{3}H B–00 are available online at *http://www.standardmethods.org.* The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only online versions that may be used.

[6] *Annual Book of ASTM Standards,* Vol. 11.01 and 11.02, 2002; ASTM International; any year containing the cited version of the method may be used. Copies of these two volumes and the 2003 version of D 5673–03 may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428–2959.

[7] "Methods for Determination of Radioactive Substances in Water and Fluvial Sediments," Chapter A5 in Book 5 of *Techniques of Water-Resources Investigations of the United States Geological Survey,* 1977. Available at U.S. Geological Survey (USGS) Information Services, Box 25286, Federal Center, Denver, CO 80225–0425.

[8] "EML Procedures Manual," 28th (1997) or 27th (1990) Editions, Volumes 1 and 2; either edition may be used. In the 27th Edition Method Ra-04 is listed as Ra-05 and Method Ga-01–R is listed as Sect. 4.5.2.3. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014–3621.

[9] "Determination of Ra–226 and Ra–228 (Ra–02)," January 1980, Revised June 1982. Available at Radiological Sciences Institute for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

[10] "Determination of Radium 228 in Drinking Water," August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

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

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

[13] ''Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma-Mass Spectrometry,'' Revision 5.4, which is published in ''Methods for the Determination of Metals in Environmental Samples—Supplement I,'' EPA 600–R–94–111, May 1994. Available at NTIS, PB 95–125472.

[14] ''The Determination of Radium-226 and Radium-228 in Drinking Water by Gamma-ray Spectrometry Using HPGE or Ge(Li) Detectors,'' Revision 1.2, December 2004. Available from the Environmental Resources Center, Georgia Institute of Technology, 620 Cherry Street, Atlanta, GA 30332–0335, USA, Telephone: 404–894–3776. This method may be used to analyze for radium-226 and radium-228 in samples collected after January 1, 2005 to satisfy the radium-226 and radium-228 monitoring requirements specified at 40 CFR 141.26.

(b) When the identification and measurement of radionuclides other than those listed in paragraph (a) of this section is required, the following references are to be used, except in cases where alternative methods have been approved in accordance with § 141.27.

(1) *Procedures for Radiochemical Analysis of Nuclear Reactor Aqueous Solutions,* H. L. Krieger and S. Gold, EPA-R4–73–014. USEPA, Cincinnati, Ohio, May 1973.

(2) *HASL Procedure Manual*, Edited by John H. Harley. HASL 300, ERDA Health and Safety Laboratory, New York, NY., 1973.

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

(1) To determine compliance with § 141.66(b), (c), and (e) the detection limit shall not exceed the concentrations in Table B to this paragraph.

TABLE B—DETECTION LIMITS FOR GROSS ALPHA PARTICLE ACTIVITY, RADIUM 226, RADIUM 228, AND URANIUM

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

(2) To determine compliance with § 141.66(d) the detection limits shall not exceed the concentrations listed in Table C to this paragraph.

TABLE C—DETECTION LIMITS FOR MAN-MADE BETA PARTICLE AND PHOTON EMITTERS

Radionuclide	Detection limit
Tritium	1,000 pCi/1.
Strontium–89	10 pCi/1.
Strontium–90	2 pCi/1.
Iodine–131	1 pCi/1.
Cesium–134	10 pCi/1.
Gross beta	4 pCi/1.
Other radionuclides	1⁄10 of the applicable limit.

(d) To judge compliance with the maximum contaminant levels listed in § 141.66, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

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

[41 FR 28404, July 9, 1976, as amended at 45 FR 57345, Aug. 27, 1980; 62 FR 10173, Mar. 5, 1997; 65 FR 76745, Dec. 7, 2000; 67 FR 65250, Oct. 23, 2002; 69 FR 38855, June 29, 2004; 69 FR 52180, Aug. 25, 2004; 72 FR 11245, Mar. 12, 2007; 74 FR 30958, June 29, 2009]

§ 141.26 Monitoring frequency and compliance requirements for radionuclides in community water systems.

(a) *Monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.* (1) Community water systems (CWSs) must conduct initial monitoring to determine compliance with § 141.66(b), (c), and (e) by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, ''detection limit'' is defined as in § 141.25(c).

(i) *Applicability and sampling location for existing community water systems or sources.* All existing CWSs using ground water, surface water or systems using both ground and surface water (for the purpose of this section hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the State has designated a distribution system location, in accordance with paragraph (a)(2)(ii)(C) of this section.

(ii) *Applicability and sampling location for new community water systems or sources.* All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. CWSs must conduct more frequent monitoring when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

(2) *Initial monitoring:* Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

(i) Systems without acceptable historical data, as defined below, must collect four consecutive quarterly samples at all sampling points before December 31, 2007.

(ii) *Grandfathering of data:* States may allow historical monitoring data collected at a sampling point to satisfy the initial monitoring requirements for that sampling point, for the following situations.

(A) To satisfy initial monitoring requirements, a community water system having only one entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(B) To satisfy initial monitoring requirements, a community water system with multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(C) To satisfy initial monitoring requirements, a community water system with appropriate historical data for a representative point in the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003, provided that the State finds that the historical data satisfactorily demonstrate that each entry point to the distribution system is expected to be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points. The State must make a written finding indicating how the data conforms to the these requirements.

(iii) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the State may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.

(iv) If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.

(3) *Reduced monitoring:* States may allow community water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria.

(i) If the average of the initial monitoring results for each contaminant (*i.e.*, gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in Table B, in §141.25(c)(1), the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

(ii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below ½ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below ½ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.

(iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above ½ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-

228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above ½ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.

(iv) Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (e.g., if a system's sampling point is on a nine year monitoring period, and the sample result is above ½ MCL, then the next monitoring period for that sampling point is three years).

(v) If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.

(4) *Compositing:* To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a system may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample. States will treat analytical results from the composited as the average analytical result to determine compliance with the MCLs and the future monitoring frequency. If the analytical result from the composited sample is greater than ½ MCL, the State may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.

(5) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l. The gross alpha measurement shall have a confidence interval of 95% (1.65σ, where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, ½ the detection limit will be used to determine compliance and the future monitoring frequency.

(b) *Monitoring and compliance requirements for beta particle and photon radioactivity.* To determine compliance with the maximum contaminant levels in §141.66(d) for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

(1) Community water systems (both surface and ground water) designated by the State as vulnerable must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State must continue to sample until the State reviews and either reaffirms or removes the designation.

(i) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in paragraph (b)(1) of this section during the reduced monitoring period.

(ii) For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(1) of this section.

(2) Community water systems (both surface and ground water) designated by the State as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the State reviews and either reaffirms or removes the designation.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect the same type of samples required in paragraph (b)(2) of this section during the reduced monitoring period.

(v) For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(2) of this section.

(3) Community water systems designated by the State to monitor for beta particle and photon radioactivity can not apply to the State for a waiver from the monitoring frequencies specified in paragraph (b)(1) or (b)(2) of this section.

(4) Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. Systems are allowed to subtract the potassium-40 beta particle activity value from the total gross beta particle activity value to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.

(5) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the appropriate screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with §141.66(d)(1), using the formula in §141.66(d)(2). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(6) Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in §141.66(d) beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of 3 monthly samples, that the MCL is being met. Systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in paragraph (b)(1)(i) or (b)(2)(iv) of this section.

(c) *General monitoring and compliance requirements for radionuclides.* (1) The

State may require more frequent monitoring than specified in paragraphs (a) and (b) of this section, or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

(2) Each public water systems shall monitor at the time designated by the State during each compliance period.

(3) *Compliance:* Compliance with § 141.66 (b) through (e) will be determined based on the analytical result(s) obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

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

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

(iii) Systems must include all samples taken and analyzed under the provisions of this section in determining compliance, even if that number is greater than the minimum required.

(iv) If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.

(v) If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, ½ the detection limit will be used to calculate the annual average.

(4) States have the discretion to delete results of obvious sampling or analytic errors.

(5) If the MCL for radioactivity set forth in § 141.66 (b) through (e) is exceeded, the operator of a community water system must give notice to the State pursuant to § 141.31 and to the public as required by subpart Q of this part.

[65 FR 76745, Dec. 7, 2000, as amended at 69 FR 38855, June 29, 2004]

§ 141.27 Alternate analytical techniques.

(a) With the written permission of the State, concurred in by the Administrator of the U.S. EPA, an alternate analytical technique may be employed. An alternate technique shall be accepted only if it is substantially equivalent to the prescribed test in both precision and accuracy as it relates to the determination of compliance with any MCL. The use of the alternate analytical technique shall not decrease the frequency of monitoring required by this part.

[45 FR 57345, Aug. 27, 1980]

§ 141.28 Certified laboratories.

(a) For the purpose of determining compliance with § 141.21 through 141.27, 141.30, 141.40, 141.74, 141.89 and 141.402, samples may be considered only if they have been analyzed by a laboratory certified by the State except that measurements of alkalinity, calcium, conductivity, disinfectant residual, orthophosphate, pH, silica, temperature and turbidity may be performed by any person acceptable to the State.

(b) Nothing in this part shall be construed to preclude the State or any duly designated representative of the State from taking samples or from using the results from such samples to determine compliance by a supplier of water with the applicable requirements of this part.

[45 FR 57345, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982, as amended at 59 FR 34323, July 1, 1994; 64 FR 67465, Dec. 1, 1999; 71 FR 65651, Nov. 8, 2006]

§ 141.29 Monitoring of consecutive public water systems.

When a public water system supplies water to one or more other public water systems, the State may modify the monitoring requirements imposed by this part to the extent that the interconnection of the systems justifies treating them as a single system for monitoring purposes. Any modified monitoring shall be conducted pursuant to a schedule specified by the State and concurred in by the Administrator of the U.S. Environmental Protection Agency.

APPENDIX A TO SUBPART C OF PART 141—ALTERNATIVE TESTING METHODS APPROVED FOR ANALYSES UNDER THE SAFE DRINKING WATER ACT

Only the editions stated in the following table are approved.

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(3)

Organism	Methodology	SM 21st Edition[1]	SM 22nd Edition[28]	SM Online[3]	Other
Total Coliforms	Total Coliform Fermentation Technique.	9221 A, B	9221 A, B	9221 A,B–06.	
	Total Coliform Membrane Filter Technique.	9222 A, B, C.			
	Presence-Absence (P–A) Coliform Test.	9221 D.			
	ONPG–MUG Test	9223	9223 B	9223 B–04.	
	Colitag™				Modified Colitag™[13]
	Tecta EC/TC[33]				

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(5)

Organism	Methodology	SM 22nd Edition[28]	SM Online[3]
Fecal Coliforms	Fecal Coliform Procedure	9221 E	9221 E–06

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.21(f)(6)

Organism	Methodology	SM 20th Edition[6]	SM 21st Edition[1]	SM 22nd Edition[28]	SM Online[3]	Other
E.coli	ONPG–MUG Test	9223 B	9223 B	9223 B	9223 B–97, B–04	
	Colitag™					Modified Colitag™[13]
	Tecta EC/TC[33]					

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)

Contaminant	Methodology	EPA method	SM 21st edition[1]	SM 22nd edition[28]	SM 23rd edition[49]	SM Online[3]	ASTM[4]	Other
Alkalinity	Titrimetric		2320 B	2320 B	2320 B		D1067–06 B, 11 B, 16 B	
Antimony	Hydride—Atomic Absorption						D 3697–07, –12	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Arsenic	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10.	D 2972–08 C, –15 C	
	Hydride Atomic Absorption		3114 B	3114 B	3114 B	3114 B–09	D 2972–08 B, –15 B.	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Barium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 D	3111 D	3111 D			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Beryllium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10.	D 3645–08 B, –15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Cadmium	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Calcium	EDTA titrimetric		3500–Ca B	3500–Ca B	3500–Ca B		D 511–09, –14 A	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 511–09, –14 B	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition [1]	SM 22nd edition [28]	SM 23rd edition [49]	SM Online [3]	ASTM [4]	Other
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2 [2]						
	Ion Chromatography						D 6919–09	
Chromium	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2 [2]						
Copper	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10.	D 1688–07, –12 C	
	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B		D 1688–07, –12 A	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2 [2]						
	Colorimetry							Hach Method 8026; [35] Hach Method 10272. [36]
Conductivity	Conductance		2510 B	2510 B	2510 B		D 1125–14 A	
Cyanide	Manual Distillation with $MgCl_2$ followed by:.		4500–CN^- C	4500–CN^- C	4500–CN^- C	4500–CN^- C–99.	D 2036–06 A	
	Spectrophotometric, Amenable		4500–CN^- G.	4500–CN^- G.	4500–CN^- G.		D 2036–06 B	
	Spectrophotometric Manual		4500–CN^- E	4500–CN^- E	4500–CN^- E		D2036–06 A	
	Selective Electrode		4500–CN^- F	4500–CN^- F	4500–CN^- F			
	Gas Chromatography/Mass Spectrometry Headspace.							ME355.01. [7]
Fluoride	Ion Chromatography		4110 B	4110 B	4110 B		D 4327–11	
	Manual Distillation; Colorimetric SPADNS.		4500–F^- B, D.	4500–F^- B, D.	4500–F^- B, D			
	Manual Electrode		4500–F^- C	4500–F^- C	4500–F^- C		D 1179–04, 10 B, 16 B	
	Automated Alizarin		4500–F^- E	4500–F^- E	4500–F^- E			
	Arsenite-Free Colorimetric SPADNS							Hach SPADNS 2 Method 10225. [22]
Lead	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10.	D 3559–08 D, 15 D	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2 [2]						

Magnesium	Atomic Absorption		3111 B	3111 B	3111 B		D 511–09, –14 B	
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Complexation Titrimetric Methods		3500–Mg B	3500–Mg B	3500–Mg B		D 511–09, –14 A	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
	Ion Chromatography						D 6919–09	
Mercury	Manual, Cold Vapor		3112 B	3112 B	3112 B	3112 B–09	D 3223–12	
Nickel	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
	Atomic Absorption; Direct		3111 B	3111 B	3111 B			
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10		
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Nitrate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327–11	
	Automated Cadmium Reduction		4500–NO_3^- F.	4500–NO_3^- F.	4500–NO_3^- F			
	Manual Cadmium Reduction		4500–NO_3^- E.	4500–NO_3^- E.	4500–NO_3^- E			
	Ion Selective Electrode		4500–NO_3^- D.	4500–NO_3^- D.	4500–NO_3^- D			
	Reduction/Colorimetric							Systea Easy (1-Reagent);[8] NECi Nitrate-Reductase.[40]
	Colorimetric; Direct							Hach TNTplus™ 835/836 Method 10206.[23]
	Capillary Ion Electrophoresis						D 6508–15	
Nitrite	Ion Chromatography		4110 B	4110 B	4110 B		D 4327–11	
	Automated Cadmium Reduction		4500–NO_3^- F.	4500–NO_3^- F.	4500–NO_3^- F			
	Manual Cadmium Reduction		4500–NO_3^- E.	4500–NO_3^- E.	4500–NO_3^- E			
	Spectrophotometric		4500–NO_2^- B.	4500–NO_2^- B.	4500–NO_2^- B			
	Reduction/Colorimetric							Systea Easy (1-Reagent);[8] NECi Nitrate-Reductase.[40]
	Capillary Ion Electrophoresis						D 6508–15	
Ortho-phosphate	Ion Chromatography		4110 B	4110 B	4110 B		D 4327–11	
	Colorimetric, ascorbic acid, single reagent.		4500–P E	4500–P E	4500–P E	4500–P E–99		
	Colorimetric, Automated, Ascorbic Acid.		4500–P F	4500–P F	4500–P F	4500–P F–99		Thermo Fisher Discrete Analyzer.[41]
	Capillary Ion Electrophoresis						D 6508–15	
pH	Electrometric	150.3[48]	4500–H+ B	4500–H+ B	4500–H+ B		D 1293–12	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.23(k)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition[1]	SM 22nd edition[28]	SM 23rd edition[49]	SM Online[3]	ASTM[4]	Other
Selenium	Hydride-Atomic Absorption		3114 B	3114 B	3114 B	3114 B–09	D 3859–08 A, –15 A	
	Atomic Absorption; Furnace		3113 B	3113 B	3113 B	3113 B–04, B–10.	D 3859–08 B, –15 B	
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
Silica	Colorimetric						D859–05, 10, 16	
	Molybdosilicate		4500–SiO_2 C	4500–SiO_2 C	4500–SiO_2 C			
	Heteropoly blue		4500–SiO_2 D	4500–SiO_2 D	4500–SiO_2 D			
	Automated for Molybdate-reactive Silica.		4500–SiO_2 E	4500–SiO_2 E	4500–SiO_2 E			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
	Inductively Coupled Plasma		3120 B	3120 B	3120 B			
Sodium	Atomic Absorption; Direct Aspiration		3111 B	3111 B	3111 B			
	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2[2]						
	Ion Chromatography						D 6919–09	
Temperature	Thermometric		2550	2550	2550	2550–10		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1)

Contaminant	Methodology	EPA method	SM 21st edition[1]	SM 22nd edition,[28] SM 23rd edition[49]	SM online[3]
Benzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Carbon tetrachloride	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Chlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,2-Dichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,4-Dichlorobenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,2-Dichloroethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
cis-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
trans-Dichloroethylene.	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Dichloromethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,2-Dichloropropane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Ethylbenzene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			

Styrene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,;[9] 524.4.[29]			
Tetrachloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,1,1-Trichloroethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Trichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Toluene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,2,4-Trichlorobenzene.	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,1-Dichloroethylene	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
1,1,2-Trichlorethane	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Vinyl chloride	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
Xylenes (total)	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9] 524.4.[29]			
2,4-D	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B–01, B–06.
2,4,5-TP (Silvex)	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B–01, B–06.
Alachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Atrazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI–MS/MS).	536.[25]			
	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3,[24]523.[26].			
Benzo(a)pyrene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Carbofuran	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection.		6610 B	6610 B	6610 B–04.
Chlordane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Dalapon	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC–ESI–MS/MS).	557.[14]			
	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B–01, B–06.
Di(2-ethylhexyl)adipate.	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Di(2-ethylhexyl)phthalate.	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Dibromochloropropane (DBCP).	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3.[9]			
Dinoseb	Gas Chromatography/Electron Capture Detection (GC/ECD)		6640 B	6640 B	6640 B–01, B–06.
Endrin	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Ethyl dibromide (EDB).	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3.[9]			
Glyphosate	High-Performance Liquid Chromatography (HPLC) with Post-Column Derivatization and Fluorescence Detection.		6651 B	6651 B	6651 B–00, B–05.
Heptachlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.24(e)(1)—Continued

Contaminant	Methodology	EPA method	SM 21st edition [1]	SM 22nd edition,[28] SM 23rd edition [49]	SM online [3]
Heptachlor Epoxide ..	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Hexachlorobenzene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Hexachlorocyclopentadiene.	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Lindane	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Methoxychlor	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Oxamyl	High-performance liquid chromatography (HPLC) with post-column derivatization and fluorescence detection.	....	6610 B	6610 B	6610 B–04.
PCBs (as Aroclors) ..	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Pentachlorophenol ...	Gas Chromatography/Electron Capture Detection (GC/ECD)	....	6640 B	6640 B	6640 B–01, B–06.
....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS)	525.3.[24]			
Picloram	Gas Chromatography/Electron Capture Detection (GC/ECD)	....	6640 B	6640 B	6640 B–01, B–06.
Simazine	Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI–MS/MS).	536.[25]			
....	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3,[24]523.[26]			
Toxaphene	Solid Phase Extraction/Gas Chromatography/Mass Spectrometry (GC/MS).	525.3.[24]			
Total Trihalomethanes.	Purge &Trap/Gas Chromatography/Mass Spectrometry	524.3,[9]524.4[29].			

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.25(a)

Contaminant	Methodology	EPA method	SM 21st edition [1]	SM 22nd edition,[28] SM 23rd edition [49]	ASTM [4]	SM Online [3]
Naturally Occurring: Gross alpha and beta.	Evaporation	900.0, Rev. 1.0 [50] ...	7110 B	7110 B.		

	Liquid Scintillation	....	....	....	D 7283–17	7110 D–17.
Gross alpha	Coprecipitation	....	7110 C	7110 C.		
Radium 226	Radon emanation	....	7500–Ra C	7500–Ra C	D 3454–05.	
	Radiochemical	....	7500–Ra B	7500–Ra B	D 2460–07.	
	Gamma Spectrometry	....	....	7500–Ra E	....	7500–Ra E–07.
Radium 228	Radiochemical	....	7500–Ra D	7500–Ra D.		
	Gamma Spectrometry	....	....	7500Ra–E	....	7500–Ra E–07.
Uranium	Radiochemical	....	7500–U B	7500–U B.		
	ICP–MS	....	3125	....	D 5673–05, 10, 16.	
	Alpha spectrometry	....	7500–U C	7500–U C	D 3972–09.	
	Laser Phosphorimetry	....	....	....	D 5174–07.	
	Alpha Liquid Scintillation Spectrometry.	....	....	....	D 6239–09.	
Man-Made:						
Radioactive Cesium	Radiochemical	....	7500–Cs B	7500–Cs B.		
	Gamma Ray Spectrometry.	....	7120	7120	D 3649–06.	
Radioactive Iodine ..	Radiochemical	....	7500–I B .... 7500–I C .... 7500–I D	7500–I B .... 7500–I C. 7500–I D.	D 3649–06.	
	Gamma Ray Spectrometry.	....	7120	7120	D 4785–08.	
Radioactive Strontium 89, 90.	Radiochemical	....	7500–Sr B	7500–Sr B.		
Tritium	Liquid Scintillation	....	7500–^{3}H B	7500–^{3}H B	D 4107–08.	
Gamma Emitters	Gamma Ray	....	7120	7120	D 3649–06.	
	Spectrometry	....	7500–Cs B .... 7500–I B	7500–Cs B .... 7500–I B.	D 4785–08.	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)

Organism	Methodology	SM 21st edition [1]	SM 22nd edition [28]	SM 23rd edition [49]	SM Online [3]	Other
Total Coliform	Total Coliform Fermentation Technique.	9221 A, B, C	9221 A, B, C	9221 A, B, C	9221 A,B,C–06.	
	Total Coliform Membrane Filter Technique.	9222 A, B, C	....	9222 A, B, C.		
	ONPG–MUG Test	9223	9223 B	9223 B	9223 B–04.	
Fecal Coliforms	Fecal Coliform Procedure.	9221 E	9221 E	9221 E	9221 E–06.	

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.74(a)(1)—Continued

Organism	Methodology	SM 21st edition[1]	SM 22nd edition[28]	SM 23rd edition[49]	SM Online[3]	Other
	Fecal Coliform Filter Procedure.	9222 D	9222 D	9222 D	9222 D–06.	
Heterotrophic bacteria	Pour Plate Method	9215 B	9215 B	9215 B	9215 B–04.	
Turbidity	Nephelometric Method.	2130 B	2130 B	2130 B		Hach Method 8195, Rev. 3.0.[52]
	Laser Nephelometry (on-line).					Mitchell M5271,[10] Mitchell M5331, Rev. 1.2,[42] Lovibond PTV 6000.[46]
	LED Nephelometry (on-line).					Mitchell M5331,[11] Mitchell M5331, Rev. 1.2,[42] Lovibond PTV 2000.[45]
	LED Nephelometry (on-line).					AMI Turbiwell,[15] Lovibond PTV 1000.[44]
	LED Nephelometry (portable).					Orion AQ4500.[12]
	360° Nephelometry					Hach Method 10258 Rev. 1.0,[39] Hach Method 10258, Rev. 2.0.[51]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.74(a)(2)

Residual	Methodology	SM 21st edition[1]	SM 22nd edition,[28] SM 23rd edition[49]	ASTM[4]	Other
Free Chlorine	Amperometric Titration.	4500–Cl D	4500–Cl D	D 1253–08, –14.	
	DPD Ferrous Titrimetric.	4500–Cl F	4500–Cl F.		
	DPD Colorimetric	4500–Cl G	4500–Cl G		Hach Method 10260.[31]
	Indophenol Colorimetric.				Hach Method 10241.[34]
	Syringaldazine (FACTS).	4500–Cl H	4500–Cl H.		
	On-line Chlorine Analyzer.				EPA 334.0.[16]
	Amperometric Sensor.				ChloroSense.[17]
Total Chlorine	Amperometric Titration.	4500–Cl D	4500–Cl D	D 1253–08, –14.	
	Amperometric Titration (Low level measurement).	4500–Cl E	4500–Cl E.		
	DPD Ferrous Titrimetric.	4500–Cl F	4500–Cl F.		
	DPD Colorimetric	4500–Cl G	4500–Cl G		Hach Method 10260.[31]
	Iodometric Electrode.	4500–Cl I	4500–Cl I.		
	On-line Chlorine Analyzer.				EPA 334.0.[16]
	Amperometric Sensor.				ChloroSense.[17]
Chlorine Dioxide	Amperometric Titration.	4500–ClO$_2$ C	4500–ClO$_2$ C.		
	Amperometric Titration.	4500–ClO$_2$ E.	4500–ClO$_2$ E.		
	Amperometric Sensor.				ChlordioX Plus.[32]
Ozone	Indigo Method	4500–O$_3$ B	4500–O$_3$ B.		

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.131(b)(1)

Contaminant	Methodology	EPA method	ASTM[4]	SM online[3]	SM 21st edition[1]	SM 22nd edition,[28] SM 23rd edition[49]	Other
TTHM	P&T/GC/MS	524.3,[9] 524.4.[29]					
HAA5	LLE (diazomethane)/GC/ECD			6251 B–07	6251 B	6251 B.	
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC–ESI–MS/MS).	557.[14]					
	Two-Dimensional Ion Chromatography (IC) with Suppressed Conductivity Detection.						Thermo Fisher 557.1.[47]
Bromate	Two-Dimensional Ion Chromatography (IC).	302.0.[18]					
	Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC–ESI–MS/MS).	557.[14]					
	Chemically Suppressed Ion Chromatography.		D 6581–08 A.				
	Electrolytically Suppressed Ion Chromatography.		D 6581–08 B.				
Chlorite	Chemically Suppressed Ion Chromatography.		D 6581–08 A.				
	Electrolytically Suppressed Ion Chromatography.		D 6581–08 B.				
	Chlorite—daily monitoring as prescribed in 40 CFR 141.132(b)(2)(i)(A). Amperometric Titration.				4500–ClO$_2$ E	4500–ClO$_2$ E.	
	Amperometric Sensor						ChlordioX Plus.[32]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(1)

Residual	Methodology	SM 21st edition[1]	SM 22nd edition,[28] SM 23rd edition[49]	ASTM[4]	Other
Free Chlorine	Amperometric Titration	4500–Cl D	4500–Cl D	D 1253–08, –14.	
	DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F.		
	DPD Colorimetric	4500–Cl G	4500–Cl G		Hach Method 10260.[31]
	Indophenol Colorimetric				Hach Method 10241.[34]
	Syringaldazine (FACTS)	4500–Cl H	4500–Cl H.		
	Amperometric Sensor				ChloroSense.[17]
	On-line Chlorine Analyzer				EPA 334.0.[16]
Combined Chlorine	Amperometric Titration	4500–Cl D	4500–Cl D	D 1253–08, –14.	
	DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F.		
	DPD Colorimetric	4500–Cl G	4500–Cl G		Hach Method 10260.[31]
Total Chlorine	Amperometric Titration	4500–Cl D	4500–Cl D	D 1253–08, –14.	
	Low level Amperometric Titration.	4500–Cl E	4500–Cl E.		
	DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F.		
	DPD Colorimetric	4500–Cl G	4500–Cl G		Hach Method 10260.[31]
	Iodometric Electrode	4500–Cl I	4500–Cl I.		
	Amperometric Sensor				ChloroSense.[17]
	On-line Chlorine Analyzer				EPA 334.0.[16]
Chlorine Dioxide	Amperometric Method II	4500–ClO_2 E	4500–ClO_2 E.		
	Amperometric Sensor				ChlordioX Plus.[32]

ALTERNATIVE TESTING METHODS FOR DISINFECTANT RESIDUALS LISTED AT 40 CFR 141.131(c)(2), IF APPROVED BY THE STATE

Residual	Methodology	Method
Free Chlorine	Test Strips	Method D99–003 [5]

ALTERNATIVE TESTING METHODS FOR PARAMETERS LISTED AT 40 CFR 141.131(d)

Parameter	Methodology	SM 21st edition [1]	SM 22nd edition [28]	SM 23rd edition [49]	SM online [3]	EPA	Other
Total Organic Carbon (TOC)	High Temperature Combustion.	5310 B	5310 B	5310 B		415.3, Rev 1.2.[19]	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation.	5310 C	5310 C	5310 C		415.3, Rev 1.2. [19].	Hach Method 10267.[38]
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2.[19]	
	Ozone Oxidation						Hach Method 10261.[37]
Specific Ultraviolet Absorbance (SUVA)	Calculation using DOC and UV_{254} data.					415.3, Rev 1.2.[19]	
Dissolved Organic Carbon (DOC).	High Temperature Combustion.	5310 B	5310 B	5310 B		415.3, Rev 1.2.[19]	
	Persulfate-Ultraviolet or Heated Persulfate Oxidation.	5310 C	5310 C	5310 C		415.3, Rev 1.2.[19]	
	Wet Oxidation	5310 D	5310 D			415.3, Rev 1.2.[19]	
Ultraviolet absorption at 254 nm (UV_{254}).	Spectrophotometry	5910 B	5910 B	5910 B	5910 B–11	415.3, Rev 1.2.[19]	

ALTERNATIVE TESTING METHODS WITH MRL >0.0010 MG/L FOR MONITORING LISTED AT 40 CFR 141.132(b)(3)(ii)(B)

Contaminant	Methodology	EPA method
Bromate	Two-Dimensional Ion Chromatography (IC) Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC–ESI–MS/MS).	302.0 [18] 557 [14]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.402(c)(2)

Organism	Methodology	SM 20th edition[6]	SM 21st edition[1]	SM 22nd edition[28]	SM 23rd edition[49]	SM online[3]	Other
E. coli	Colilert		9223 B	9223 B	9223 B	9223 B–97, B–04.	
	Colisure		9223 B	9223 B	9223 B	9223 B–97, B–04.	
	Colilert-18	9223 B	9223 B	9223 B	9223 B	9223 B–97, B–04.	
	Readycult®						Readycult®.[20]
	Colitag						Modified Colitag.™[13]
	Chromocult®						Chromocult®.[21]
	EC-MUG			9221 F	9221 F	9221 F–06.	
	NA-MUG				9222 I.		
	m-ColiBlue24 Test				9222 J.		
	Tecta EC/TC[33][43]						
Enterococci	Multiple-Tube Technique					9230 B–04.	
	Membrane Filter Techniques.				9230 C.		
	Fluorogenic Substrate Enterococcus Test (using Enterolert).				9230 D.		
Coliphage	Two-Step Enrichment Presence-Absence Procedure.						Fast Phage.[30]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.704(a)

Organism	Methodology	EPA Method
Cryptosporidium	*Filtration/Immunomagnetic Separation/Immunofluorescence Assay Microscopy.*	*1623.1*[27]

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.704(b)

Organism	Methodology	SM 20th edition[6]
E. coli	Membrane Filtration, Two Step	9222 D/9222 G

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 141.852(a)(5)

Organism	Methodology category	Method	SM 20th, 21st editions [1] [6]	SM 22nd edition [28]	SM 23rd edition [49]	SM online [3]
Total Coliforms	Lactose Fermentation Methods.	Standard Total Coliform Fermentation Technique.		9221 B.1, B.2	9221 B.1, B.2, B.3, B.4.	9221 B.1, B.2–06.
		Presence-Absence (P–A) Coliform Test.			9221 D.1, D.2, D.3.	
	Membrane Filtration Methods.	Standard Total Coliform Membrane Filter Procedure using Endo Media.			9222 B, C.	
		Simultaneous Detection of Total Coliforms and *E. coli* by Dual Chromogen Membrane Filter Procedure (using mColiBlue24 medium).			9222 J.	
	Enzyme Substrate Methods	Colilert®		9223 B	9223 B	9223 B–04.
		Colisure®		9223 B	9223 B	9223 B–04.
		Colilert-18	9223 B	9223 B	9223 B	9223 B–04.
		Tecta EC/TC [33] [43]				
Escherichia coli	*Escherichia coli* Procedure (following Lactose Fermentation Methods).	EC–MUG medium		9221 F.1	9221 F.1	9221 F.1–06.
	Escherichia coli Partitioning Methods (following Membrane Filtration Methods).	EC broth with MUG (EC–MUG).			9222 H.	
		NA–MUG medium			9222 I.	
	Simultaneous Detection of Total Coliforms and *E. coli* by Dual Chromogen Membrane Filter Procedure.	mColiBlue24 medium			9222 J.	
	Enzyme Substrate Methods	Colilert®		9223 B	9223 B	9223 B–04.
		Colisure®		9223 B	9223 B	9223 B–04.
		Colilert-18	9223 B	9223 B	9223 B	9223 B–04.
		Tecta EC/TC [33] [43]				

ALTERNATIVE TESTING METHODS FOR CONTAMINANTS LISTED AT 40 CFR 143.4(b)

Contaminant	Methodology	EPA method	ASTM[4]	SM 21st edition[1]	SM 22nd edition,[28] SM 23rd edition[49]	SM online[3]
Aluminum	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2.[2]				
	Atomic Absorption; Direct			3111 D	3111 D.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B–04, B–10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Chloride	Silver Nitrate Titration		D 512–04 B, 12 B.	4500–Cl^- B	4500–Cl^- B	
	Ion Chromatography		D 4327–11	4110 B	4110 B.	
	Potentiometric Titration			4500–Cl^- D	4500–Cl^- D.	
Color	Visual Comparison			2120 B	2120 B.	
Foaming Agents	Methylene Blue Active Substances (MBAS)			5540 C	5540 C.	
Iron	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2.[2]				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B–04, B–10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Manganese	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2.[2]				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B–04, B–10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Odor	Threshold Odor Test			2150 B	2150 B.	
Silver	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2.[2]				
	Atomic Absorption; Direct			3111 B	3111 B.	
	Atomic Absorption; Furnace			3113 B	3113 B	3113 B–04, B–10.
	Inductively Coupled Plasma			3120 B	3120 B.	
Sulfate	Ion Chromatography		D 4327–11	4110 B	4110 B.	
	Gravimetric with ignition of residue			4500–$SO_4{}^{2-}$ C.	4500–$SO_4{}^{2-}$ C.	4500–$SO_4{}^{2-}$ C–97.
	Gravimetric with drying of residue			4500–$SO_4{}^{2-}$ D.	4500–$SO_4{}^{2-}$ D.	4500–$SO_4{}^{2-}$ D–97.

	Turbidimetric method		D 516–07, 11, 16.	4500–SO_4^{2-} E.	4500–SO_4^{2-} E.	4500–SO_4^{2-} E–97.
	Automated methylthymol blue method			4500–SO_4^{2-} F.	4500–SO_4^{2-} F.	4500–SO_4^{2-} F–97.
Total Dissolved Solids	Total Dissolved Solids Dried at 180 deg C			2540 C	2540 C.	
Zinc	Axially viewed inductively coupled plasma-atomic emission spectrometry (AVICP–AES).	200.5, Revision 4.2.[2]				
	Atomic Absorption; Direct Aspiration			3111 B	3111 B.	
	Inductively Coupled Plasma			3120 B	3120 B.	

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

[2] EPA Method 200.5, Revision 4.2. ''Determination of Trace Elements in Drinking Water by Axially Viewed Inductively Coupled Plasma-Atomic Emission Spectrometry.'' 2003. EPA/600/R–06/115. (Available at *http://www.epa.gov/water-research/epa-drinking-water-research-methods.*)

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

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

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

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[16] EPA Method 334.0. ''Determination of Residual Chlorine in Drinking Water Using an On-line Chlorine Analyzer,'' September 2009. EPA 815–B–09–013. Available at *https://www.nemi.gov.*

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[18] EPA Method 302.0. ''Determination of Bromate in Drinking Water using Two-Dimensional Ion Chromatography with Suppressed Conductivity Detection,'' September 2009. EPA 815–B–09–014. Available at *https://www.nemi.gov.*

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Subpart D—Reporting and Recordkeeping

§ 141.31 Reporting requirements.

(a) Except where a shorter period is specified in this part, the supplier of water shall report to the State the results of any test measurement or analysis required by this part within (1) The first ten days following the month in which the result is received, or (2) the first ten days following the end of the required monitoring period as stipulated by the State, whichever of these is shortest.

(b) Except where a different reporting period is specified in this part, the supplier of water must report to the State within 48 hours the failure to comply with any national primary drinking water regulation (including failure to comply with monitoring requirements) set forth in this part.

(c) The supplier of water is not required to report analytical results to the State in cases where a State laboratory performs the analysis and reports the results to the State office which would normally receive such notification from the supplier.

(d) The public water system, within 10 days of completing the public notification requirements under subpart Q of this part for the initial public notice and any repeat notices, must submit to the primacy agency a certification that it has fully complied with the public notification regulations. The public water system must include with this certification a representative copy of each type of notice distributed, published, posted, and made available to the persons served by the system and to the media.

(e) The water supply system shall submit to the State within the time stated in the request copies of any records required to be maintained under § 141.33 hereof or copies of any documents then in existence which the State or the Administrator is entitled to inspect pursuant to the authority of section 1445 of the Safe Drinking Water Act or the equivalent provisions of State law.

[40 FR 59570, Dec. 24, 1975, as amended at 45 FR 57345, Aug. 27, 1980; 65 FR 26022, May 4, 2000]

§ 141.32 [Reserved]

§ 141.33 Record maintenance.

Any owner or operator of a public water system subject to the provisions of this part shall retain on its premises or at a convenient location near its premises the following records:

(a) Records of microbiological analyses and turbidity analyses made pursuant to this part shall be kept for not less than 5 years. Records of chemical analyses made pursuant to this part shall be kept for not less than 10 years. Actual laboratory reports may be kept, or data may be transferred to tabular summaries, provided that the following information is included:

(1) The date, place, and time of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as to whether it was a routine distribution system sample, check sample, raw or process water sample or other special purpose sample;

(3) Date of analysis;

(4) Laboratory and person responsible for performing analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) Records of action taken by the system to correct violations of primary drinking water regulations shall be kept for a period not less than 3 years after the last action taken with respect to the particular violation involved.

(c) Copies of any written reports, summaries or communications relating to sanitary surveys of the system conducted by the system itself, by a private consultant, or by any local, State or Federal agency, shall be kept for a period not less than 10 years after completion of the sanitary survey involved.

(d) Records concerning a variance or exemption granted to the system shall be kept for a period ending not less than 5 years following the expiration of such variance or exemption.

(e) Copies of public notices issued pursuant to subpart Q of this part and certifications made to the primacy agency pursuant to § 141.31 must be kept for three years after issuance.

(f) Copies of monitoring plans developed pursuant to this part shall be kept for the same period of time as the records of analyses taken under the plan are required to be kept under paragraph (a) of this section, except as specified elsewhere in this part.

[40 FR 59570, Dec. 24, 1975, as amended at 65 FR 26022, May 4, 2000; 71 FR 478, Jan. 4, 2006]

§ 141.34 [Reserved]

§ 141.35 Reporting for unregulated contaminant monitoring results.

(a) *General applicability*. This section applies to any owner or operator of a public water system (PWS) required to monitor for unregulated contaminants under § 141.40(a); such owner or operator is referred to as ''you.'' This section specifies the information that must be reported to EPA prior to the commencement of monitoring and describes the process for reporting monitoring results to EPA. For the purposes of this section, PWS ''population served'' is the retail population served directly by the PWS as reported to the Federal Safe Drinking Water Information System (SDWIS/Fed); wholesale or consecutive populations are not included. For purposes of this section, the term ''finished'' means water that is introduced into the distribution system of a PWS and is intended for distribution and consumption without further treatment, except the treatment necessary to maintain water quality in the distribution system (e.g., booster disinfection, addition of corrosion control chemicals). For purposes of this section, the term ''State'' refers to the State or Tribal government entity that has jurisdiction over your PWS even if that government does not have primary enforcement responsibility for PWSs under the Safe Drinking Water Act. For purposes of this section, the term ''PWS Official'' refers to the person at your PWS who is able to function as the official spokesperson for the system's Unregulated Contaminant Monitoring Regulation (UCMR) activities; and the term ''PWS Technical Contact'' refers to the person at your PWS who is responsible for the technical aspects of your UCMR activities, such as details concerning sampling and reporting.

(b) *Reporting by all systems*. You must meet the reporting requirements of this paragraph if you meet the applicability criteria in § 141.40(a)(1) and (2).

(1) *Where to submit UCMR reporting requirement information*. Some of your reporting requirements are to be fulfilled electronically and others by mail. Information that must be submitted using EPA's electronic data reporting system must be submitted through: *https://www.epa.gov/dwucmr*. Documentation that is required to be mailed can be submitted either: To UCMR Sampling Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive (MS 140), Cincinnati, OH 45268; or by email at *UCMR_Sampling_Coordinator@epa.gov*. In addition, you must notify the public of the availability of unregulated contaminant monitoring data as provided in subpart Q (Public Notification) of this part (40 CFR 141.207). Community Water Systems that detect unregulated contaminants under this monitoring must also address such detections as part of their Consumer Confidence Reports, as provided in subpart O of this part (40 CFR 141.151).

(2) *Contacting EPA if your system does not meet applicability criteria or has a status change*. If you have received a letter from EPA or your State concerning your required monitoring and your system does not meet the applicability criteria for UCMR established in § 141.40(a)(1) or (2), or if a change occurs at your system that may affect your requirements under UCMR as defined in § 141.40(a)(3) through (5), you must mail or email a letter to EPA, as specified in paragraph (b)(1) of this section. The letter must be from your PWS Official and must include your PWS Identification (PWSID) Code along with an explanation as to why the UCMR requirements are not applicable to your PWS, or have changed for your PWS, along with the appropriate contact information. EPA will make an applicability determination based on your letter and in consultation with the State when necessary. You are subject to UCMR requirements unless and until you receive a letter from EPA agreeing that you do not meet the applicability criteria.

(c) *Reporting by large systems*. If you serve a population of more than 10,000 people, and meet the applicability criteria in §141.40(a)(2)(i), you must meet the reporting requirements in paragraphs (c)(1) through (8) of this section.

(1) *Contact and zip code information.* You must provide contact information by December 31, 2017, and provide updates within 30 days if this information changes. The contact information must be submitted using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section, and include the name, affiliation, mailing address, phone number, and email address for your PWS Technical Contact and your PWS Official. In addition, as a one-time reporting requirement, you must report the U.S. Postal Service Zip Code(s) for all areas being served water by your PWS.

(2) *Sampling location and inventory information.* You must provide your sampling location(s) and inventory information by December 31, 2017, using EPA's electronic data reporting system. You must submit, verify or update the following information for each sampling location, or for each approved representative sampling location (as specified in paragraph (c)(3) of this section regarding representative sampling locations): PWSID Code; PWS Name; PWS Facility Identification Code; PWS Facility Name; PWS Facility Type; Water Source Type; Sampling Point Identification Code; Sampling Point Name; and Sampling Point Type Code; (as defined in Table 1 of paragraph (e) of this section). If this information changes, you must report updates, including new sources and sampling locations that are put in use before or during the PWS' UCMR sampling period, to EPA's electronic data reporting system within 30 days of the change.

(3) *Proposed ground water representative sampling locations.* Some systems that use ground water as a source and have multiple entry points to the distribution system (EPTDSs) may propose monitoring at representative entry point(s), rather than monitor at every EPTDS, as follows:

(i) *Qualifications.* Large PWSs that have EPA- or State-approved alternate EPTDS sampling locations from a previous UCMR cycle, or as provided for under §141.23(a)(1), §141.24(f)(1), or §141.24(h)(1), may submit a copy of documentation from their State or EPA that approves their alternative sampling plan for EPTDSs. PWSs that do not have an approved alternative EPTDS sampling plan may submit a proposal to sample at representative EPTDS(s) rather than at each individual EPTDS if: They use ground water as a source; all of their well sources have either the same treatment or no treatment; and they have multiple EPTDSs from the same source, such as an aquifer. You must submit a copy of the existing alternate EPTDS sampling plan or your representative well proposal, as appropriate, April 19, 2017, as specified in paragraph (b)(1) of this section.

(ii) *Demonstration.* If you are submitting a proposal to sample at representative EPTDS(s) rather than at each individual EPTDS, you must demonstrate that any EPTDS that you select as representative of the ground water you supply from multiple wells is associated with a well that draws from the same aquifer as the wells it will represent. The proposed well must be representative of the highest annual volume producing and most consistently active wells in the representative array. If that representative well is not in use at the scheduled sampling time, you must select and sample an alternative representative well. You must submit the following information for each proposed representative sampling location: PWSID Code; PWS Name; PWS Facility Identification Code; PWS Facility Name; PWS Facility Type; Sampling Point Identification Code; and Sampling Point Name (as defined in Table 1, paragraph (e) of this section). You must also include documentation to support your proposal that the specified wells are representative of other wells. This documentation can include system-maintained well logs or construction drawings indicating that the representative well(s) is/are at a representative depth, and details of well casings and grouting; data demonstrating relative homogeneity of water quality constituents (e.g., pH, dissolved oxygen, conductivity, iron, manganese) in samples drawn from each well; and data showing that your wells are located in a limited geographic area (e.g., all wells within a 0.5

mile radius) and/or, if available, the hydrogeologic data indicating the time of travel separating the representative well from each of the individual wells it represents (e.g., all wells within a five-year time of travel delineation). Your proposal must be sent in writing to EPA, as specified in paragraph (b)(1) of this section. You must also provide a copy of this information to the State, unless otherwise directed by the State. Information about the actual or potential occurrence or non-occurrence of contaminants in an individual well, or a well's vulnerability to contamination, must not be used as a basis for selecting a representative well.

(iii) *Approval.* EPA or the State (as specified in the Partnership Agreement reached between the State and EPA) will review your proposal, coordinate any necessary changes with you, and approve the final list of EPTDSs where you will be required to monitor. Your plan will not be final until you receive written approval from EPA or the State.

(4) *Contacting EPA if your PWS has not been notified of requirements.* If you believe you are subject to UCMR requirements, as defined in §141.40(a)(1) and (2)(i), and you have not been notified by either EPA or your State by April 19, 2017, you must send a letter to EPA, as specified in paragraph (b)(1) of this section. The letter must be from your PWS Official and must include an explanation as to why the UCMR requirements are applicable to your system along with the appropriate contact information. A copy of the letter must also be submitted to the State, as directed by the State. EPA will make an applicability determination based on your letter, and in consultation with the State when necessary, and will notify you regarding your applicability status and required sampling schedule. However, if your PWS meets the applicability criteria specified in §141.40(a)(2)(i), you are subject to the UCMR monitoring and reporting requirements, regardless of whether you have been notified by the State or EPA.

(5) *Notifying EPA if your PWS cannot sample according to schedule—*

(i) *General rescheduling notification requirements.* Large systems may change their monitoring schedules up to December 31, 2017, using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section. After this date has passed, if your PWS cannot sample according to your assigned sampling schedule (e.g., because of budget constraints, or if a sampling location will be closed during the scheduled month of monitoring), you must mail or email a letter to EPA, as specified in paragraph (b)(1) of this section, prior to the scheduled sampling date. You must include an explanation of why the samples cannot be taken according to the assigned schedule, and you must provide the alternative schedule you are requesting. You must not reschedule monitoring specifically to avoid sample collection during a suspected vulnerable period. You are subject to your assigned UCMR sampling schedule or the schedule that you revised on or before December 31, 2017, unless and until you receive a letter from EPA specifying a new schedule.

(ii) *Exceptions to the rescheduling notification requirements.* For ground water sampling, if the second round of sampling will be completed five to seven months after the first sampling event, as specified in Table 2 of §141.40(a)(4)(i)(B), no notification to EPA is required. If any ground water sampling location will be non-operational for more than one month before and one month after the month in which the second sampling event is scheduled (*i.e.*, it is not possible for you to sample within the five to seven month window), you must notify EPA, as specified in paragraph (b)(1) of this section, explaining why the schedule cannot be met. You must comply with any modified schedule provided by EPA.

(6) *Reporting monitoring results.* For UCMR samples, you must report all data elements specified in Table 1 of paragraph (e) of this section, using EPA's electronic data reporting system. You also must report any changes, relative to what is currently posted, made to data elements 1 through 9 to EPA in writing, explaining the nature and purpose of the proposed change, as specified in paragraph (b)(1) of this section.

(i) *Electronic reporting system.* You are responsible for ensuring that the laboratory conducting the analysis of your unregulated contaminant monitoring samples (your laboratory) posts the analytical results to EPA's electronic reporting system. You are also responsible for reviewing, approving, and submitting those results to EPA.

(ii) *Reporting schedule.* You must ensure that your laboratory posts the data to EPA's electronic data reporting system within 120 days from the sample collection date (sample collection must occur as specified in §141.40(a)(4)). You have 60 days from when the laboratory posts the data in EPA's electronic data reporting system to review, approve, and submit the data to the State and EPA, at the Web address specified in paragraph (b)(1) of this section. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory's posting data to EPA's electronic reporting system, the data will be considered approved by you and available for State and EPA review.

(7) *Only one set of results accepted.* If you report more than one set of valid results for the same sampling location and the same sampling event (for example, because you have had more than one laboratory analyze replicate samples collected under §141.40(a)(5), or because you have collected multiple samples during a single monitoring event at the same sampling location), EPA will use the highest of the reported values as the official result.

(8) *No reporting of previously collected data.* You cannot report previously collected data to meet the testing and reporting requirements for the contaminants listed in §141.40(a)(3). All analyses must be performed by laboratories approved by EPA to perform UCMR analyses using the analytical methods specified in Table 1 of §141.40(a)(3) and using samples collected according to §141.40(a)(4). Such requirements preclude the possibility of ''grandfathering'' previously collected data.

(d) *Reporting by small systems.* If you serve a population of 10,000 or fewer people, and you are notified that you have been selected for UCMR monitoring, your reporting requirements will be specified within the materials that EPA sends you, including a request for contact information, and a request for information associated with the sampling kit.

(1) *Contact and zip code information.* EPA will send you a notice requesting contact information for key individuals at your system, including name, affiliation, mailing address, phone number and email address. These individuals include your PWS Technical Contact and your PWS Official. You are required to provide this contact information within 90 days of receiving the notice from EPA as specified in paragraph (b)(1) of this section. If this contact information changes, you also must provide updates within 30 days of the change, as specified in paragraph (b)(1) of this section. In addition, as a one-time reporting requirement, you must report the U.S. Postal Service Zip Code(s) for all areas being served water by your PWS.

(2) *Reporting sampling information.* You must provide your sampling location(s) by December 31, 2017, using EPA's electronic data reporting system, as specified in paragraph (b)(1) of this section. If this information changes, you must report updates, including new sources and sampling locations that are put in use before or during the PWS' UCMR sampling period, to EPA's electronic data reporting system within 30 days of the change, as specified in paragraph (b)(1) of this section. You must record all data elements listed in Table 1 of paragraph (e) of this section on each sample form and sample bottle, as appropriate, provided to you by the UCMR Sampling Coordinator. You must send this information as specified in the instructions of your sampling kit, which will include the due date and return address. You must report any changes made in data elements 1 through 9 by emailing an explanation of the nature and purpose of the proposed change to EPA, as specified in paragraph (b)(1) of this section.

(e) *Data elements.* Table 1 defines the data elements that must be provided for UCMR monitoring.

TABLE 1—UNREGULATED CONTAMINANT MONITORING REPORTING REQUIREMENTS

Data element	Definition
1. Public Water System Identification (PWSID) Code.	The code used to identify each PWS. The code begins with the standard 2-character postal State abbreviation or Region code; the remaining 7 numbers are unique to each PWS in the State. The same identification code must be used to represent the PWS identification for all current and future UCMR monitoring.
2. Public Water System Name	Unique name, assigned once by the PWS.
3. Public Water System Facility Identification Code.	An identification code established by the State or, at the State's discretion, by the PWS, following the format of a 5-digit number unique within each PWS for each applicable facility (*i.e.,* for each source of water, treatment plant, distribution system, or any other facility associated with water treatment or delivery). The same identification code must be used to represent the facility for all current and future UCMR monitoring.
4. Public Water System Facility Name.	Unique name, assigned once by the PWS, for every facility ID (e.g., Treatment Plant).
5. Public Water System Facility Type.	That code that identifies that type of facility as either: CC = consecutive connection. DS = distribution system. IN = source water influent. SS = sampling station. TP = treatment plant. OT = other.
6. Water Source Type	The type of source water that supplies a water system facility. Systems must report one of the following codes for each sampling location: SW = surface water (to be reported for water facilities that are served entirely by a surface water source during the twelve-month period). GW = ground water (to be reported for water facilities that are served entirely by a ground water source during the twelve-month period). GU = ground water under the direct influence of surface water (to be reported for water facilities that are served all or in part by ground water under the direct influence of surface water at any time during the twelve-month sampling period), and are not served at all by surface water during this period. MX = mixed water (to be reported for water facilities that are served by a mix of surface water, ground water and/or ground water under the direct influence of surface water during the twelve-month period).
7. Sampling Point Identification Code.	An identification code established by the State, or at the State's discretion, by the PWS, that uniquely identifies each sampling point. Each sampling code must be unique within each applicable facility, for each applicable sampling location (*i.e.,* entry point to the distribution system, source water influent or distribution system sample at maximum residence time). The same identification code must be used to represent the sampling location for all current and future UCMR monitoring.
8. Sampling Point Name	Unique sample point name, assigned once by the PWS, for every sample point ID (e.g., Entry Point).
9. Sampling Point Type Code	A code that identifies the location of the sampling point as either: SR = source water taken from plant influent; untreated water entering the water treatment plant (*i.e.,* a location prior to any treatment). EP = entry point to the distribution system. DS = distribution system sample.
10. Disinfectant Type	All of the disinfectants/oxidants that have been added prior to the entry point to the distribution system. Please select all that apply: PEMB = Permanganate. HPXB = Hydrogen peroxide. CLGA = Gaseous chlorine. CLOF = Offsite Generated Hypochlorite (stored as a liquid form). CLON = Onsite Generated Hypochlorite. CAGC = Chloramine (formed with gaseous chlorine). CAOF = Chloramine (formed with offsite hypochlorite). CAON = Chloramine (formed with onsite hypochlorite). CLDB = Chlorine dioxide. OZON = Ozone. ULVL = Ultraviolet light. OTHD = All other types of disinfectant/oxidant. NODU = No disinfectant/oxidant used.
11. Treatment Information	Treatment information associated with the sample point. Please select all that apply: CON = Conventional (non-softening, consisting of at least coagulation/sedimentation basins and filtration). SFN = Softening. RBF = River bank filtration. PSD = Pre-sedimentation. INF = In-line filtration. DFL = Direct filtration. SSF = Slow sand filtration. BIO = Biological filtration (operated with an intention of maintaining biological activity within filter). UTR = Unfiltered treatment for surface water source.

Table 1—Unregulated Contaminant Monitoring Reporting Requirements—Continued

Data element	Definition
	GWD = Groundwater system with disinfection only. PAC = Application of powder activated carbon. GAC = Granular activated carbon adsorption (not part of filters in CON, SCO, INF, DFL, or SSF). AIR = Air stripping (packed towers, diffused gas contactors). POB = Pre-oxidation with chlorine (applied before coagulation for CON or SFN plants or before filtration for other filtration plants). MFL = Membrane filtration. IEX = Ionic exchange. DAF = Dissolved air floatation. CWL = Clear well/finished water storage without aeration. CWA = Clear well/finished water storage with aeration. ADS = Aeration in distribution system (localized treatment). OTH = All other types of treatment. NTU = No treatment used. DKN = Do not know.
12. Disinfectant Residual Type	Disinfectant residual type in the distribution system for each HAA sample. CL2 = Chlorine (*i.e.,* originating from addition of free chlorine only). CLO2 = chlorine dioxide. CLM = Chloramines (originating from with addition of chlorine and ammonia or pre-formed chloramines). CAC = Chlorine and chloramines (if being mixed from chlorinated and chloroaminated water). NOD = No disinfectant residual.
13. Sample Collection Date	The date the sample is collected, reported as 4-digit year, 2-digit month, and 2-digit day (YYYY/MM/DD).
14. Sample Identification Code	An alphanumeric value up to 30 characters assigned by the laboratory to uniquely identify containers, or groups of containers, containing water samples collected at the same sampling location for the same sampling date.
15. Contaminant	The unregulated contaminant for which the sample is being analyzed.
16. Analytical Method Code	The identification code of the analytical method used.
17. Extraction Batch Identification Code.	Laboratory assigned extraction batch ID. Must be unique for each extraction batch within the laboratory for each method. For CCC samples report the Analysis Batch Identification Code as the value for this field. For methods without an extraction batch, leave this field null.
18. Extraction Date	Date for the start of the extraction batch (YYYY/MM/DD). For methods without an extraction batch, leave this field null.
19. Analysis Batch Identification Code.	Laboratory assigned analysis batch ID. Must be unique for each analysis batch within the laboratory for each method.
20. Analysis Date	Date for the start of the analysis batch (YYYY/MM/DD).
21. Sample Analysis Type	The type of sample collected and/or prepared, as well as the fortification level. Permitted values include: CF = concentration fortified; the concentration of a known contaminant added to a field sample reported with sample analysis types LFSM, LFSMD, LFB, CCC and QCS. CCC = continuing calibration check; a calibration standard containing the contaminant, the internal standard, and surrogate analyzed to verify the existing calibration for those contaminants. FS = field sample; sample collected and submitted for analysis under this rule. IS = internal standard; a standard that measures the relative response of contaminants. LFB = laboratory fortified blank; an aliquot of reagent water fortified with known quantities of the contaminants and all preservation compounds. LRB = laboratory reagent blank; an aliquot of reagent water treated exactly as a field sample, including the addition of preservatives, internal standards, and surrogates to determine if interferences are present in the laboratory, reagents, or other equipment. LFSM = laboratory fortified sample matrix; a UCMR field sample with a known amount of the contaminant of interest and all preservation compounds added. LFSMD = laboratory fortified sample matrix duplicate; duplicate of the laboratory fortified sample matrix. QCS = quality control sample; a sample prepared with a source external to the one used for initial calibration and CCC. The QCS is used to check calibration standard integrity. QHS = quality HAA sample; HAA sample collected and submitted for quality control purposes. SUR = surrogate standard; a standard that assesses method performance for each extraction.
22. Analytical Results—Sign	A value indicating whether the sample analysis result was: (<) "less than" means the contaminant was not detected, or was detected at a level below the Minimum Reporting Level. (=) "equal to" means the contaminant was detected at the level reported in "Analytical Result— Measured Value."
23. Analytical Result—Measured Value.	The actual numeric value of the analytical results for: Field samples; laboratory fortified matrix samples; laboratory fortified sample matrix duplicates; and concentration fortified.
24. Additional Value	Represents the true value or the fortified concentration for spiked samples for QC Sample Analysis Types (CCC, EQC, LFB, LFSM and LFSMD). For Sample Analysis Type FS and LRB and for IS and surrogate QC Contaminants, leave this field null.

TABLE 1—UNREGULATED CONTAMINANT MONITORING REPORTING REQUIREMENTS—Continued

Data element	Definition
25. Laboratory Identification Code.	The code, assigned by EPA, used to identify each laboratory. The code begins with the standard two-character State postal abbreviation; the remaining five numbers are unique to each laboratory in the State.
26. Sample Event Code	A code assigned by the PWS for each sample event. This will associate samples with the PWS monitoring plan to allow EPA to track compliance and completeness. Systems must assign the following codes: SEC1, SEC2, SEC3, SEC4, SEC5, SEC6, SEC7 and SEC8—represent samples collected to meet UCMR Assessment Monitoring requirements for cyanotoxins; where "SEC1" represents the first sampling period, "SEC2" the second period and so forth, for all eight sampling events. SEA1, SEA2, SEA3 and SEA4—represent samples collected to meet UCMR Assessment Monitoring requirements for the additional contaminants; where "SEA1" and "SEA2" represent the first and second sampling period for all water types; and "SEA3" and "SEA4" represent the third and fourth sampling period for SW and GU sources only.
27. Bloom Occurrence	A yes or no answer provided by the PWS for each cyanotoxin sample event. *Question:* Preceding the finished water sample collection, did you observe an algal bloom in your source waters near the intake? YES = if yes, select all the YESs that apply: YD = yes, on the day the UCMR cyanotoxin sample was collected. YW = yes, between the day the sample was taken and the past week. YM = yes, between the past week and past month. YY = yes, between the past month and past year. YP = yes, prior to the past year. NO = have never seen a bloom.
28. Cyanotoxin Occurrence	A yes or no answer provided by the PWS for each cyanotoxin sample event. *Question:* Preceding the finished water sample collection, were cyanotoxins ever detected in your source waters near the intake and prior to any treatment (based on sampling by you or another party)? YES = if yes, select all the YESs that apply: YD = yes, on the day the UCMR cyanotoxin sample was collected. YW = yes, between the day the sample was taken and the past week. YM = yes, between the past week and past month. YY = yes, between the past month and past year. YP = yes, prior to the past year. NO = have never detected cyanotoxins in source water. NS = unaware of any source water cyanotoxin sampling. Select all that apply (*i.e.,* all that were detected) if you answered YES to detecting cyanotoxins in source water: MIC = Microcystins. CYL = Cylindrospermopsin. ANA = Anatoxin-A. SAX = Saxitoxins. OTH = Other. DK = do not know.
29. Indicator of Possible Bloom—Treatment.	A yes or no answer provided by the PWS for each cyanotoxin sample event. *Question:* Preceding the finished water sample collection, did you notice any changes in your treatment system operation and/or treated water quality that may indicate a bloom in the source water? YES = if yes, select all that apply: DFR = Decrease in filter runtimes. ITF = Increase in turbidity in filtered water. ICD = Need for increased coagulant dose. TOI = Increase in taste and odor issues in finished water. IOD = Need for increase in oxidant/disinfectant dose. IDB = Increase in TTHM/HAA5 in finished water. OTH = Describe other changes. NO = no changes.
30. Indicator of Possible Bloom—Source Water Quality Parameters.	A yes or no answer provided by the PWS for each cyanotoxin sample event. *Question:* Preceding the finished water sample collection, did you observe any notable changes in source water quality parameters (if measured)? YES = if yes, select all that apply to the source water: ITP = Increase in water temperature. ITU = Increase in turbidity. IAL = Increase in alkalinity. ITO = Increase in total organic carbon. ICD = Increase in chlorine demand. IPH = Increase in pH. ICA = Increase in chlorophyll a. IPY = Increase in phycocyanin. INU = Increase in nutrients (example: nitrogen or phosphorus). OTH = Describe other changes. NO = no changes observed.

[72 FR 389, Jan. 4, 2007, as amended at 77 FR 26096, May 2, 2012; 81 FR 92684, Dec. 20, 2016]

Subpart E—Special Regulations, Including Monitoring Regulations and Prohibition on Lead Use

§ 141.40 Monitoring requirements for unregulated contaminants.

(a) *General applicability.* This section specifies the monitoring and quality control requirements that must be followed if you own or operate a public water system (PWS) that is subject to the Unregulated Contaminant Monitoring Regulation (UCMR), as specified in paragraphs (a)(1) and (2) of this section. In addition, this section specifies the UCMR requirements for State and Tribal participation. For the purposes of this section, PWS ''population served,'' ''State,'' '' PWS Official,'' ''PWS Technical Contact,'' and ''finished water'' apply as defined in § 141.35(a). The determination of whether a PWS is required to monitor under this rule is based on the type of system (e.g., community water system, non-transient non-community water system, etc.), and its retail population, as indicated by SDWIS/Fed on December 31, 2015.

(1) *Applicability to transient non-community systems.* If you own or operate a transient non-community water system, you are not subject to monitoring requirements in this section.

(2) *Applicability to community water systems and non-transient non-community water systems*—(i) *Large systems.* If you own or operate a retail PWS (other than a transient non-community system) that serves more than 10,000 people, you must monitor according to the specifications in this paragraph (a)(2)(i). If you believe that your applicability status is different than EPA has specified in the notification letter that you received, or if you are subject to UCMR requirements and you have not been notified by either EPA or your State, you must report to EPA, as specified in § 141.35(b)(2) or (c)(4).

(A) *Assessment monitoring.* You must monitor for the contaminants on List 1, per Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. If you serve a retail population of more than 10,000 people, you are required to perform this monitoring regardless of whether you have been notified by the State or EPA.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 (Screening Survey) of Table 1, as specified in paragraph (a)(3) of this section, if your system serves 10,001 to 100,000 people and you are notified by EPA or your State that you are part of the State Monitoring Plan for Screening Survey testing. If your system serves more than 100,000 people, you are required to conduct this Screening Survey testing regardless of whether you have been notified by the State or EPA.

(C) *Pre-Screen Testing.* You must monitor for the unregulated contaminants on List 3 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the Pre-Screen Testing.

(ii) *Small systems.* Small PWSs, as defined in this paragraph, will not be selected to monitor for any more than one of the three monitoring lists provided in Table 1, UCMR Contaminant List, in paragraph (a)(3) of this section. EPA will provide sample containers, provide pre-paid air bills for shipping the sampling materials, conduct the laboratory analysis, and report and review monitoring results for all small systems selected to conduct monitoring under paragraphs (a)(2)(ii)(A) through (C) of this section. If you own or operate a PWS that serves 10,000 or fewer people you must monitor as follows:

(A) *Assessment monitoring.* You must monitor for the contaminants on List 1 per Table 1, in paragraph (a)(3) of this section, if you are notified by your State or EPA that you are part of the State Monitoring Plan for Assessment Monitoring.

(B) *Screening Survey.* You must monitor for the unregulated contaminants on List 2 of Table 1, in paragraph (a)(3) of this section, if notified by your State or EPA that you are part of the State Monitoring Plan for the Screening Survey.

(C) *Pre-screen testing*. You must monitor for the contaminants on List 3 of Table 1, in paragraph (a)(3) of this section if you are notified by your State or EPA that you are part of the State Monitoring Plan for Pre-Screen Testing.

(3) *Analytes to be monitored*. Lists 1, 2, and 3 contaminants are provided in the following table:

TABLE 1—UCMR CONTAMINANT LIST

1—Contaminant	2—CAS Registry No.	3—Analytical methods[a]	4—Minimum reporting level[b]	5—Sampling location[c]	6—Period during which monitoring to be completed
List 1: Assessment Monitoring Cyanotoxin Chemical Contaminants					
"total microcystin"	N/A	EPA 546	0.3 µg/L	EPTDS	3/1/2018–11/30/2020.
anatoxin-a	64285–06–9.	EPA 545	0.03 µg/L	EPTDS	3/1/2018–11/30/2020.
cylindrospermopsin	143545–90–8.	EPA 545	0.09 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LA	96180–79–9.	EPA 544	0.008 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LF	154037–70–4.	EPA 544	0.006 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LR	101043–37–2.	EPA 544	0.02 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-LY	123304–10–9.	EPA 544	0.009 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-RR	111755–37–4.	EPA 544	0.006 µg/L	EPTDS	3/1/2018–11/30/2020.
microcystin-YR	101064–48–6.	EPA 544	0.02 µg/L	EPTDS	3/1/2018–11/30/2020.
nodularin	118399–22–7.	EPA 544	0.005 µg/L	EPTDS	3/1/2018–11/30/2020.
List 1: Assessment Monitoring Additional Chemical Contaminants					
Metals					
germanium	7440–56–4	EPA 200.8, ASTM D5673–10, SM 3125.	0.3 µg/L	EPTDS	1/1/2018–12/31/2020.
manganese	7439–96–5	EPA 200.8, ASTM D5673–10, SM 3125.	0.4 µg/L	EPTDS	1/1/2018–12/31/2020.
Pesticides and a Pesticide Manufacturing Byproduct					
alpha-hexachlorocyclohexane.	319–84–6	EPA 525.3	0.01 µg/L	EPTDS	1/1/2018–12/31/2020.
chlorpyrifos	2921–88–2	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
dimethipin	55290–64–7.	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018–12/31/2020.
ethoprop	13194–48–4.	EPA 525.3	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
oxyfluorfen	42874–03–3.	EPA 525.3	0.05 µg/L	EPTDS	1/1/2018–12/31/2020.
profenofos	41198–08–7.	EPA 525.3	0.3 µg/L	EPTDS	1/1/2018–12/31/2020.
tebuconazole	107534–96–3.	EPA 525.3	0.2 µg/L	EPTDS	1/1/2018–12/31/2020.
total permethrin (cis- & trans-).	52645–53–1.	EPA 525.3	0.04 µg/L	EPTDS	1/1/2018–12/31/2020.
tribufos	78–48–8	EPA 525.3	0.07 µg/L	EPTDS	1/1/2018–12/31/2020.
Brominated Haloacetic Acid (HAA) Groups[d e]					
HAA5	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.
HAA6Br	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.
HAA9	N/A	EPA 552.3 or EPA 557.	N/A	D/DBPR HAA location.	1/1/2018–12/31/2020.

TABLE 1—UCMR CONTAMINANT LIST—Continued

1—Contaminant	2—CAS Registry No.	3—Analytical methods [a]	4—Minimum reporting level [b]	5—Sampling location [c]	6—Period during which monitoring to be completed
Alcohols					
1-butanol	71–36–3	EPA 541	2.0 µg/L	EPTDS	1/1/2018–12/31/2020.
2-methoxyethanol	109–86–4	EPA 541	0.4 µg/L	EPTDS	1/1/2018–12/31/2020.
2-propen-1-ol	107–18–6	EPA 541	0.5 µg/L	EPTDS	1/1/2018–12/31/2020.
Other Semivolatile Chemicals					
butylated hydroxanisole.	25013–16–5.	EPA 530	0.03 µg/L	EPTDS	1/1/2018–12/31/2020.
o-toluidine	95–53–4	EPA 530	0.007 µg/L	EPTDS	1/1/2018–12/31/2020.
quinoline	91–22–5	EPA 530	0.02 µg/L	EPTDS	1/1/2018–12/31/2020.
List 2: Screening Survey					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.
List 3: Pre-Screen Testing					
Reserved	Reserved	Reserved	Reserved	Reserved	Reserved.

Column headings are:

1—Contaminant: The name of the contaminant to be analyzed.

2—CAS (Chemical Abstract Service) Registry Number or Identification Number: A unique number identifying the chemical contaminants.

3—Analytical Methods: Method numbers identifying the methods that must be used to test the contaminants.

4—Minimum Reporting Level (MRL): The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSs and laboratories of the new MRLs. N/A is defined as non-applicable.

5—Sampling Location: The locations within a PWS at which samples must be collected.

6—Period During Which Monitoring to be Completed: The time period during which the sampling and testing will occur for the indicated contaminant.

[a] The analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section.

[b] The MRL is the minimum concentration of each analyte that must be reported to EPA.

[c] With the exception of HAA monitoring, sampling must occur at entry points to the distribution system (EPTDSs), after treatment is applied, that represent each non-emergency water source in routine use over the 12-month period of monitoring. Systems that purchase water with multiple connections from the same wholesaler may select one representative connection from that wholesaler. This EPTDS sampling location must be representative of the highest annual volume connections. If the connection selected as the representative EPTDS is not available for sampling, an alternate highest volume representative connection must be sampled. See 40 CFR 141.35(c)(3) for an explanation of the requirements related to the use of representative GW EPTDSs. Sampling for UCMR 4 HAA groups must be conducted at the Disinfectants and Disinfection Byproduct Rule (D/DBPR) sampling locations (40 CFR 141.622).

[d] UCMR 4 HAA monitoring applies only to those PWSs that are subject to D/DBPR HAA5 monitoring requirements.

[e] PWSs that purchase 100 percent of their water (''consecutive systems'') are not required to collect UCMR 4 source water samples for TOC or bromide analyses. Sampling for TOC and bromide must otherwise occur at source water influent locations representing untreated water entering the water treatment plant (*i.e.,* a location prior to any treatment). SW and GWUDI systems subject to the D/DBPR TOC monitoring must use their D/DBPR TOC source water sampling site(s) from 40 CFR 141.132 for UCMR 4 TOC and bromide samples. SW and GWUDI systems that are not subject to D/DBPR TOC monitoring will use their Long Term 2 Enhance Surface Water Treatment Rule (LT2) source water sampling site(s) (40 CFR 141.703) for UCMR 4 TOC and bromide samples. Ground water systems that are subject to the D/DBPRs, and therefore subject to UCMR 4 HAA monitoring, will take TOC and bromide samples at their influents entering their treatment train. TOC and bromide must be collected at the same time as HAA samples. These indicator samples must be collected at a single source water influent using methods already approved for compliance monitoring. TOC methods include: SM 5310 B, SM 5310 C, SM 5310 D (21st edition), or SM 5310 B–00, SM 5310 C–00, SM 5310 D–00 (SM Online), EPA Method 415.3 (Rev. 1.1 or 1.2). Bromide methods include: EPA Methods 300.0 (Rev. 2.1), 300.1 (Rev. 1.0), 317.0 (Rev. 2.0), 326.0 (Rev. 1.0) or ASTM D 6581–12. The MRLs for the individual HAAs are discussed in paragraph (a)(5)(v) of this section.

(4) *Sampling requirements*—(i) *Large systems.* If you serve more than 10,000 people and meet the UCMR applicability criteria specified in paragraph (a)(2)(i) of this section, you must comply with the requirements specified in paragraphs (a)(4)(i)(A) through (I) of this section. Your samples must be collected according to the schedule that you are assigned by EPA or your State, or the schedule that you revised using EPA's electronic data reporting system on or before December 31, 2017. Your schedule must follow both the timing and frequency of monitoring specified in Tables 1 and 2 of this section.

(A) *Monitoring period.* You must collect the samples in one continuous 12-month period for List 1 Assessment Monitoring, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, during the time frame indicated in column 6 of Table 1, in paragraph (a)(3) of this section. EPA or your State will specify the month(s) and year(s) in which your monitoring must occur. As specified in § 141.35(c)(5), you must contact EPA if you believe you cannot conduct monitoring according to your schedule.

(B) *Frequency.* You must collect the samples within the timeframe and according to the frequency specified by contaminant type and water source type for each sampling location, as specified in Table 2, in this paragraph. For the second or subsequent round of sampling, if a sample location is non-operational for more than one month before and one month after the scheduled sampling month (*i.e.*, it is not possible for you to sample within the window specified in Table 2, in this paragraph), you must notify EPA as specified in § 141.35(c)(5) to reschedule your sampling.

TABLE 2—MONITORING FREQUENCY BY CONTAMINANT AND WATER SOURCE TYPES

Contaminant type	Water source type	Timeframe	Frequency[1]
List 1 Cyanotoxins Chemicals.	Surface water or Ground water under the direct influence of surface water (GWUDI).	March–November.	You must monitor twice a month for four consecutive months (total of eight sampling events). Sample events must occur two weeks apart.
List 1 Contaminants—Additional Chemicals.	Surface water or GWUDI	12 months	You must monitor for four consecutive quarters. Sample events must occur three months apart. (Example: If first monitoring is in January, the second monitoring must occur any time in April, the third any time in July and the fourth any time in October).
	Ground water	12 months	You must monitor twice in a consecutive 12-month period. Sample events must occur 5–7 months apart. (Example: If the first monitoring event is in April, the second monitoring event must occur any time in September, October or November).

[1] Systems must assign a sample event code for each contaminant listed in Table 1. Sample event codes must be assigned by the PWS for each sample event. For more information on sample event codes see § 141.35(e) Table 1.

(C) *Location.* You must collect samples for each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, as specified in Table 1, in paragraph (a)(3) of this section. Samples must be collected at each sample point that is specified in column 5 and footnote c of Table 1, in paragraph (a)(3) of this section. PWSs conducting List 1 monitoring for the brominated HAA groups must collect TOC and bromide samples as specified in footnote d of Table 1, in paragraph (a)(3) of this section. If you are a GW system with multiple EPTDSs, and you request and receive approval from EPA or the State for sampling at representative EPTDS(s), as specified in § 141.35(c)(3), you must collect your samples from the approved representative sampling location(s).

(D) *Sampling instructions.* For each List 1 Assessment Monitoring contaminant, and, if applicable, for each List 2 Screening Survey, or List 3 Pre-Screen Testing contaminant, you must follow the sampling procedure for the method specified in column 3 of Table 1, in paragraph (a)(3) of this section. In addition, you must not composite (that is, combine, mix, or blend) the samples; you must collect and preserve each sample separately.

(E) *Sample collection and shipping time.* If you must ship the samples for analysis, you must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature, unless you have made special arrangements with your laboratory to receive the samples.

(F) *Analytical methods.* For each contaminant, you must use the respective analytical methods for List 1, and, if applicable, for List 2, or List 3 that are specified in column 3 of Table 1, in paragraph (a)(3) of this section; report values at or above the minimum reporting levels for List 1, and, if applicable, for List 2 Screening Survey, or List 3 Pre-Screen Testing, that are specified in column 4 of Table 1, in paragraph (a)(3) of this section; and conduct the quality control procedures specified in paragraph (a)(5) of this section.

(G) *Laboratory errors or sampling deviations.* If the laboratory data do not meet the required QC criteria, as specified in paragraph (a)(5) of this section, or you do not follow the required sampling procedures, as specified in paragraphs (a)(4) of this section, you must resample within 30 days of being informed or becoming aware of these facts. This resampling is not for the purpose of confirming previous results, but to correct the sampling or laboratory error. All systems must report the results obtained from the first sampling for each sampling period, except for cases of sampling or laboratory errors. For the purposes of this rule, no samples are to be recollected for the purposes of confirming the results observed in a previous sampling.

(H) *Analysis.* For the List 1 contaminants, and, if applicable, List 2 Screening Survey, or List 3 Pre-Screen Testing contaminants, identified in Table 1, paragraph (a)(3) of this section, you must arrange for testing by a laboratory that has been approved by EPA according to requirements in paragraph (a)(5)(ii) of this section.

(I) *Review and reporting of results.* After you have received the laboratory results, you must review, approve, and submit the system information, and sample collection data and test results. You must report the results as provided in §141.35(c)(6).

(ii) *Small systems.* If you serve 10,000 or fewer people and are notified that you are part of the State Monitoring Plan for Assessment Monitoring, Screening Survey or Pre-Screen monitoring, you must comply with the requirements specified in paragraphs (a)(4)(ii)(A) through (H) of this section. If EPA or the State informs you that they will be collecting your UCMR samples, you must assist them in identifying the appropriate sampling locations and in collecting the samples.

(A) *Monitoring period and frequency.* You must collect samples at the times specified for you by the State or EPA. Your schedule must follow both the timing of monitoring specified in Table 1, List 1, and, if applicable, List 2, or List 3, and the frequency of monitoring in Table 2 of this section.

(B) *Location.* You must collect samples at the locations specified for you by the State or EPA.

(C) *Sample kits.* You must store and maintain the sample collection kits sent to you by the UCMR Sampling Coordinator in accordance with the kit's instructions. The sample kit will include all necessary containers, packing materials and cold packs, instructions for collecting the sample and sample treatment (such as dechlorination or preservation), report forms for each sample, contact name and telephone number for the laboratory, and a prepaid return shipping docket and return address label. If any of the materials listed in the kit's instructions are not included in the kit or arrive damaged, you must notify the UCMR Sampling Coordinator who sent you the sample collection kits.

(D) *Sampling instructions.* You must comply with the instructions sent to you by the State or EPA concerning the use of containers, collection (how to fill the sample bottle), dechlorination and/or preservation, and sealing and preparation of sample and shipping containers for shipment. You must not composite (that is, combine, mix, or blend) the samples. You also must collect, preserve, and test each sample separately. You must also comply with the instructions sent to you by the UCMR Sampling Coordinator concerning the handling of sample containers for specific contaminants.

(E) *Sampling deviations.* If you do not collect a sample according to the instructions provided to you for a listed contaminant, you must report the deviation within 7 days of the scheduled monitoring on the sample reporting form, as specified in §141.35(d)(2). You must resample following instructions that you will be sent from the UCMR Sampling Coordinator or State. A copy of the form must be sent to the laboratory with the recollected samples, and to the UCMR Sampling Coordinator.

(F) [Reserved]

(G) *Sampling forms.* You must completely fill out each of the sampling forms and bottles sent to you by the

UCMR Sampling Coordinator, including data elements listed in §141.35(e) for each sample, as specified in §141.35(d)(2). You must sign and date the sampling forms.

(H) *Sample collection and shipping.* You must collect the samples early enough in the day to allow adequate time to send the samples for overnight delivery to the laboratory. You should not collect samples on Friday, Saturday, or Sunday because sampling on these days may not allow samples to be shipped and received at the laboratory at the required temperature unless you have made special arrangements with EPA for the laboratory to receive the samples. Once you have collected the samples and completely filled in the sampling forms, you must send the samples and the sampling forms to the laboratory designated on the air bill.

(iii) *Phased sample analysis for microcystins.* You must collect the three required samples (one each for EPA Methods 544, 545 and 546 (ELISA) at the EPTDS) for each sampling event, but not all samples may need to be analyzed. If the Method 546 ELISA result is less than 0.3 μg/L, report that result and do not analyze the EPA Method 544 sample for that sample event. If the Method 546 ELISA result is greater than or equal to 0.3 μg/L, report the value and analyze the other microcystin sample using EPA Method 544. You must analyze the EPA Method 545 sample for each sample event for Cylindrospermopsin and anatoxin-a only.

(5) *Quality control requirements.* If your system serves more than 10,000 people, you must ensure that the quality control requirements listed below are met during your sampling procedures and by the laboratory conducting your analyses. You must also ensure that all method quality control procedures and all UCMR quality control procedures are followed.

(i) *Sample collection/preservation.* You must follow the sample collection and preservation requirements for the specified method for each of the contaminants in Table 1, in paragraph (a)(3) of this section. These requirements specify sample containers, collection, dechlorination, preservation, storage, sample holding time, and extract storage and/or holding time that you must assure that the laboratory follow.

(ii) *Laboratory approval for Lists 1, List 2 and List 3.* To be approved to conduct UCMR testing, the laboratory must be certified under §141.28 for one or more compliance analyses; demonstrate for each analytical method it plans to use for UCMR testing that it can meet the Initial Demonstration of Capability (IDC) requirements detailed in the analytical methods specified in column 3 of Table 1, in paragraph (a)(3) of this section; and successfully participate in the UCMR Proficiency Testing (PT) Program administered by EPA for each analytical method it plans to use for UCMR testing. UCMR laboratory approval decisions will be granted on an individual method basis for the methods listed in column 3 of Table 1 in paragraph (a)(3) of this section for List 1, List 2, and List 3 contaminants. Laboratory approval is contingent upon the capability of the laboratory to post monitoring data to the EPA electronic data reporting system. To participate in the UCMR Laboratory Approval Program, the laboratory must complete and submit the necessary registration forms by February 21, 2017, and necessary application material April 19, 2017. Correspondence must be addressed to: UCMR Laboratory Approval Coordinator, USEPA, Technical Support Center, 26 West Martin Luther King Drive, (MS 140), Cincinnati, OH 45268; or emailed to EPA at: *UCMR_Sampling_Coordinator@epa.gov.*

(iii) *Minimum Reporting Level.* The MRL is an estimate of the quantitation limit. Assuming good instrumentation and experienced analysts, an MRL is achievable, with 95% confidence, by 75% of laboratories nationwide.

(A) Validation of laboratory performance. Your laboratory must be capable of quantifying each contaminant listed in Table 1, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section. You must ensure that the laboratory completes and has on file and available for your inspection, records of two distinct procedures. First, your laboratory must have conducted an IDC involving replicate analyses at or below the MRL as described in this paragraph. Second, for each day that UCMR analyses are conducted by your laboratory, a validation of its ability to quantify each contaminant, at or below the MRL specified in column 4 of Table 1, in paragraph (a)(3) of this section, following the procedure listed in paragraph (a)(5)(iii)(B) of this section, must be performed. The procedure for initial validation of laboratory performance at or below the MRL is as follows:

(*1*) All laboratories performing analysis under UCMR must demonstrate that they are capable of meeting data quality objectives at or below the MRL listed in Table 1, column 4, in paragraph (a)(3) of this section.

(*2*) The MRL, or any concentration below the MRL, at which performance is being evaluated, must be contained within the range of calibration. The calibration curve regression model and the range of calibration levels that are used in these performance validation steps must be used in all routine sample analyses used to comply with this regulation. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(*3*) Replicate analyses of at least seven (7) fortified samples in reagent water must be performed at or below the MRL for each analyte, and must be processed through the entire method procedure (*i.e.*, including extraction, where applicable, and with all preservatives).

(*4*) A prediction interval of results (PIR), which is based on the estimated arithmetic mean of analytical results and the estimated sample standard deviation of measurement results, must be determined by Equation 1:

$$\text{Equation 1} \qquad \text{PIR} = \text{Mean} \pm s \times t_{(df,\ 1-\alpha/2)} \times \sqrt{1+\frac{1}{n}}$$

Where:

t is the Student's t value with df degrees of freedom and confidence level $(1–\alpha)$,

s is the sample standard deviation of n replicate samples fortified at the MRL,

n is the number of replicates.

(*5*) The values needed to calculate the PIR using Equation 1 are: Number of replicates (n); Student's t value with a two-sided 99% confidence level for n number of replicates; the average (mean) of at least seven replicates; and the sample standard deviation. Factor 1 is referred to as the Half Range PIR (HR_{PIR}).

$$HR_{PIR} = s \times t_{(df,\ 1-\alpha/2)} \times \sqrt{1+\frac{1}{n}}$$

For a certain number of replicates and for a certain confidence level in Student's t, this factor

$$C = t_{(df,\ 1-\alpha/2)} \times \sqrt{1+\frac{1}{n}}$$

is constant, and can be tabulated according to replicate number and confidence level for the Student's t. Table 3 in this paragraph lists the constant factor (C) for replicate sample numbers 7 through 10 with a confidence level of 99% for Student's t.

(*6*) The HRPIR is calculated by Equation 2:

$$\text{Equation 2} \qquad HR_{PIR} = s \times C$$

(*7*) The PIR is calculated by Equation 3:

$$\text{Equation 3} \qquad \text{PIR} = \text{Mean} \pm HR_{PIR}$$

TABLE 3—THE CONSTANT FACTOR (C) TO BE MULTIPLIED BY THE STANDARD DEVIATION TO DETERMINE THE HALF RANGE INTERVAL OF THE PIR (STUDENT'S t 99% CONFIDENCE LEVEL) [A]

Replicates	Degrees of freedom	Constant factor (C) to be multiplied by the standard deviation
7	6	3.963
8	7	3.711
9	8	3.536
10	9	3.409

[a] The critical *t*-value for a two-sided 99% confidence interval is equivalent to the critical *t*-value for a one-sided 99.5% confidence interval, due to the symmetry of the *t*-distribution. PIR = Prediction Interval of Results.

(*8*) The lower and upper result limits of the PIR must be converted to percent recovery of the concentration being tested. To pass criteria at a certain level, the PIR lower recovery limits cannot be lower than the lower recovery limits of the QC interval (50%), and the PIR upper recovery limits cannot be greater than the upper recovery limits of the QC interval (150%). When either of the PIR recovery limits falls outside of either bound of the QC interval of recovery (higher than 150% or less than 50%), laboratory performance is not validated at the concentration evaluated. If the PIR limits are contained within both bounds of the QC interval, laboratory performance is validated for that analyte.

(B) Quality control requirements for validation of laboratory performance at or below the MRL.

(*1*) You must ensure that the calibration curve regression model and that the range of calibration levels that are used in these performance validation steps are used in future routine sample analysis. Only straight line or quadratic regression models are allowed. The use of either weighted or unweighted models is permitted. The use of cubic regression models is not permitted.

(*2*) You must ensure, once your laboratory has performed an IDC as specified in each analytical method (demonstrating that DQOs are met at or below an MRL), that a daily performance check is performed for each analyte and method. A single laboratory blank, fortified at or below the MRL for each analyte, must be processed through the entire method procedure. The measured concentration for each analyte must be converted to a percent recovery, and if the recovery is within 50%–150% (inclusive), the daily performance of the laboratory has been validated. The results for any analyte for which 50%–150% recovery cannot be demonstrated during the daily check are not valid. Laboratories may elect to re-run the daily performance check sample if the performance for any analyte or analytes cannot be validated. If performance is validated for these analytes, the laboratory performance is considered validated. Alternatively, the laboratory may re-calibrate and repeat the performance validation process for all analytes.

(iv) *Laboratory fortified sample matrix and laboratory fortified sample matrix duplicate*. You must ensure that your laboratory prepares and analyzes the Laboratory Fortified Sample Matrix (LFSM) sample for accuracy and Laboratory Fortified Sample Matrix Duplicate (LFSMD) samples for precision to determine method accuracy and precision for all contaminants in Table 1, in paragraph (a)(3) of this section. LFSM/LFSMD samples must be prepared using a sample collected and analyzed in accordance with UCMR requirements and analyzed at a frequency of 5% (or 1 LFSM/LFSMD set per every 20 samples) or with each sample batch, whichever is more frequent. In addition, the LFSM/LFSMD fortification concentrations must be alternated between a low-level fortification and mid-level fortification approximately 50% of the time. (For example: A set of 40 samples will require preparation and analysis of 2 LFSM/LFSMD paired samples. The first LFSM/LFSMD paired sample set must be fortified at either the low-level or mid-level, and the second LFSM/LFSMD paired sample set must be fortified with the other standard, either the low-level or mid-level, whichever was not used for the initial LFSM/LFSMD paired sample set.) The low-level LFSM/LFSMD fortification concentration must be within ±50% of the MRL for each contaminant (e.g., for an MRL of 1 μg/L the acceptable fortification levels must be between 0.5 μg/L and 1.5 μg/L). The mid-level LFSM/LFSMD fortification concentration must be within ±20% of the mid-level calibration standard for each contaminant, and is to represent, where possible and where the laboratory has data from previously analyzed samples, an approximate average concentration observed in previous analyses of that analyte. There are no UCMR contaminant recovery acceptance criteria specified for LFSM/LFSMD analyses. All LFSM/LFSMD data are to be reported.

(v) *Method defined quality control.* You must ensure that your laboratory analyzes Laboratory Fortified Blanks and conducts Laboratory Performance Checks, as appropriate to the method's requirements, for those methods listed in Table 1, column 3, in paragraph (a)(3) of this section. Each method specifies acceptance criteria for these QC checks. The following HAA results must be reported using EPA's electronic data reporting system for quality control purposes.

TABLE 4—HAA QC RESULTS

1—Contaminant	2—CAS Registry No.	3—Analytical methods [a]	4—Minimum reporting level [b]	5—HAA6Br Group	6—HAA9 Group	7—HAA5 Group
Brominated Haloacetic Acid (HAA) Groups						
Bromochloroacetic acid (BCAA)	5589–96–8	EPA 552.3 or EPA 557	0.3 µg/L.	HAA6Br	HAA9	
Bromodichloroacetic acid (BDCAA).	71133–14–7	EPA 552.3 or EPA 557	0.5 µg/L.			
Chlorodibromoacetic acid (CDBAA).	5278–95–5	EPA 552.3 or EPA 557	0.3 µg/L			
Tribromoacetic acid (TBAA)	75–96–7	EPA 552.3 or EPA 557	2.0 µg/L.			
Monobromoacetic acid (MBAA)	79–08–3	EPA 552.3 or EPA 557	0.3 µg/L.			HAA5
Dibromoacetic acid (DBAA)	631–64–1	EPA 552.3 or EPA 557	0.3 µg/L			
Dichloroacetic acid (DCAA)	79–43–6	EPA 552.3 or EPA 557	0.2 µg/L.			
Monochloroacetic acid (MCAA)	79–11–8	EPA 552.3 or EPA 557	2.0 µg/L			
Trichloroacetic acid (TCAA)	76–03–9	EPA 552.3 or EPA 557	0.5 µg/L.			

Column headings are:

1—Contaminant: The name of the contaminant to be analyzed.

2—CAS (Chemical Abstract Service) Registry Number or Identification Number: A unique number identifying the chemical contaminants.

3—Analytical Methods: Method numbers identifying the methods that must be used to test the contaminants.

4—Minimum Reporting Level (MRL): The value and unit of measure at or above which the concentration of the contaminant must be measured using the approved analytical methods. If EPA determines, after the first six months of monitoring that the specified MRLs result in excessive resampling, EPA will establish alternate MRLs and will notify affected PWSs and laboratories of the new MRLs.

5–7—HAA groups identified in paragraph (a)(3) of this section to be monitored as UCMR contaminants.

[a] The analytical procedures shall be performed in accordance with the documents associated with each method, see paragraph (c) of this section, and must meet all quality control requirements outlined paragraph (a)(5) of this section.

[b] The MRL is the minimum concentration of each analyte that must be reported to EPA.

(vi) *Reporting.* You must require your laboratory to submit these data electronically to the State and EPA using EPA's electronic data reporting system, accessible at *https://www.epa.gov/dwucmr*, within 120 days from the sample collection date. You then have 60 days from when the laboratory posts the data to review, approve and submit the data to the State and EPA, via EPA's electronic data reporting system. If you do not electronically approve and submit the laboratory data to EPA within 60 days of the laboratory posting data to EPA's electronic reporting system, the data will be considered approved and available for State and EPA review.

(6) *Violation of this rule*—(i) *Monitoring violations.* Any failure to monitor in accordance with § 141.40(a)(3)–(5) is a monitoring violation.

(ii) *Reporting violations.* Any failure to report in accordance with § 141.35 is a reporting violation.

(b) *Petitions and waivers by States*—(1) *Governors' petition for additional contaminants.* The Safe Drinking Water Act allows Governors of seven (7) or more States to petition the EPA Administrator to add one or more contaminants to the UCMR Contaminant List in paragraph (a)(3) of this section. The petition must clearly identify the reason(s) for adding the contaminant(s) to the monitoring list, including the potential risk to public health, particularly any information that might be available regarding disproportional risks to the health and safety of children, the expected occurrence documented by any available data, any analytical methods known or proposed to be used to test for the contaminant(s), and any other information that could assist the Administrator in determining which contaminants present the greatest public health concern and should, therefore, be included on the UCMR Contaminant List in paragraph (a)(3) of this section.

(2) *State-wide waivers.* A State can waive monitoring requirements only with EPA approval and under very limited conditions. Conditions and procedures for obtaining a waiver are as follows:

(i) *Application.* A State may apply to EPA for a State-wide waiver from the unregulated contaminant monitoring requirements for PWSs serving more than 10,000 people. To apply for such a waiver, the State must submit an application to EPA that includes the following information: The list of contaminants on the UCMR Contaminant List for which a waiver is requested, along with documentation for each contaminant in the request demonstrating that the contaminants or their parent compounds do not occur naturally in the State, and certifying that during the past 15 years they have not been used, applied, stored, disposed of, released, or detected in the source waters or distribution systems in the State.

(ii) *Approval.* EPA will review State applications and notify the State whether it accepts or rejects the request. The State must receive written approval from EPA before issuing a State-wide waiver.

(c) *Incorporation by reference.* These standards are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. All approved material is available for inspection either electronically at *http://www.regulations.gov*, in hard copy at the Water Docket, EPA/DC, and from the sources as follows. The Public Reading Room (EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC) is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for this Public Reading Room is (202) 566–1744, and the telephone number for the Water Docket is (202) 566–2426. The material is also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call (202) 741–6030 or go to *http://www.archives.gov/federal-register/cfr/about.html.*

(1) U.S. Environmental Protection Agency, Water Docket, EPA/DC, EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC 20004.

(i) Method 200.8 ''Determination of Trace Elements in Waters and Wastes by Inductively Coupled Plasma—Mass Spectrometry,'' Revision 5.4, EMMC

Version, 1994. Available on the Internet at *https://www.nemi.gov*.

(ii) Method 300.0 ''Determination of Inorganic Anions by Ion Chromatography Samples,'' Revision 2.1, August 1993. Available on the Internet at *https://www.nemi.gov*.

(iii) Method 300.1 ''Determination of Inorganic Anions in Drinking Water by Ion Chromatography,'' Revision 1.0, 1997. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(iv) Method 317.0 ''Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis,'' Revision 2.0, July 2001, EPA 815–B–01–001. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(v) Method 326.0 ''Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis,'' Revision 1.0, June 2002, EPA 815–R–03–007. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(vi) Method 415.3 ''Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,'' Revision 1.1, February 2005, EPA/600/R–05/055. Available on the Internet at *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(vii) Method 415.3 ''Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,'' Revision 1.2, September 2009, EPA/600/R–09/122. Available on the Internet at *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(viii) Method 525.3 ''Determination of Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Capillary Column Gas Chromatography/Mass Spectrometry (GC/MS),'' Version 1.0, February 2012, EPA/600/R–12/010. Available on the Internet *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(ix) Method 530 ''Determination of Select Semivolatile Organic Chemicals in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry (GC/MS),'' Version 1.0, January 2015, EPA/600/R–14/442. Available on the Internet at *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(x) EPA Method 541: ''Determination of 1-Butanol, 1,4-Dioxane, 2-Methoxyethanol and 2-Propen-1-ol in Drinking Water by Solid Phase Extraction and Gas Chromatography/Mass Spectrometry,'' November 2015, EPA 815–R–15–011. Available on the Internet at *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(xi) Method 544 ''Determination of Microcystins and Nodularin in Drinking Water by Solid Phase Extraction and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS),'' Version 1.0, February 2015, EPA 600–R–14/474. Available on the Internet at *https://www.epa.gov/water-research/epa-drinking-water-research-methods*.

(xii) EPA Method 545: ''Determination of Cylindrospermopsin and Anatoxin-a in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI–MS/MS),'' April 2015, EPA 815–R–15–009. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(xiii) EPA Method 546: ''Determination of Total Microcystins and Nodularins in Drinking Water and Ambient Water by Adda Enzyme-Linked Immunosorbent Assay,'' August 2016, EPA–815–B–16–011. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(xiv) Method 552.3 ''Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-Liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection,'' Revision 1.0, July 2003, EPA 815–B–03–002. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods*.

(xv) EPA Method 557: ''Determination of Haloacetic Acids, Bromate, and Dalapon in Drinking Water by Ion Chromatography Electrospray Ionization Tandem Mass Spectrometry (IC–ESI–MS/MS),'' Version 1.0, September 2009, EPA 815–B–09–012. Available on the Internet at *https://www.epa.gov/dwanalyticalmethods.*

(2) American Public Health Association—Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,'' approved August 1, 2010. Available for purchase on the Internet at *http://www.astm.org/Standards/D5673.htm.*

(i) ''Standard Methods for the Examination of Water & Wastewater,'' 21st edition (2005).

(A) SM 3125 ''Metals by Inductively Coupled Plasma/Mass Spectrometry.''

(B) SM 5310B ''Total Organic Carbon (TOC): High-Temperature Combustion Method.''

(C) SM 5310C ''Total Organic Carbon (TOC): Persulfate-UV or Heated-Persulfate Oxidation Method.''

(D) SM 5310D ''Total Organic Carbon (TOC): Wet-Oxidation Method.''

(ii) The following methods are from ''Standard Methods Online.,'' approved 2000 (unless noted). Available for purchase on the Internet at *http://www.standardmethods.org.*

(A) SM 3125 ''Metals by Inductively Coupled Plasma/Mass Spectrometry'' Editorial revisions, 2011 (SM 3125–09).

(B) SM 5310B ''Total Organic Carbon: High-Temperature Combustion Method,'' (5310B–00).

(C) SM 5310C ''Total Organic Carbon: Persulfate-UV or Heated-Persulfate Oxidation Method,'' (5310C–00).

(D) SM 5310D ''Total Organic Carbon: Wet-Oxidation Method,'' (5310D–00).

(3) ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959.

(i) ASTM D5673–10 ''Standard Test Method for Elements in Water by Inductively Coupled Plasma-Mass Spectrometry,'' approved August 1, 2010. Available for purchase on the Internet at *http://www.astm.org/Standards/D5673.htm.*

(ii) ASTM D6581–12 ''Standard Test Methods for Bromate, Bromide, Chlorate, and Chlorite in Drinking Water by Suppressed Ion Chromatography,'' approved March 1, 2012. Available for purchase on the Internet at *http://www.astm.org/Standards/D6581.htm.*

[72 FR 393, Jan. 4, 2007; 72 FR 3916, Jan. 26, 2007, as amended at 77 FR 26098, May 2, 2012; 81 FR 92688, Dec. 20, 2016]

§ 141.41 Special monitoring for sodium.

(a) Suppliers of water for community public water systems shall collect and analyze one sample per plant at the entry point of the distribution system for the determination of sodium concentration levels; samples must be collected and analyzed annually for systems utilizing surface water sources in whole or in part, and at least every three years for systems utilizing solely ground water sources. The minimum number of samples required to be taken by the system shall be based on the number of treatment plants used by the system, except that multiple wells drawing raw water from a single aquifer may, with the State approval, be considered one treatment plant for determining the minimum number of samples. The supplier of water may be required by the State to collect and analyze water samples for sodium more frequently in locations where the sodium content is variable.

(b) The supplier of water shall report to EPA and/or the State the results of the analyses for sodium within the first 10 days of the month following the month in which the sample results were received or within the first 10 days following the end of the required monitoring period as stipulated by the State, whichever of these is first. If more than annual sampling is required the supplier shall report the average sodium concentration within 10 days of the month following the month in which the analytical results of the last sample used for the annual average was received. The supplier of water shall not be required to report the results to EPA where the State has adopted this regulation and results are reported to the State. The supplier shall report the results to EPA where the State has not adopted this regulation.

(c) The supplier of water shall notify appropriate local and State public health officials of the sodium levels by written notice by direct mail within three months. A copy of each notice required to be provided by this paragraph shall be sent to EPA and/or the State within 10 days of its issuance. The supplier of water is not required to notify appropriate local and State public health officials of the sodium levels where the State provides such notices in lieu of the supplier.

(d) Analyses for sodium shall be conducted as directed in § 141.23(k)(1).

[45 FR 57345, Aug. 27, 1980, as amended at 59 FR 62470, Dec. 5, 1994]

§ 141.42 Special monitoring for corrosivity characteristics.

(a)–(c) [Reserved]

(d) Community water supply systems shall identify whether the following construction materials are present in their distribution system and report to the State:

Lead from piping, solder, caulking, interior lining of distribution mains, alloys and home plumbing.
Copper from piping and alloys, service lines, and home plumbing.
Galvanized piping, service lines, and home plumbing.
Ferrous piping materials such as cast iron and steel.
Asbestos cement pipe.

In addition, States may require identification and reporting of other materials of construction present in distribution systems that may contribute contaminants to the drinking water, such as:

Vinyl lined asbestos cement pipe.
Coal tar lined pipes and tanks.

[45 FR 57346, Aug. 27, 1980; 47 FR 10999, Mar. 12, 1982, as amended at 59 FR 62470, Dec. 5, 1994]

§ 141.43 Prohibition on use of lead pipes, solder, and flux.

(a) *In general*—(1) *Prohibition.* Any pipe, solder, or flux, which is used after June 19, 1986, in the installation or repair of—

(i) Any public water system, or

(ii) Any plumbing in a residential or nonresidential facility providing water for human consumption which is connected to a public water system shall be lead free as defined by paragraph (d) of this section. This paragraph (a)(1) shall not apply to leaded joints necessary for the repair of cast iron pipes.

(2) [Reserved]

(b) *State enforcement*—(1) *Enforcement of prohibition.* The requirements of paragraph (a)(1) of this section shall be enforced in all States effective June 19, 1988. States shall enforce such requirements through State or local plumbing codes, or such other means of enforcement as the State may determine to be appropriate.

(2) [Reserved]

(c) *Penalties.* If the Administrator determines that a State is not enforcing the requirements of paragraph (a) of this section, as required pursuant to paragraph (b) of this section, the Administrator may withhold up to 5 percent of Federal funds available to that State for State program grants under section 1443(a) of the Act.

(d) *Definition of lead free.* For purposes of this section, the term lead free:

(1) When used with respect to solders and flux refers to solders and flux containing not more than 0.2 percent lead;

(2) When used with respect to pipes and pipe fittings refers to pipes and pipe fittings containing not more than 8.0 percent lead; and

(3) When used with respect to plumbing fittings and fixtures intended by the manufacturer to dispense water for human ingestion refers to fittings and fixtures that are in compliance with standards established in accordance with 42 U.S.C. 300g–6(e).

[52 FR 20674, June 2, 1987, as amended at 65 FR 2003, Jan. 12, 2000]

Subpart F—Maximum Contaminant Level Goals and Maximum Residual Disinfectant Level Goals

§ 141.50 Maximum contaminant level goals for organic contaminants.

(a) MCLGs are zero for the following contaminants:

(1) Benzene
(2) Vinyl chloride
(3) Carbon tetrachloride
(4) 1,2-dichloroethane
(5) Trichloroethylene
(6) Acrylamide
(7) Alachlor
(8) Chlordane
(9) Dibromochloropropane
(10) 1,2-Dichloropropane
(11) Epichlorohydrin
(12) Ethylene dibromide
(13) Heptachlor
(14) Heptachlor epoxide
(15) Pentachlorophenol

(16) Polychlorinated biphenyls (PCBs)

(17) Tetrachloroethylene

(18) Toxaphene

(19) Benzo[a]pyrene

(20) Dichloromethane (methylene chloride)

(21) Di(2-ethylhexyl)phthalate

(22) Hexachlorobenzene

(23) 2,3,7,8-TCDD (Dioxin)

(b) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG in mg/l
(1) 1,1-Dichloroethylene	0.007
(2) 1,1,1-Trichloroethane	0.20
(3) para-Dichlorobenzene	0.075
(4) Aldicarb	0.001
(5) Aldicarb sulfoxide	0.001
(6) Aldicarb sulfone	0.001
(7) Atrazine	0.003
(8) Carbofuran	0.04
(9) o-Dichlorobenzene	0.6
(10) cis-1,2-Dichloroethylene	0.07
(11) trans-1,2-Dichloroethylene	0.1
(12) 2,4-D	0.07
(13) Ethylbenzene	0.7
(14) Lindane	0.0002
(15) Methoxychlor	0.04
(16) Monochlorobenzene	0.1
(17) Styrene	0.1
(18) Toluene	1
(19) 2,4,5-TP	0.05
(20) Xylenes (total)	10
(21) Dalapon	0.2
(22) Di(2-ethylhexyl)adipate	.4
(23) Dinoseb	.007
(24) Diquat	.02
(25) Endothall	.1
(26) Endrin	.002
(27) Glyphosate	.7
(28) Hexachlorocyclopentadiene	.05
(29) Oxamyl (Vydate)	.2
(30) Picloram	.5
(31) Simazine	.004
(32) 1,2,4-Trichlorobenzene	.07
(33) 1,1,2-Trichloroethane	.003

[50 FR 46901, Nov. 13, 1985, as amended at 52 FR 20674, June 2, 1987; 52 FR 25716, July 8, 1987; 56 FR 3592, Jan. 30, 1991; 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992]

§ 141.51 Maximum contaminant level goals for inorganic contaminants.

(a) [Reserved]

(b) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG (mg/l)
Antimony	0.006
Arsenic	zero[1]
Asbestos	7 Million fibers/liter (longer than 10 μm).
Barium	2
Beryllium	.004
Cadmium	0.005
Chromium	0.1
Copper	1.3
Cyanide (as free Cyanide)	.2
Fluoride	4.0
Lead	zero
Mercury	0.002
Nitrate	10 (as Nitrogen).
Nitrite	1 (as Nitrogen).
Total Nitrate + Nitrite	10 (as Nitrogen).
Selenium	0.05
Thallium	.0005

[1] This value for arsenic is effective January 23, 2006. Until then, there is no MCLG.

[50 FR 47155, Nov. 14, 1985, as amended at 52 FR 20674, June 2, 1987; 56 FR 3593, Jan. 30, 1991; 56 FR 26548, June 7, 1991; 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 60 FR 33932, June 29, 1995; 66 FR 7063, Jan. 22, 2001]

§ 141.52 Maximum contaminant level goals for microbiological contaminants.

(a) MCLGs for the following contaminants are as indicated:

Contaminant	MCLG
(1) *Giardia lamblia*	zero
(2) Viruses	zero
(3) *Legionella*	zero
(4) Total coliforms (including fecal) coliforms and *Escherichia coli.*	zero
(5) *Cryptosporidium*	zero
(6) *Escherichia coli (E. coli)*	zero

(b) The MCLG identified in paragraph (a)(4) of this section is applicable until March 31, 2016. The MCLG identified in paragraph (a)(6) of this section is applicable beginning April 1, 2016.

[78 FR 10347, Feb. 13, 2013]

§ 141.53 Maximum contaminant level goals for disinfection byproducts.

MCLGs for the following disinfection byproducts are as indicated:

Disinfection byproduct	MCLG (mg/L)
Bromodichloromethane	zero
Bromoform	zero
Bromate	zero
Chlorite	0.8
Chloroform	0.07
Dibromochloromethane	0.06
Dichloroacetic acid	zero
Monochloroacetic acid	0.07
Trichloroacetic acid	0.02

[63 FR 69465, Dec. 16, 1998, as amended at 65 FR 34405, May 30, 2000; 71 FR 478, Jan. 4, 2006]

§ 141.54 Maximum residual disinfectant level goals for disinfectants.

MRDLGs for disinfectants are as follows:

Disinfectant residual	MRDLG(mg/L)
Chlorine	4 (as Cl_2).
Chloramines	4 (as Cl_2).
Chlorine dioxide	0.8 (as ClO_2)

[63 FR 69465, Dec. 16, 1998]

§ 141.55 Maximum contaminant level goals for radionuclides.

MCLGs for radionuclides are as indicated in the following table:

Contaminant	MCLG
1. Combined radium-226 and radium-228	Zero.
2. Gross alpha particle activity (excluding radon and uranium).	Zero.
3. Beta particle and photon radioactivity	Zero.
4. Uranium	Zero.

[65 FR 76748, Dec. 7, 2000]

Subpart G—National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels

§ 141.60 Effective dates.

(a) The effective dates for § 141.61 are as follows:

(1) The effective date for paragraphs (a)(1) through (a)(8) of § 141.61 is January 9, 1989.

(2) The effective date for paragraphs (a)(9) through (a)(18) and (c)(1) through (c)(18) of § 141.61 is July 30, 1992.

(3) The effective date for paragraphs (a)(19) through (a)(21), (c)(19) through (c)(25), and (c)(27) through (c)(33) of § 141.61 is January 17, 1994. The effective date of § 141.61(c)(26) is August 17, 1992.

(b) The effective dates for § 141.62 are as follows:

(1) The effective date of paragraph (b)(1) of § 141.62 is October 2, 1987.

(2) The effective date for paragraphs (b)(2) and (b)(4) through (b)(10) of § 141.62 is July 30, 1992.

(3) The effective date for paragraphs (b)(11) through (b)(15) of § 141.62 is January 17, 1994.

(4) The effective date for § 141.62(b)(16) is January 23, 2006.

[56 FR 3593, Jan. 30, 1991, as amended at 57 FR 31846, July 17, 1992; 59 FR 34324, July 1, 1994; 66 FR 7063, Jan. 22, 2001]

§ 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) 107–06–2	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-Trichloro- benzene	.07
(21) 79–00–5	1,1,2-Trichloro- ethane	.005

(b) The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the Table below granular activated carbon (GAC), packed tower aeration (PTA), or oxidation (OX) as the best technology treatment technique, or other means available for achieving compliance with the maximum contaminant level for organic contaminants identified in paragraphs (a) and (c) of this section:

BAT FOR ORGANIC CONTAMINANTS LISTED IN § 141.61 (a) AND (c)

CAS No.	Contaminant	GAC	PTA	OX
15972–60–8	Alachlor	X		
116–06–3	Aldicarb	X		
1646–88–4	Aldicarb sulfone	X		
1646–87–3	Aldicarb sulfoxide	X		
1912–24–9	Atrazine	X		
71–43–2	Benzene	X	X	
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		
145–73–3	Endothall	X		
72–20–8	Endrin	X		
100–41–4	Ethylbenzene	X	X	
106–93–4	Ethylene Dibromide (EDB)	X	X	
1071–83–6	Gylphosate	....	....	X
76–44–8	Heptachlor	X		
1024–57–3	Heptachlor epoxide	X		
118–74–1	Hexachlorobenzene	X		
77–47–3	Hexachlorocyclopentadiene	X	X	
58–89–9	Lindane	X		
72–43–5	Methoxychlor	X		
108–90–7	Monochlorobenzene	X	X	
23135–22–0	Oxamyl (Vydate)	X		
87–86–5	Pentachlorophenol	X		
1918–02–1	Picloram	X		
1336–36–3	Polychlorinated biphenyls (PCB)	X		
122–34–9	Simazine	X		
100–42–5	Styrene	X	X	
1746–01–6	2,3,7,8-TCDD (Dioxin)	X		
127–18–4	Tetrachloroethylene	X	X	
108–88–3	Toluene	X	X	
8001–35–2	Toxaphene	X		
93–72–1	2,4,5-TP (Silvex)	X		
120–82–1	1,2,4-Trichlorobenzene	X	X	
71–55–6	1,1,1-Trichloroethane	X	X	
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 synthetic organic contaminants apply to community water systems and non-transient, non-community water systems:

CAS No.	Contaminant	MCL (mg/l)
(1) 15972–60–8	Alachlor	0.002

CAS No.	Contaminant	MCL (mg/l)
(2) 116–06–3	Aldicarb	0.003
(3) 1646–87–3	Aldicarb sulfoxide	0.004
(4) 1646–87–4	Aldicarb sulfone	0.002
(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	Hexacholorbenzene	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)	3×10^{-8}

[56 FR 3593, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31846, July 17, 1992; 59 FR 34324, July 1, 1994]

§ 141.62 Maximum contaminant levels for inorganic contaminants.

(a) [Reserved]

(b) The maximum contaminant levels for inorganic contaminants specified in paragraphs (b) (2)–(6), (b)(10), and (b) (11)–(16) 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 (b)(7), (b)(8), and (b)(9) of this section apply to community water systems; non-transient, non-community water systems; and transient non-community water systems.

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 Nitrite	10 (as Nitrogen)
(10) Selenium	0.05
(11) Antimony	0.006
(12) Beryllium	0.004
(13) Cyanide (as free Cyanide).	0.2
(14) [Reserved].	
(15) Thallium	0.002
(16) Arsenic	0.010

(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 levels for inorganic contaminants identified in paragraph (b) of this section, except fluoride:

BAT FOR INORGANIC COMPOUNDS LISTED IN SECTION 141.62(b)

Chemical Name	BAT(s)
Antimony	2,7
Arsenic[4]	1, 2, 5, 6, 7, 9, 12[5]
Asbestos	2,3,8
Barium	5,6,7,9

BAT FOR INORGANIC COMPOUNDS LISTED IN SECTION 141.62(b)—Continued

Chemical Name	BAT(s)
Beryllium	1,2,5,6,7
Cadmium	2,5,6,7
Chromium	2,5,6[2],7
Cyanide	5,7,13
Mercury	2[1],4,6[1],7[1]
Nickel	5,6,7
Nitrate	5,7,9
Nitrite	5,7
Selenium	1,2[3],6,7,9
Thallium	1,5

[1] BAT only if influent Hg concentrations ≤10μg/1.

[2] BAT for Chromium III only.

[3] BAT for Selenium IV only.

[4] BATs for Arsenic V. Pre-oxidation may be required to convert Arsenic III to Arsenic V.

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

Key to BATS in Table

1 = Activated Alumina
2 = Coagulation/Filtration (not BAT for systems <500 service connections)
3 = Direct and Diatomite Filtration
4 = Granular Activated Carbon
5 = Ion Exchange
6 = Lime Softening (not BAT for systems <500 service connections)
7 = Reverse Osmosis
8 = Corrosion Control
9 = Electrodialysis
10 = Chlorine
11 = Ultraviolet
12 = Oxidation/Filtration
13 = Alkaline Chlorination (pH ≥8.5)

(d) The Administrator, pursuant to section 1412 of the Act, hereby identifies in the following table the affordable technology, treatment technique, or other means available to systems serving 10,000 persons or fewer for achieving compliance with the maximum contaminant level for arsenic:

SMALL SYSTEM COMPLIANCE TECHNOLOGIES (SSCTS)[1] FOR ARSENIC[2]

Small system compliance technology	Affordable for listed small system categories[3]
Activated Alumina (centralized).	All size categories.
Activated Alumina (Point-of-Use)[4].	All size categories.
Coagulation/Filtration[5]	501–3,300, 3,301–10,000.
Coagulation-assisted Microfiltration.	501–3,300, 3,301–10,000.
Electrodialysis reversal[6]	501–3,300, 3,301–10,000.
Enhanced coagulation/filtration.	All size categories
Enhanced lime softening (pH>10.5).	All size categories.
Ion Exchange	All size categories.
Lime Softening[5]	501–3,300, 3,301–10,000.
Oxidation/Filtration[7]	All size categories.
Reverse Osmosis (centralized)[6].	501–3,300, 3,301–10,000.
Reverse Osmosis (Point-of-Use)[4].	All size categories.

[1] Section 1412(b)(4)(E)(ii) of SDWA specifies that SSCTs must be affordable and technically feasible for small systems.

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

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

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

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

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

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

[56 FR 3594, Jan. 30, 1991, as amended at 56 FR 30280, July 1, 1991; 57 FR 31847, July 17, 1992; 59 FR 34325, July 1, 1994; 60 FR 33932, June 29, 1995; 66 FR 7063, Jan. 22, 2001; 68 FR 14506, Mar. 25, 2003; 69 FR 38855, June 29, 2004]

§ 141.63 Maximum contaminant levels (MCLs) for microbiological contaminants.

(a) Until March 31, 2016, the total coliform MCL is based on the presence or absence of total coliforms in a sample, rather than coliform density.

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

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

(b) Until March 31, 2016, any fecal coliform-positive repeat sample or *E. coli*-positive repeat sample, or any total coliform-positive repeat sample following a fecal coliform-positive or *E. coli*-positive routine sample, constitutes a violation of the MCL for total coliforms. For purposes of the public notification requirements in subpart Q of this part, this is a violation that may pose an acute risk to health.

(c) Beginning April 1, 2016, a system is in compliance with the MCL for *E.*

coli for samples taken under the provisions of subpart Y of this part unless any of the conditions identified in paragraphs (c)(1) through (c)(4) of this section occur. For purposes of the public notification requirements in subpart Q of this part, violation of the MCL may pose an acute risk to health.

(1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.

(2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.

(3) The system fails to take all required repeat samples following an *E. coli*-positive routine sample.

(4) The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.

(d) Until March 31, 2016, a public water system must determine compliance with the MCL for total coliforms in paragraphs (a) and (b) of this section for each month in which it is required to monitor for total coliforms. Beginning April 1, 2016, a public water system must determine compliance with the MCL for *E. coli* in paragraph (c) of this section for each month in which it is required to monitor for total coliforms.

(e) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section and for achieving compliance with the maximum contaminant level for *E. coli* in paragraph (c) of this section:

(1) Protection of wells from fecal contamination by appropriate placement and construction;

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

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

(4) Filtration and/or disinfection of surface water, as described in subparts H, P, T, and W of this part, or disinfection of ground water, as described in subpart S of this part, using strong oxidants such as chlorine, chlorine dioxide, or ozone; and

(5) For systems using ground water, compliance with the requirements of an EPA-approved State Wellhead Protection Program developed and implemented under section 1428 of the SDWA.

(f) The Administrator, pursuant to section 1412 of the Act, hereby identifies the technology, treatment techniques, or other means available identified in paragraph (e) of this section as affordable technology, treatment techniques, or other means available to systems serving 10,000 or fewer people for achieving compliance with the maximum contaminant level for total coliforms in paragraphs (a) and (b) of this section and for achieving compliance with the maximum contaminant level for *E. coli* in paragraph (c) of this section.

[78 FR 10347, Feb. 13, 2013]

§ 141.64 Maximum contaminant levels for disinfection byproducts.

(a) *Bromate and chlorite.* The maximum contaminant levels (MCLs) for bromate and chlorite are as follows:

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

(1) *Compliance dates for CWSs and NTNCWSs.* Subpart H systems serving 10,000 or more persons must comply with this paragraph (a) beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this paragraph (a) beginning January 1, 2004.

(2) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for bromate and chlorite identified in this paragraph (a):

Disinfection byproduct	Best available technology
Bromate	Control of ozone treatment process to reduce production of bromate
Chlorite	Control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels

(b) TTHM and HAA5. (1) Subpart L—RAA compliance. (i) Compliance dates. Subpart H systems serving 10,000 or more persons must comply with this paragraph (b)(1) beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this paragraph (b)(1) beginning January 1, 2004. All systems must comply with these MCLs until the date specified for subpart V compliance in §141.620(c).

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

(ii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(1):

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).	Enhanced coagulation or enhanced softening or GAC10, with chlorine as the primary and residual disinfectant

(2) Subpart V—LRAA compliance. (i) Compliance dates. The subpart V MCLs for TTHM and HAA5 must be complied with as a locational running annual average at each monitoring location beginning the date specified for subpart V compliance in §141.620(c).

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

(ii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(2) for all systems that disinfect their source water:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).	Enhanced coagulation or enhanced softening, plus GAC10; or nanofiltration with a molecular weight cutoff ≤1000 Daltons; or GAC20

(iii) The Administrator, pursuant to section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for TTHM and HAA5 identified in this paragraph (b)(2) for consecutive systems and applies only to the disinfected water that consecutive systems buy or otherwise receive:

Disinfection byproduct	Best available technology
Total trihalomethanes (TTHM) and Haloacetic acids (five) (HAA5).	Systems serving ≥10,000: Improved distribution system and storage tank management to reduce residence time, plus the use of chloramines for disinfectant residual maintenance Systems serving <10,000: Improved distribution system and storage tank management to reduce residence time

[71 FR 478, Jan. 4, 2006]

§ 141.65 Maximum residual disinfectant levels.

(a) Maximum residual disinfectant levels (MRDLs) are as follows:

Disinfectant residual	MRDL (mg/L)
Chlorine	4.0 (as Cl_2).
Chloramines	4.0 (as Cl_2).
Chlorine dioxide	0.8 (as ClO_2).

(b) *Compliance dates*—(1) *CWSs and NTNCWSs.* Subpart H systems serving 10,000 or more persons must comply with this section beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.

(2) Transient NCWSs. Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant

or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

(c) The Administrator, pursuant to Section 1412 of the Act, hereby identifies the following as the best technology, treatment techniques, or other means available for achieving compliance with the maximum residual disinfectant levels identified in paragraph (a) of this section: control of treatment processes to reduce disinfectant demand and control of disinfection treatment processes to reduce disinfectant levels.

[63 FR 69465, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001]

§ 141.66 Maximum contaminant levels for radionuclides.

(a) [Reserved]

(b) *MCL for combined radium-226 and -228*. The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

(c) *MCL for gross alpha particle activity (excluding radon and uranium)*. The maximum contaminant level for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L.

(d) *MCL for beta particle and photon radioactivity*. (1) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year (mrem/year).

(2) Except for the radionuclides listed in table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of 2 liter per day drinking water intake using the 168 hour data list in ‘‘Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure,’’ NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800–553–6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.* If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

TABLE A—AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE: A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR

1. Radionuclide	Critical organ	pCi per liter
2. Tritium	Total body	20,000
3. Strontium-90	Bone Marrow	8

(e) *MCL for uranium.* The maximum contaminant level for uranium is 30 μg/L.

(f) *Compliance dates.* (1) Compliance dates for combined radium-226 and -228, gross alpha particle activity, gross beta particle and photon radioactivity, and uranium: Community water systems must comply with the MCLs listed in paragraphs (b), (c), (d), and (e) of this section beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of §§ 141.25 and 141.26. Compliance with reporting requirements for the radionuclides under appendix A to subpart O and appendices A and B to subpart Q is required on December 8, 2003.

(2) [Reserved]

(g) *Best available technologies (BATs) for radionuclides.* The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the following table the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

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

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

(h) *Small systems compliance technologies list for radionuclides.*

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

Unit technologies	Limitations (see footnotes)	Operator skill level required[1]	Raw water quality range and considerations.[1]
1. Ion exchange (IE)	(a)	Intermediate	All ground waters.
2. Point of use (POU[2]) IE	(b)	Basic	All ground waters.
3. Reverse osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration.
4. POU[2] RO	(b)	Basic	Surface waters usually require pre-filtration.
5. Lime softening	(d)	Advanced	All waters.
6. Green sand filtration	(e)	Basic.	
7. Co-precipitation with Barium sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/electrodialysis reversal.		Basic to Intermediate	All ground waters.
9. Pre-formed hydrous Manganese oxide filtration.	(g)	Intermediate	All ground waters.
10. Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11. Enhanced coagulation/filtration	(i)	Advanced	Can treat a wide range of water qualities.

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

[2] A POU, or "point-of-use" technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

[a] The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

[b] When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

[c] Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

[e] Removal efficiencies can vary depending on water quality.

[f] This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

[g] This technology is most applicable to small systems that already have filtration in place.

[h] Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

[i] Assumes modification to a coagulation/filtration process already in place.

TABLE D—COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDE NPDWR'S

Contaminant	Compliance technologies[1] for system size categories (population served)		3,300–10,000
	25–500	501–3,300	
1. Combined radium-226 and radium-228	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7, 8, 9	1, 2, 3, 4, 5, 6, 7. 8, 9.

TABLE D—COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDE NPDWR'S—Continued

Contaminant	Compliance technologies[1] for system size categories (population served)		3,300–10,000
	25–500	501–3,300	
2. Gross alpha particle activity	3, 4	3, 4	3, 4.
3. Beta particle activity and photon activity	1, 2, 3, 4	1, 2, 3, 4	1, 2, 3, 4.
4. Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11.

NOTE: [1] Numbers correspond to those technologies found listed in the table C of 141.66(h).

[65 FR 76748, Dec. 7, 2000]

Subpart H—Filtration and Disinfection

SOURCE: 54 FR 27527, June 29, 1989, unless otherwise noted.

§141.70 General requirements.

(a) The requirements of this subpart H constitute national primary drinking water regulations. These regulations establish criteria under which filtration is required as a treatment technique for public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water. In addition, these regulations establish treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, and turbidity. Each public water system with a surface water source or a ground water source under the direct influence of surface water must provide treatment of that source water that complies with these treatment technique requirements. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

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

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

(b) A public water system using a surface water source or a ground water source under the direct influence of surface water is considered to be in compliance with the requirements of paragraph (a) of this section if:

(1) It meets the requirements for avoiding filtration in §141.71 and the disinfection requirements in §141.72(a); or

(2) It meets the filtration requirements in §141.73 and the disinfection requirements in §141.72(b).

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

(d) *Additional requirements for systems serving at least 10,000 people.* In addition to complying with requirements in this subpart, systems serving at least 10,000 people must also comply with the requirements in subpart P of this part.

(e) *Additional requirements for systems serving fewer than 10,000 people.* In addition to complying with requirements in this subpart, systems serving fewer than 10,000 people must also comply with the requirements in subpart T of this part.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 67 FR 1836, Jan. 14, 2002]

§141.71 Criteria for avoiding filtration.

A public water system that uses a surface water source must meet all of the conditions of paragraphs (a) and (b) of this section, and is subject to paragraph (c) of this section, beginning December 30, 1991, unless the State has determined, in writing pursuant to §1412(b)(7)(C)(iii), that filtration is required. A public water system that uses a ground water source under the direct influence of surface water must meet all of the conditions of paragraphs (a) and (b) of this section and is subject to paragraph (c) of this section, beginning 18 months after the State determines that it is under the direct influence of surface water, or December 30, 1991, whichever is later, unless the State has determined, in writing pursuant to §1412(b)(7)(C)(iii), that filtration is required. If the State determines in writing pursuant to §1412(b)(7)(C)(iii) before December 30, 1991, that filtration is required, the system must have installed filtration and meet the criteria for filtered systems specified in §§141.72(b) and 141.73 by June 29, 1993. Within 18 months of the failure of a system using surface water or a ground water source under the direct influence of surface water to meet any one of the requirements of paragraphs (a) and (b) of this section or after June 29, 1993, whichever is later, the system must have installed filtration and meet the criteria for filtered systems specified in §§141.72(b) and 141.73.

(a) *Source water quality conditions.* (1) The fecal coliform concentration must be equal to or less than 20/100 ml, or the total coliform concentration must be equal to or less than 100/100 ml (measured as specified in §141.74 (a) (1) and (2) and (b)(1)), in representative samples of the source water immediately prior to the first or only point of disinfectant application in at least 90 percent of the measurements made for the 6 previous months that the system served water to the public on an ongoing basis. If a system measures both fecal and total coliforms, the fecal coliform criterion, but not the total coliform criterion, in this paragraph must be met.

(2) The turbidity level cannot exceed 5 NTU (measured as specified in §141.74 (a)(1) and (b)(2)) in representative samples of the source water immediately prior to the first or only point of disinfectant application unless: (i) the State determines that any such event was caused by circumstances that were unusual and unpredictable; and (ii) as a result of any such event, there have not been more than two events in the past 12 months the system served water to the public, or more than five events in the past 120 months the system served water to the public, in which the turbidity level exceeded 5 NTU. An ''event'' is a series of consecutive days during which at least one turbidity measurement each day exceeds 5 NTU.

(b) *Site-specific conditions.* (1)(i) The public water system must meet the requirements of §141.72(a)(1) at least 11 of the 12 previous months that the system served water to the public, on an ongoing basis, unless the system fails to meet the requirements during 2 of the 12 previous months that the system served water to the public, and the State determines that at least one of these failures was caused by circumstances that were unusual and unpredictable.

(ii) The public water system must meet the requirements of §141.72(a)(2) at all times the system serves water to the public.

(iii) The public water system must meet the requirements of §141.72(a)(3) at all times the system serves water to the public unless the State determines that any such failure was caused by circumstances that were unusual and unpredictable.

(iv) The public water system must meet the requirements of §141.72(a)(4) on an ongoing basis unless the State determines that failure to meet these requirements was not caused by a deficiency in treatment of the source water.

(2) The public water system must maintain a watershed control program which minimizes the potential for contamination by *Giardia lamblia* cysts and viruses in the source water. The State must determine whether the watershed control program is adequate to meet this goal. The adequacy of a program to limit potential contamination by *Giardia lamblia* cysts and viruses must be based on: the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor

and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed. At a minimum, the watershed control program must:

(i) Characterize the watershed hydrology and land ownership;

(ii) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

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

The public water system must demonstrate through ownership and/or written agreements with landowners within the watershed that it can control all human activities which may have an adverse impact on the microbiological quality of the source water. The public water system must submit an annual report to the State that identifies any special concerns about the watershed and how they are being handled; describes activities in the watershed that affect water quality; and projects what adverse activities are expected to occur in the future and describes how the public water system expects to address them. For systems using a ground water source under the direct influence of surface water, an approved wellhead protection program developed under section 1428 of the Safe Drinking Water Act may be used, if the State deems it appropriate, to meet these requirements.

(3) The public water system must be subject to an annual on-site inspection to assess the watershed control program and disinfection treatment process. Either the State or a party approved by the State must conduct the on-site inspection. The inspection must be conducted by competent individuals such as sanitary and civil engineers, sanitarians, or technicians who have experience and knowledge about the operation and maintenance of a public water system, and who have a sound understanding of public health principles and waterborne diseases. A report of the on-site inspection summarizing all findings must be prepared every year. The on-site inspection must indicate to the State's satisfaction that the watershed control program and disinfection treatment process are adequately designed and maintained. The on-site inspection must include:

(i) A review of the effectiveness of the watershed control program;

(ii) A review of the physical condition of the source intake and how well it is protected;

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

(iv) An inspection of the disinfection equipment for physical deterioration;

(v) A review of operating procedures;

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

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

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

(5) The public water system must comply with the maximum contaminant level (MCL) for total coliforms in §141.63(a) and (b) and the MCL for *E. coli* in §141.63(c) at least 11 months of the 12 previous months that the system served water to the public, on an ongoing basis, unless the State determines that failure to meet this requirement was not caused by a deficiency in treatment of the source water.

(6) The public water system must comply with the requirements for trihalomethanes in §§141.12 and 141.30 until December 31, 2001. After December 31, 2001, the system must comply with the requirements for total trihalomethanes, haloacetic acids (five), bromate, chlorite, chlorine, chloramines, and chlorine dioxide in subpart L of this part.

(c) *Treatment technique violations.* (1) A system that (i) fails to meet any one of the criteria in paragraphs (a) and (b) of this section and/or which the State has determined that filtration is required, in writing pursuant to

§ 1412(b)(7)(C)(iii), and (ii) fails to install filtration by the date specified in the introductory paragraph of this section is in violation of a treatment technique requirement.

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

(i) The turbidity level (measured as specified in § 141.74(a)(1) and (b)(2)) in a representative sample of the source water immediately prior to the first or only point of disinfection application exceeds 5 NTU; or

(ii) The system is identified as a source of a waterborne disease outbreak.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 66 FR 3776, Jan. 16, 2001; 69 FR 38855, June 29, 2004; 78 FR 10347, Feb. 13, 2013]

§ 141.72 Disinfection.

A public water system that uses a surface water source and does not provide filtration treatment must provide the disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, unless the State determines that filtration is required in writing pursuant to § 1412 (b)(7)(C)(iii). A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must provide disinfection treatment specified in paragraph (a) of this section beginning December 30, 1991, or 18 months after the State determines that the ground water source is under the influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to § 1412(b)(7)(C)(iii). If the State has determined that filtration is required, the system must comply with any interim disinfection requirements the State deems necessary before filtration is installed. A system that uses a surface water source that provides filtration treatment must provide the disinfection treatment specified in paragraph (b) of this section beginning June 29, 1993, or beginning when filtration is installed, whichever is later. A system that uses a ground water source under the direct influence of surface water and provides filtration treatment must provide disinfection treatment as specified in paragraph (b) of this section by June 29, 1993, or beginning when filtration is installed, whichever is later. Failure to meet any requirement of this section after the applicable date specified in this introductory paragraph is a treatment technique violation.

(a) *Disinfection requirements for public water systems that do not provide filtration.* Each public water system that does not provide filtration treatment must provide disinfection treatment as follows:

(1) The disinfection treatment must be sufficient to ensure at least 99.9 percent (3-log) inactivation of *Giardia lamblia* cysts and 99.99 percent (4-log) inactivation of viruses, every day the system serves water to the public, except any one day each month. Each day a system serves water to the public, the public water system must calculate the CT value(s) from the system's treatment parameters, using the procedure specified in § 141.74(b)(3), and determine whether this value(s) is sufficient to achieve the specified inactivation rates for *Giardia lamblia* cysts and viruses. If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for on-site disinfection challenge studies or other information satisfactory to the State, that $CT_{99.9}$ values other than those specified in tables 2.1 and 3.1 in § 141.74(b)(3) or other operational parameters are adequate to demonstrate that the system is achieving minimum inactivation rates required by paragraph (a)(1) of this section.

(2) The disinfection system must have either (i) redundant components, including an auxiliary power supply with automatic start-up and alarm to ensure that disinfectant application is maintained continuously while water is being delivered to the distribution system, or (ii) automatic shut-off of delivery of water to the distribution system whenever there is less than 0.2 mg/l of residual disinfectant concentration in the water. If the State determines that automatic shut-off would cause unreasonable risk to health or interfere with fire protection, the system must comply with paragraph (a)(2)(i) of this section.

(3) The residual disinfectant concentration in the water entering the distribution system, measured as specified in §141.74 (a)(2) and (b)(5), cannot be less than 0.2 mg/l for more than 4 hours.

(4)(i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in §141.74 (a)(2) and (b)(6), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in §141.74(a)(1), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

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

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

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

d = number of instances where the residual disinfectant concentration is measured but not detected and where the HPC is >500/ml; and

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

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(4)(i) of this section do not apply to that system.

(b) *Disinfection requirements for public water systems which provide filtration.* Each public water system that provides filtration treatment must provide disinfection treatment as follows.

(1) The disinfection treatment must be sufficient to ensure that the total treatment processes of that system achieve at least 99.9 percent (3-log) inactivation and/or removal of *Giardia lamblia* cysts and at least 99.99 percent (4-log) inactivation and/or removal of viruses, as determined by the State.

(2) The residual disinfectant concentration in the water entering the distribution system, measured as specified in §141.74 (a)(2) and (c)(2), cannot be less than 0.2 mg/l for more than 4 hours.

(3)(i) The residual disinfectant concentration in the distribution system, measured as total chlorine, combined chlorine, or chlorine dioxide, as specified in §141.74 (a)(2) and (c)(3), cannot be undetectable in more than 5 percent of the samples each month, for any two consecutive months that the system serves water to the public. Water in the distribution system with a heterotrophic bacteria concentration less than or equal to 500/ml, measured as heterotrophic plate count (HPC) as specified in §141.74(a)(1), is deemed to have a detectable disinfectant residual for purposes of determining compliance with this requirement. Thus, the value "V" in the following formula cannot exceed 5 percent in one month, for any two consecutive months.

$$V = \frac{c+d+e}{a+b} \times 100$$

where:

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

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

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

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

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

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified in § 141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(3)(i) of this section do not apply.

[54 FR 27527, June 29, 1989, as amended at 69 FR 38855, June 29, 2004]

§ 141.73 Filtration.

A public water system that uses a surface water source or a ground water source under the direct influence of surface water, and does not meet all of the criteria in § 141.71 (a) and (b) for avoiding filtration, must provide treatment consisting of both disinfection, as specified in § 141.72(b), and filtration treatment which complies with the requirements of paragraph (a), (b), (c), (d), or (e) of this section by June 29, 1993, or within 18 months of the failure to meet any one of the criteria for avoiding filtration in § 141.71 (a) and (b), whichever is later. Failure to meet any requirement of this section after the date specified in this introductory paragraph is a treatment technique violation.

(a) *Conventional filtration treatment or direct filtration.* (1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.5 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(1) and (c)(1), except that if the State determines that the system is capable of achieving at least 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts at some turbidity level higher than 0.5 NTU in at least 95 percent of the measurements taken each month, the State may substitute this higher turbidity limit for that system. However, in no case may the State approve a turbidity limit that allows more than 1 NTU in more than 5 percent of the samples taken each month, measured as specified in § 141.74 (a)(1) and (c)(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in § 141.74 (a)(1) and (c)(1).

(3) Beginning January 1, 2002, systems serving at least 10,000 people must meet the turbidity requirements in § 141.173(a).

(4) Beginning January 1, 2005, systems serving fewer than 10,000 people must meet the turbidity requirements in §§ 141.550 through 141.553.

(b) *Slow sand filtration.* (1) For systems using slow sand filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(1) and (c)(1), except that if the State determines there is no significant interference with disinfection at a higher turbidity level, the State may substitute this higher turbidity limit for that system.

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in § 141.74 (a)(1) and (c)(1).

(c) *Diatomaceous earth filtration.* (1) For systems using diatomaceous earth filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 1 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74 (a)(1) and (c)(1).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 5 NTU, measured as specified in § 141.74 (a)(1) and (c)(1).

(d) *Other filtration technologies.* A public water system may use a filtration technology not listed in paragraphs (a) through (c) of this section if it demonstrates to the State, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of § 141.72(b), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses. For a system that makes this demonstration, the requirements of paragraph (b) of this section apply. Beginning January 1, 2002, systems serving at least 10,000 people must meet the requirements for other filtration technologies in § 141.173(b). Beginning January 14, 2005, systems serving fewer than 10,000 people must meet the requirements for other filtration technologies in § 141.550 through 141.553.

[54 FR 27527, June 29, 1989, as amended at 63 FR 69516, Dec. 16, 1998; 66 FR 3776, Jan. 16, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38855, June 29, 2004]

§ 141.74 Analytical and monitoring requirements.

(a) *Analytical requirements.* Only the analytical method(s) specified in this paragraph, or otherwise approved by EPA, may be used to demonstrate compliance with §§ 141.71, 141.72 and 141.73. Measurements for pH, turbidity, temperature and residual disinfectant concentrations must be conducted by a person approved by the State. Measurement for total coliforms, fecal coliforms and HPC must be conducted by a laboratory certified by the State or EPA to do such analysis. Until laboratory certification criteria are developed for the analysis of fecal coliforms and HPC, any laboratory certified for total coliforms analysis by the State or EPA is deemed certified for fecal coliforms and HPC analysis. The following procedures shall be conducted in accordance with the publications listed in the following section. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the methods published in *Standard Methods for the Examination of Water and Wastewater* may be obtained from the American Public Health Association et al., 1015 Fifteenth Street, NW., Washington, DC 20005; copies of the Minimal Medium ONPG-MUG Method as set forth in the article ''National Field Evaluation of a Defined Substrate Method for the Simultaneous Enumeration of Total Coliforms and *Esherichia coli* from Drinking Water: Comparison with the Standard Multiple Tube Fermentation Method'' (Edberg et al.), Applied and Environmental Microbiology, Volume 54, pp. 1595–1601, June 1988 (as amended under Erratum, Applied and Environmental Microbiology, Volume 54, p. 3197, December, 1988), may be obtained from the American Water Works Association Research Foundation, 6666 West Quincy Avenue, Denver, Colorado, 80235; and copies of the Indigo Method as set forth in the article ''Determination of Ozone in Water by the Indigo Method'' (Bader and Hoigne), may be obtained from Ozone Science & Engineering, Pergamon Press Ltd., Fairview Park, Elmsford, New York 10523. Copies may be inspected at the U.S. Environmental Protection Agency, Room EB15, 401 M St., SW., Washington, DC 20460 or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html.*

(1) Public water systems must conduct analysis of pH and temperature in accordance with one of the methods listed at § 141.23(k)(1). Public water systems must conduct analysis of total coliforms, fecal coliforms, heterotrophic bacteria, and turbidity in accordance with one of the following analytical methods or one of the alternative methods listed in appendix A to subpart C of this part and by using analytical test procedures contained in *Technical Notes on Drinking Water Methods,* EPA–600/R–94–173, October 1994. This document is available from the National Service Center for Environmental Publications (NSCEP), P.O. Box 42419, Cincinnati, OH 45242–0419 or *http://www.epa.gov/nscep/.*

Organism	Methodology	Citation [1]
Total Coliform [2]	Total Coliform Fermentation Technique [3 4 5].	9221 A, B, C
	Total Coliform Membrane Filter Technique [6].	9222 A, B, C
	ONPG-MUG Test [7]	9223
Fecal Coliforms [2] ...	Fecal Coliform Procedure [8].	9221 E
	Fecal Coliform Filter Procedure.	9222 D
Heterotrophic bacteria [2].	Pour Plate Method	9215 B
	SimPlate [11].	
Turbidity [13]	Nephelometric Method.	2130 B
	Nephelometric Method.	180.1 [9]
	Great Lakes Instruments.	Method 2 [10]

Organism	Methodology	Citation [1]
	Hach FilterTrak	10133 [12]

The procedures shall be done in accordance with the documents listed below. The incorporation by reference of the following documents listed in footnotes 1, 6, 7 and 9–12 was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Information regarding obtaining these documents can be obtained from the Safe Drinking Water Hotline at 800–426–4791. Documents may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

[1] Except where noted, all methods refer to *Standard Methods for the Examination of Water and Wastewater,* 18th edition (1992), 19th edition (1995), or 20th edition (1998), American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. The cited methods published in any of these three editions may be used. In addition, the following online versions may also be used: 2130 B–01, 9215 B–00, 9221 A, B, C, E–99, 9222 A, B, C, D–97, and 9223 B–97. Standard Methods Online are available at *http://www.standardmethods.org.* The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that may be used.

[2] The time from sample collection to initiation of analysis may not exceed 8 hours. Systems must hold samples below 10 deg. C during transit.

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

[4] Media should cover inverted tubes at least one-half to two-thirds after the sample is added.

[5] No requirement exists to run the completed phase on 10 percent of all total coliform-positive confirmed tubes.

[6] MI agar also may be used. Preparation and use of MI agar is set forth in the article, "New medium for the simultaneous detection of total coliform and *Escherichia coli* in water" by Brenner, K.P., et. al., 1993, Appl. Environ. Microbiol. 59:3534–3544. Also available from the Office of Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington DC 20460, EPA/600/J–99/225. Verification of colonies is not required.

[7] The ONPG-MUG Test is also known as the Autoanalysis Colilert System.

[8] A–1 broth may be held up to 7 days in a tightly closed screw cap tube at 4 °C.

[9] "Methods for the Determination of Inorganic Substances in Environmental Samples", EPA/600/R–93/100, August 1993. Available at NTIS, PB94–121811.

[10] GLI Method 2, "Turbidity," November 2, 1992, Great Lakes Instruments, Inc., 8855 North 55th Street, Milwaukee, WI 53223.

[11] A description of the SimPlate method, "IDEXX SimPlate TM HPC Test Method for Heterotrophs in Water," November 2000, can be obtained from IDEXX Laboratories, Inc., 1 IDEXX Drive, Westbrook, ME 04092, telephone (800) 321–0207.

[12] A description of the Hach FilterTrak Method 10133, "Determination of Turbidity by Laser Nephelometry," January 2000, Revision 2.0, can be obtained from; Hach Co., P.O. Box 389, Loveland, CO 80539–0389, telephone: 800–227–4224.

[13] Styrene divinyl benzene beads (e.g., AMCO-AEPA–1 or equivalent) and stabilized formazin (e.g., Hach StablCal™ or equivalent) are acceptable substitutes for formazin.

(2) Public water systems must measure residual disinfectant concentrations with one of the analytical methods in the following table or one of the alternative methods listed in appendix A to subpart C of this part. If approved by the State, residual disinfectant concentrations for free chlorine and combined chlorine also may be measured by using DPD colorimetric test kits. In addition States may approve the use of the ITS free chlorine test strip for the determination of free chlorine. Use of the test strips is described in Method D99–003, "Free Chlorine Species ($HOCl^-$ and OCl^-) by Test Strip," Revision 3.0, November 21, 2003, available from Industrial Test Systems, Inc., 1875 Langston St., Rock Hill, SC 29730. Free and total chlorine residuals may be measured continuously by adapting a specified chlorine residual method for use with a continuous monitoring instrument provided the chemistry, accuracy, and precision remain the same. Instruments used for continuous monitoring must be calibrated with a grab sample measurement at least every five days, or with a protocol approved by the State.

Residual	Methodology	SM[1]	SM Online[2]	Other
Free Chlorine	Amperometric Titration	4500–Cl D	4500–Cl D–00	D1253–03[3]
	DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F–00.	
	DPD Colorimetric	4500–Cl G	4500–Cl G–00.	
	Syringaldazine (FACTS)	4500–Cl H	4500–Cl H–00.	
Total Chlorine	Amperometric Titration	4500–Cl D	4500–Cl D–00	D1253–03[3]
	Amperometric Titration (low level measurement)	4500–Cl E	4500–Cl E–00.	
	DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F–00.	
	DPD Colorimetric	4500–Cl G	4500–Cl G–00.	
	Iodometric Electrode	4500–Cl I	4500–Cl I–00.	
Chlorine Dioxide	Amperometric Titration	4500–ClO_2 C	4500–ClO_2 C–00.	
	DPD Method	4500–ClO_2 D.		
	Amperometric Titration	4500–ClO_2 E	4500–ClO_2 E–00.	
	Spectrophotometric			327.0, Revision 1.1[4]
Ozone	Indigo Method	4500–O_3 B	4500–O_3 B–97.	

[1] All the listed methods are contained in the 18th, 19th, and 20th editions of *Standard Methods for the Examination of Water and Wastewater,* 1992, 1995, and 1998; the cited methods published in any of these three editions may be used.

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

[3] *Annual Book of ASTM Standards,* Vol. 11.01, 2004 ; ASTM International; any year containing the cited version of the method may be used. Copies of this method may be obtained from ASTM International, 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19428–2959.

[4] EPA Method 327.0, Revision 1.1, ''Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry,'' USEPA, May 2005, EPA 815–R–05–008. Available online at *http://www.epa.gov/safewater/methods/sourcalt.html.*

(b) *Monitoring requirements for systems that do not provide filtration.* A public water system that uses a surface water source and does not provide filtration treatment must begin monitoring, as specified in this paragraph (b), beginning December 31, 1990, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must begin monitoring as specified in this paragraph (b) beginning December 31, 1990, or 6 months after the State determines that the ground water source is under the direct influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative monitoring requirements, as appropriate, until filtration is in place.

(1) Fecal coliform or total coliform density measurements as required by §141.71(a)(1) must be performed on representative source water samples immediately prior to the first or only point of disinfectant application. The system must sample for fecal or total coliforms at the following minimum frequency each week the system serves water to the public:

System size (persons served)	Samples/ week[1]
≤500	1
501 to 3,300	2
3,301 to 10,000	3
10,001 to 25,000	4
>25,000	5

[1] Must be taken on separate days.

Also, one fecal or total coliform density measurement must be made every day the system serves water to the public and the turbidity of the source water exceeds 1 NTU (these samples count towards the weekly coliform sampling requirement) unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection.

(2) Turbidity measurements as required by §141.71(a)(2) must be performed on representative grab samples of source water immediately prior to the first or only point of disinfectant application every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State.

(3) The total inactivation ratio for each day that the system is in operation must be determined based on the $CT_{99.9}$ values in tables 1.1–1.6, 2.1, and 3.1 of this section, as appropriate. The parameters necessary to determine the total inactivation ratio must be monitored as follows:

(i) The temperature of the disinfected water must be measured at least once per day at each residual disinfectant concentration sampling point.

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

(iii) The disinfectant contact time(s) (''T'') must be determined for each day during peak hourly flow.

(iv) The residual disinfectant concentration(s) (''C'') of the water before or at the first customer must be measured each day during peak hourly flow.

(v) If a system uses a disinfectant other than chlorine, the system may demonstrate to the State, through the use of a State-approved protocol for onsite disinfection challenge studies or other information satisfactory to the State, that $CT_{99.9}$ values other than those specified in tables 2.1 and 3.1 in this section other operational parameters are adequate to demonstrate that the system is achieving the minimum inactivation rates required by §141.72(a)(1).

Table 1.1—CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 0.5 °C or Lower[1]

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

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

Table 1.2—CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 5.0 °C[1]

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	97	117	139	166	198	236	279
0.6	100	120	143	171	204	244	291
0.8	103	122	146	175	210	252	301
1.0	105	125	149	179	216	260	312
1.2	107	127	152	183	221	267	320
1.4	109	130	155	187	227	274	329
1.6	111	132	158	192	232	281	337
1.8	114	135	162	196	238	287	345
2.0	116	138	165	200	243	294	353
2.2	118	140	169	204	248	300	361
2.4	120	143	172	209	253	306	368
2.6	122	146	175	213	258	312	375
2.8	124	148	178	217	263	318	382
3.0	126	151	182	221	268	324	389

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

Table 1.3—CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 10.0 °C[1]

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

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

Table 1.4—CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 15.0 °C[1]

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	49	59	70	83	99	118	140
0.6	50	60	72	86	102	122	146
0.8	52	61	73	88	105	126	151
1.0	53	63	75	90	108	130	156
1.2	54	64	76	92	111	134	160
1.4	55	65	78	94	114	137	165
1.6	56	66	79	96	116	141	169
1.8	57	68	81	98	119	144	173
2.0	58	69	83	100	122	147	177
2.2	59	70	85	102	124	150	181
2.4	60	72	86	105	127	153	184
2.6	61	73	88	107	129	156	188
2.8	62	74	89	109	132	159	191
3.0	63	76	91	111	134	162	195

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

Table 1.5—CT Values ($CT_{99.9}$) for 99.9 Percent Inactivation of Giardia Lamblia Cysts by Free Chlorine at 20 °C[1]

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
≤0.4	36	44	52	62	74	89	105
0.6	38	45	54	64	77	92	109
0.8	39	46	55	66	79	95	113
1.0	39	47	56	67	81	98	117
1.2	40	48	57	69	83	100	120
1.4	41	49	58	70	85	103	123
1.6	42	50	59	72	87	105	126

TABLE 1.5—CT VALUES (CT$_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 20 °C[1]—Continued

Free residual (mg/l)	pH						
	≤6.0	6.5	7.0	7.5	8.0	8.5	≤9.0
1.8	43	51	61	74	89	108	129
2.0	44	52	62	75	91	110	132
2.2	44	53	63	77	93	113	135
2.4	45	54	65	78	95	115	138
2.6	46	55	66	80	97	117	141
2.8	47	56	67	81	99	119	143
3.0	47	57	68	83	101	122	146

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

TABLE 1.6—CT VALUES (CT$_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY FREE CHLORINE AT 25 °C[1] AND HIGHER

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

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

TABLE 2.1—CT VALUES (CT$_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORINE DIOXIDE AND OZONE[1]

	Temperature					
	<1 °C	5 °C	10 °C	15 °C	20 °C	≥25 °C
Chlorine dioxide	63	26	23	19	15	11
Ozone	2.9	1.9	1.4	0.95	0.72	0.48

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

TABLE 3.1—CT VALUES (CT $_{99.9}$) FOR 99.9 PERCENT INACTIVATION OF GIARDIA LAMBLIA CYSTS BY CHLORAMINES[1]

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

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

(4) The total inactivation ratio must be calculated as follows:

(i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio based on either of the following two methods:

(A) One inactivation ratio (CTcalc/CT$_{99.9}$) is determined before or at the first customer during peak hourly flow and if the CTcalc/CT$_{99.9}$ ≥1.0, the 99.9 percent *Giardia lamblia* inactivation requirement has been achieved; or

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

$$(1) \qquad \text{Determine } \frac{\text{CTcalc}}{\text{CT}_{99.9}} \text{ for each sequence.}$$

$$(2) \qquad \text{Add the } \frac{\text{CTcalc}}{\text{CT}_{99.9}} \text{ values together} \left(\sum \frac{(\text{CTcalc})}{\text{CT}_{99.9}} \right)$$

$$(3) \qquad \text{If } \sum \left(\frac{\text{CTcalc}}{\text{CT}_{99.9}} \right) \geq 1.0, \text{ the 99.9 percent } \textit{Giardia}$$

lamblia inactivation requirement has been achieved.

(ii) If the system uses more than one point of disinfectant application before or at the first customer, the system must determine the CT value of each disinfection sequence immediately prior to the next point of disinfectant application during peak hourly flow. The CTcalc/$\text{CT}_{99.9}$ value of each sequence and

$$\sum \frac{\text{CTcalc}}{\text{CT}_{99.9}}$$

must be calculated using the method in paragraph (b)(4)(i)(B) of this section to determine if the system is in compliance with § 141.72(a).

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

$$\text{Percent inactivation} = 100 - \frac{100}{10^z}$$

$$\text{where } z = 3 \times \sum \left(\frac{\text{CTcalc}}{\text{CT}_{99.9}} \right)$$

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

System size by population	Samples/ day [1]
<500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

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

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

(6)(i) Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in § 141.21. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §§ 141.854 through 141.858. The State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(1) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(1) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(6)(i) of this section do not apply to that system.

(c) *Monitoring requirements for systems using filtration treatment.* A public water system that uses a surface water source or a ground water source under the influence of surface water and provides filtration treatment must monitor in accordance with this paragraph (c) beginning June 29, 1993, or when filtration is installed, whichever is later.

(1) Turbidity measurements as required by § 141.73 must be performed on representative samples of the system's filtered water every four hours (or more frequently) that the system serves water to the public. A public water system may substitute continuous turbidity monitoring for grab sample monitoring if it validates the continuous measurement for accuracy on a regular basis using a protocol approved by the State. For any systems using slow sand filtration or filtration treatment other than conventional treatment, direct filtration, or diatomaceous earth filtration, the State may reduce the sampling frequency to once per day if it determines that less frequent monitoring is sufficient to indicate effective filtration performance. For systems serving 500 or fewer persons, the State may reduce the turbidity sampling frequency to once per day, regardless of the type of filtration treatment used, if the State determines that less frequent monitoring is sufficient to indicate effective filtration performance.

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

System size by population	Samples/ day [1]
±500	1
501 to 1,000	2
1,001 to 2,500	3
2,501 to 3,300	4

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

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

(3)(i) Until March 31, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in § 141.21. Beginning April 1, 2016, the residual disinfectant concentration must be measured at least at the same points in the distribution system and at the same time as total coliforms are sampled, as specified in §§ 141.854 through 141.858. The State may allow a public water system which uses both a surface water source or a ground water source under direct influence of surface water, and a ground water source, to take disinfectant residual samples at points other than the total coliform sampling points if the State determines that such points are more representative of treated (disinfected) water quality within the distribution system. Heterotrophic bacteria, measured as heterotrophic plate count (HPC) as specified in paragraph (a)(1) of this section, may be measured in lieu of residual disinfectant concentration.

(ii) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by paragraph (a)(1) of this section and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (c)(3)(i) of this section do not apply to that system.

[54 FR 27527, June 29, 1989, as amended at 59 FR 62470, Dec. 5, 1994; 60 FR 34086, June 29, 1995; 64 FR 67465, Dec. 1, 1999; 67 FR 65252, Oct. 23, 2002; 67 FR 65901, Oct. 29, 2002; 69 FR 38856, June 29, 2004; 72 FR 11247, Mar. 12, 2007; 74 FR 30958, June 29, 2009; 78 FR 10347, Feb. 13, 2013]

§ 141.75 Reporting and recordkeeping requirements.

(a) A public water system that uses a surface water source and does not provide filtration treatment must report monthly to the State the information specified in this paragraph (a) beginning December 31, 1990, unless the State has determined that filtration is required in writing pursuant to section 1412(b)(7)(C)(iii), in which case the State may specify alternative reporting requirements, as appropriate, until filtration is in place. A public water system that uses a ground water source under the direct influence of surface water and does not provide filtration treatment must report monthly to the State the information specified in this paragraph (a) beginning December 31, 1990, or 6 months after the State determines that the ground water source is under the direct influence of surface water, whichever is later, unless the State has determined that filtration is required in writing pursuant to §1412(b)(7)(C)(iii), in which case the State may specify alternative reporting requirements, as appropriate, until filtration is in place.

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

(i) The cumulative number of months for which results are reported.

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

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

(iv) The cumulative number of fecal or total coliform samples, whichever are analyzed, during the previous six months the system served water to the public.

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

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

(vii) The maximum turbidity level measured during the month, the date(s) of occurrence for any measurement(s) which exceeded 5 NTU, and the date(s) the occurrence(s) was reported to the State.

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

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

(2) Disinfection information specified in §141.74(b) must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

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

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

(iii) The daily residual disinfectant concentration(s) (in mg/l) and disinfectant contact time(s) (in minutes) used for calculating the CT value(s).

(iv) If chlorine is used, the daily measurement(s) of pH of disinfected water following each point of chlorine disinfection.

(v) The daily measurement(s) of water temperature in °C following each point of disinfection.

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

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

(viii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to §141.72:

(A) Number of instances where the residual disinfectant concentration is measured;

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

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where the residual disinfectant concentration is detected and where HPC is >500/ml;

(E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;

(F) For the current and previous month the system served water to the public, the value of "V" in the following formula:

$$V = \frac{c + d + e}{a + b} \times 100$$

where:

a = the value in paragraph (a)(2)(viii)(A) of this section,
b = the value in paragraph (a)(2)(viii)(B) of this section,
c = the value in paragraph (a)(2)(viii)(C) of this section,
d = the value in paragraph (a)(2)(viii)(D) of this section, and
e = the value in paragraph (a)(2)(viii)(E) of this section.

(G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory under the requisite time and temperature conditions specified by §141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (a)(2)(viii) (A)–(F) of this section do not apply to that system.

(ix) A system need not report the data listed in paragraphs (a)(2) (i), and (iii)–(vi) of this section if all data listed in paragraphs (a)(2) (i)–(viii) of this section remain on file at the system, and the State determines that:

(A) The system has submitted to the State all the information required by paragraphs (a)(2) (i)–(viii) of this section for at least 12 months; and

(B) The State has determined that the system is not required to provide filtration treatment.

(3) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report which summarizes its compliance with all watershed control program requirements specified in §141.71(b)(2).

(4) No later than ten days after the end of each Federal fiscal year (September 30), each system must provide to the State a report on the on-site inspection conducted during that year pursuant to §141.71(b)(3), unless the on-site inspection was conducted by the State. If the inspection was conducted by the State, the State must provide a copy of its report to the public water system.

(5)(i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.

(ii) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under § 141.203(b)(3).

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

(b) A public water system that uses a surface water source or a ground water source under the direct influence of surface water and provides filtration treatment must report monthly to the State the information specified in this paragraph (b) beginning June 29, 1993, or when filtration is installed, whichever is later.

(1) Turbidity measurements as required by § 141.74(c)(1) must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

(i) The total number of filtered water turbidity measurements taken during the month.

(ii) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in § 141.73 for the filtration technology being used.

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

(2) Disinfection information specified in § 141.74(c) must be reported to the State within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

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

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

(iii) The following information on the samples taken in the distribution system in conjunction with total coliform monitoring pursuant to § 141.72:

(A) Number of instances where the residual disinfectant concentration is measured;

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

(C) Number of instances where the residual disinfectant concentration is measured but not detected and no HPC is measured;

(D) Number of instances where no residual disinfectant concentration is detected and where HPC is >500/ml;

(E) Number of instances where the residual disinfectant concentration is not measured and HPC is >500/ml;

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

$$V = \frac{c + d + e}{a + b} \times 100$$

where:

a = the value in paragraph (b)(2)(iii)(A) of this section,
b = the value in paragraph (b)(2)(iii)(B) of this section,
c = the value in paragraph (b)(2)(iii)(C) of this section,
d = the value in paragraph (b)(2)(iii)(D) of this section, and
e = the value in paragraph (b)(2)(iii)(E) of this section.

(G) If the State determines, based on site-specific considerations, that a system has no means for having a sample transported and analyzed for HPC by a certified laboratory within the requisite time and temperature conditions specified by § 141.74(a)(1) and that the system is providing adequate disinfection in the distribution system, the requirements of paragraph (b)(2)(iii) (A)–(F) of this section do not apply.

(iv) A system need not report the data listed in paragraph (b)(2)(i) of this section if all data listed in paragraphs (b)(2) (i)–(iii) of this section remain on file at the system and the State determines that the system has submitted all the information required by paragraphs (b)(2) (i)–(iii) of this section for at least 12 months.

(3)(i) Each system, upon discovering that a waterborne disease outbreak potentially attributable to that water system has occurred, must report that occurrence to the State as soon as possible, but no later than by the end of the next business day.

(ii) If at any time the turbidity exceeds 5 NTU, the system must consult with the primacy agency as soon as practical, but no later than 24 hours after the exceedance is known, in accordance with the public notification requirements under § 141.203(b)(3).

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

[54 FR 27527, June 29, 1989, as amended at 65 FR 26022, May 4, 2000; 69 FR 38856, June 29, 2004]

§ 141.76 Recycle provisions.

(a) *Applicability.* All subpart H systems that employ conventional filtration or direct filtration treatment and that recycle spent filter backwash water, thickener supernatant, or liquids from dewatering processes must meet the requirements in paragraphs (b) through (d) of this section.

(b) *Reporting.* A system must notify the State in writing by Decemeber 8, 2003, if the system recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes. This notification must include, at a minimum, the information specified in paragraphs (b)(1) and (2) of this section.

(1) A plant schematic showing the origin of all flows which are recycled (including, but not limited to, spent filter backwash water, thickener supernatant, and liquids from dewatering processes), the hydraulic conveyance used to transport them, and the location where they are re-introduced back into the treatment plant.

(2) Typical recycle flow in gallons per minute (gpm), the highest observed plant flow experienced in the previous year (gpm), design flow for the treatment plant (gpm), and State-approved operating capacity for the plant where the State has made such determinations.

(c) *Treatment technique requirement.* Any system that recycles spent filter backwash water, thickener supernatant, or liquids from dewatering processes must return these flows through the processes of a system's existing conventional or direct filtration system as defined in § 141.2 or at an alternate location approved by the State by June 8, 2004. If capital improvements are required to modify the recycle location to meet this requirement, all capital improvements must be completed no later than June 8, 2006.

(d) *Recordkeeping.* The system must collect and retain on file recycle flow information specified in paragraphs (d)(1) through (6) of this section for review and evaluation by the State beginning June 8, 2004.

(1) Copy of the recycle notification and information submitted to the State under paragraph (b) of this section.

(2) List of all recycle flows and the frequency with which they are returned.

(3) Average and maximum backwash flow rate through the filters and the average and maximum duration of the filter backwash process in minutes.

(4) Typical filter run length and a written summary of how filter run length is determined.

(5) The type of treatment provided for the recycle flow.

(6) Data on the physical dimensions of the equalization and/or treatment units, typical and maximum hydraulic loading rates, type of treatment chemicals used and average dose and frequency of use, and frequency at which solids are removed, if applicable.

[66 FR 31103, June 8, 2001]

Subpart I—Control of Lead and Copper

SOURCE: 56 FR 26548, June 7, 1991, unless otherwise noted.

§ 141.80 General requirements.

(a) *Applicability and effective dates.* (1) The requirements of this subpart I constitute the national primary drinking water regulations for lead and copper. Unless otherwise indicated, each of the provisions of this subpart applies to community water systems and non-transient, non-community water systems (hereinafter referred to as ''water systems'' or ''systems'').

(2) [Reserved]

(b) *Scope.* These regulations establish a treatment technique that includes requirements for corrosion control treatment, source water treatment, lead service line replacement, and public education. These requirements are triggered, in some cases, by lead and copper action levels measured in samples collected at consumers' taps.

(c) *Lead and copper action levels.* (1) The lead action level is exceeded if the concentration of lead in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with § 141.86 is greater than 0.015 mg/L (*i.e.*, if the ''90th percentile'' lead level is greater than 0.015 mg/L).

(2) The copper action level is exceeded if the concentration of copper in more than 10 percent of tap water samples collected during any monitoring period conducted in accordance with § 141.86 is greater than 1.3 mg/L (*i.e.*, if the ''90th percentile'' copper level is greater than 1.3 mg/L).

(3) The 90th percentile lead and copper levels shall be computed as follows:

(i) The results of all lead or copper samples taken during a monitoring period shall be placed in ascending order from the sample with the lowest concentration to the sample with the highest concentration. Each sampling result shall be assigned a number, ascending by single integers beginning with the number 1 for the sample with the lowest contaminant level. The number assigned to the sample with the highest contaminant level shall be equal to the total number of samples taken.

(ii) The number of samples taken during the monitoring period shall be multiplied by 0.9.

(iii) The contaminant concentration in the numbered sample yielded by the calculation in paragraph (c)(3)(ii) is the 90th percentile contaminant level.

(iv) For water systems serving fewer than 100 people that collect 5 samples per monitoring period, the 90th percentile is computed by taking the average of the highest and second highest concentrations.

(v) For a public water system that has been allowed by the State to collect fewer than five samples in accordance with § 141.86(c), the sample result with the highest concentration is considered the 90th percentile value.

(d) *Corrosion control treatment requirements.* (1) All water systems shall install and operate optimal corrosion control treatment as defined in § 141.2.

(2) Any water system that complies with the applicable corrosion control treatment requirements specified by the State under §§ 141.81 and 141.82 shall be deemed in compliance with the treatment requirement contained in paragraph (d)(1) of this section.

(e) *Source water treatment requirements.* Any system exceeding the lead or copper action level shall implement all applicable source water treatment requirements specified by the State under § 141.83.

(f) *Lead service line replacement requirements.* Any system exceeding the lead action level after implementation of applicable corrosion control and source water treatment requirements shall complete the lead service line replacement requirements contained in § 141.84.

(g) *Public education requirements.* Pursuant to § 141.85, all water systems must provide a consumer notice of lead tap water monitoring results to persons served at the sites (taps) that are tested. Any system exceeding the lead action level shall implement the public education requirements.

(h) *Monitoring and analytical requirements.* Tap water monitoring for lead and copper, monitoring for water quality parameters, source water monitoring for lead and copper, and analyses of the monitoring results under this subpart shall be completed in compliance with §§141.86, 141.87, 141.88, and 141.89.

(i) *Reporting requirements.* Systems shall report to the State any information required by the treatment provisions of this subpart and §141.90.

(j) *Recordkeeping requirements.* Systems shall maintain records in accordance with §141.91.

(k) *Violation of national primary drinking water regulations.* Failure to comply with the applicable requirements of §§141.80–141.91, including requirements established by the State pursuant to these provisions, shall constitute a violation of the national primary drinking water regulations for lead and/or copper.

[56 FR 26548, June 7, 1991; 57 FR 28788, June 29, 1992, as amended at 72 FR 57814, Oct. 10, 2007]

§ 141.81 Applicability of corrosion control treatment steps to small, medium-size and large water systems.

(a) Systems shall complete the applicable corrosion control treatment requirements described in §141.82 by the deadlines established in this section.

(1) A large system (serving >50,000 persons) shall complete the corrosion control treatment steps specified in paragraph (d) of this section, unless it is deemed to have optimized corrosion control under paragraph (b)(2) or (b)(3) of this section.

(2) A small system (serving ≤3300 persons) and a medium-size system (serving >3,300 and ≤50,000 persons) shall complete the corrosion control treatment steps specified in paragraph (e) of this section, unless it is deemed to have optimized corrosion control under paragraph (b)(1), (b)(2), or (b)(3) of this section.

(b) A system is deemed to have optimized corrosion control and is not required to complete the applicable corrosion control treatment steps identified in this section if the system satisfies one of the criteria specified in paragraphs (b)(1) through (b)(3) of this section. Any such system deemed to have optimized corrosion control under this paragraph, and which has treatment in place, shall continue to operate and maintain optimal corrosion control treatment and meet any requirements that the State determines appropriate to ensure optimal corrosion control treatment is maintained.

(1) A small or medium-size water system is deemed to have optimized corrosion control if the system meets the lead and copper action levels during each of two consecutive six-month monitoring periods conducted in accordance with §141.86.

(2) Any water system may be deemed by the State to have optimized corrosion control treatment if the system demonstrates to the satisfaction of the State that it has conducted activities equivalent to the corrosion control steps applicable to such system under this section. If the State makes this determination, it shall provide the system with written notice explaining the basis for its decision and shall specify the water quality control parameters representing optimal corrosion control in accordance with §141.82(f). Water systems deemed to have optimized corrosion control under this paragraph shall operate in compliance with the State-designated optimal water quality control parameters in accordance with §141.82(g) and continue to conduct lead and copper tap and water quality parameter sampling in accordance with §141.86(d)(3) and §141.87(d), respectively. A system shall provide the State with the following information in order to support a determination under this paragraph:

(i) The results of all test samples collected for each of the water quality parameters in §141.82(c)(3).

(ii) A report explaining the test methods used by the water system to evaluate the corrosion control treatments listed in §141.82(c)(1), the results of all tests conducted, and the basis for the system's selection of optimal corrosion control treatment;

(iii) A report explaining how corrosion control has been installed and how it is being maintained to insure minimal lead and copper concentrations at consumers' taps; and

(iv) The results of tap water samples collected in accordance with §141.86 at least once every six months for one year after corrosion control has been installed.

(3) Any water system is deemed to have optimized corrosion control if it submits results of tap water monitoring conducted in accordance with §141.86 and source water monitoring conducted in accordance with §141.88 that demonstrates for two consecutive 6-month monitoring periods that the difference between the 90th percentile tap water lead level computed under §141.80(c)(3), and the highest source water lead concentration is less than the Practical Quantitation Level for lead specified in §141.89(a)(1)(ii).

(i) Those systems whose highest source water lead level is below the Method Detection Limit may also be deemed to have optimized corrosion control under this paragraph if the 90th percentile tap water lead level is less than or equal to the Practical Quantitation Level for lead for two consecutive 6-month monitoring periods.

(ii) Any water system deemed to have optimized corrosion control in accordance with this paragraph shall continue monitoring for lead and copper at the tap no less frequently than once every three calendar years using the reduced number of sites specified in §141.86(c) and collecting the samples at times and locations specified in §141.86(d)(4)(iv). Any such system that has not conducted a round of monitoring pursuant to §141.86(d) since September 30, 1997, shall complete a round of monitoring pursuant to this paragraph no later than September 30, 2000.

(iii) Any water system deemed to have optimized corrosion control pursuant to this paragraph shall notify the State in writing pursuant to §141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State may require any such system to conduct additional monitoring or to take other action the State deems appropriate to ensure that such systems maintain minimal levels of corrosion in the distribution system.

(iv) As of July 12, 2001, a system is not deemed to have optimized corrosion control under this paragraph, and shall implement corrosion control treatment pursuant to paragraph (b)(3)(v) of this section unless it meets the copper action level.

(v) Any system triggered into corrosion control because it is no longer deemed to have optimized corrosion control under this paragraph shall implement corrosion control treatment in accordance with the deadlines in paragraph (e) of this section. Any such large system shall adhere to the schedule specified in that paragraph for medium-size systems, with the time periods for completing each step being triggered by the date the system is no longer deemed to have optimized corrosion control under this paragraph.

(c) Any small or medium-size water system that is required to complete the corrosion control steps due to its exceedance of the lead or copper action level may cease completing the treatment steps whenever the system meets both action levels during each of two consecutive monitoring periods conducted pursuant to §141.86 and submits the results to the State. If any such water system thereafter exceeds the lead or copper action level during any monitoring period, the system (or the State, as the case may be) shall recommence completion of the applicable treatment steps, beginning with the first treatment step which was not previously completed in its entirety. The State may require a system to repeat treatment steps previously completed by the system where the State determines that this is necessary to implement properly the treatment requirements of this section. The State shall notify the system in writing of such a determination and explain the basis for its decision. The requirement for any small- or medium-size system to implement corrosion control treatment steps in accordance with paragraph (e) of this section (including systems deemed to have optimized corrosion control under paragraph (b)(1) of this section) is triggered whenever any small- or medium-size system exceeds the lead or copper action level.

(d) *Treatment steps and deadlines for large systems.* Except as provided in paragraph (b) (2) and (3) of this section, large systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§ 141.82, 141.86, and 141.87) by the indicated dates.

(1) *Step 1:* The system shall conduct initial monitoring (§ 141.86(d)(1) and § 141.87(b)) during two consecutive six-month monitoring periods by January 1, 1993.

(2) *Step 2:* The system shall complete corrosion control studies (§ 141.82(c)) by July 1, 1994.

(3) *Step 3:* The State shall designate optimal corrosion control treatment (§ 141.82(d)) by January 1, 1995.

(4) *Step 4:* The system shall install optimal corrosion control treatment (§ 141.82(e)) by January 1, 1997.

(5) *Step 5:* The system shall complete follow-up sampling (§ 141.86(d)(2) and § 141.87(c)) by January 1, 1998.

(6) *Step 6:* The State shall review installation of treatment and designate optimal water quality control parameters (§ 141.82(f)) by July 1, 1998.

(7) *Step 7:* The system shall operate in compliance with the State-specified optimal water quality control parameters (§ 141.82(g)) and continue to conduct tap sampling (§ 141.86(d)(3) and § 141.87(d)).

(e) *Treatment Steps and deadlines for small and medium-size systems.* Except as provided in paragraph (b) of this section, small and medium-size systems shall complete the following corrosion control treatment steps (described in the referenced portions of §§ 141.82, 141.86 and 141.87) by the indicated time periods.

(1) *Step 1:* The system shall conduct initial tap sampling (§ 141.86(d)(1) and § 141.87(b)) until the system either exceeds the lead or copper action level or becomes eligible for reduced monitoring under § 141.86(d)(4). A system exceeding the lead or copper action level shall recommend optimal corrosion control treatment (§ 141.82(a)) within six months after the end of the monitoring period during which it exceeds one of the action levels.

(2) *Step 2:* Within 12 months after the end of the monitoring period during which a system exceeds the lead or copper action level, the State may require the system to perform corrosion control studies (§ 141.82(b)). If the State does not require the system to perform such studies, the State shall specify optimal corrosion control treatment (§ 141.82(d)) within the following timeframes:

(i) For medium-size systems, within 18 months after the end of the monitoring period during which such system exceeds the lead or copper action level.

(ii) For small systems, within 24 months after the end of the monitoring period during which such system exceeds the lead or copper action level.

(3) *Step 3:* If the State requires a system to perform corrosion control studies under step 2, the system shall complete the studies (§ 141.82(c)) within 18 months after the State requires that such studies be conducted.

(4) *Step 4:* If the system has performed corrosion control studies under step 2, the State shall designate optimal corrosion control treatment (§ 141.82(d)) within 6 months after completion of step 3.

(5) *Step 5:* The system shall install optimal corrosion control treatment (§ 141.82(e)) within 24 months after the State designates such treatment.

(6) *Step 6:* The system shall complete follow-up sampling (§ 141.86(d)(2) and § 141.87(c)) within 36 months after the State designates optimal corrosion control treatment.

(7) *Step 7:* The State shall review the system's installation of treatment and designate optimal water quality control parameters (§ 141.82(f)) within 6 months after completion of step 6.

(8) *Step 8:* The system shall operate in compliance with the State-designated optimal water quality control parameters (§ 141.82(g)) and continue to conduct tap sampling (§ 141.86(d)(3) and § 141.87(d)).

[56 FR 26548, June 7, 1991, as amended at 59 FR 33862, June 30, 1994; 65 FR 2004, Jan. 12, 2000; 72 FR 57814, Oct. 10, 2007]

§ 141.82 Description of corrosion control treatment requirements.

Each system shall complete the corrosion control treatment requirements described below which are applicable to such system under § 141.81.

(a) *System recommendation regarding corrosion control treatment.* Based upon the results of lead and copper tap monitoring and water quality parameter monitoring, small and medium-size water systems exceeding the lead or copper action level shall recommend installation of one or more of the corrosion control treatments listed in paragraph (c)(1) of this section which the system believes constitutes optimal corrosion control for that system. The State may require the system to conduct additional water quality parameter monitoring in accordance with §141.87(b) to assist the State in reviewing the system's recommendation.

(b) *State decision to require studies of corrosion control treatment (applicable to small and medium-size systems).* The State may require any small or medium-size system that exceeds the lead or copper action level to perform corrosion control studies under paragraph (c) of this section to identify optimal corrosion control treatment for the system.

(c) *Performance of corrosion control studies.* (1) Any public water system performing corrosion control studies shall evaluate the effectiveness of each of the following treatments, and, if appropriate, combinations of the following treatments to identify the optimal corrosion control treatment for that system:

(i) Alkalinity and pH adjustment;

(ii) Calcium hardness adjustment; and

(iii) The addition of a phosphate or silicate based corrosion inhibitor at a concentration sufficient to maintain an effective residual concentration in all test tap samples.

(2) The water system shall evaluate each of the corrosion control treatments using either pipe rig/loop tests, metal coupon tests, partial-system tests, or analyses based on documented analogous treatments with other systems of similar size, water chemistry and distribution system configuration.

(3) The water system shall measure the following water quality parameters in any tests conducted under this paragraph before and after evaluating the corrosion control treatments listed above:

(i) Lead;

(ii) Copper;

(iii) pH;

(iv) Alkalinity;

(v) Calcium;

(vi) Conductivity;

(vii) Orthophosphate (when an inhibitor containing a phosphate compound is used);

(viii) Silicate (when an inhibitor containing a silicate compound is used);

(ix) Water temperature.

(4) The water system shall identify all chemical or physical constraints that limit or prohibit the use of a particular corrosion control treatment and document such constraints with at least one of the following:

(i) Data and documentation showing that a particular corrosion control treatment has adversely affected other water treatment processes when used by another water system with comparable water quality characteristics; and/or

(ii) Data and documentation demonstrating that the water system has previously attempted to evaluate a particular corrosion control treatment and has found that the treatment is ineffective or adversely affects other water quality treatment processes.

(5) The water system shall evaluate the effect of the chemicals used for corrosion control treatment on other water quality treatment processes.

(6) On the basis of an analysis of the data generated during each evaluation, the water system shall recommend to the State in writing the treatment option that the corrosion control studies indicate constitutes optimal corrosion control treatment for that system. The water system shall provide a rationale for its recommendation along with all supporting documentation specified in paragraphs (c) (1) through (5) of this section.

(d) *State designation of optimal corrosion control treatment.* (1) Based upon consideration of available information including, where applicable, studies performed under paragraph (c) of this section and a system's recommended treatment alternative, the State shall either approve the corrosion control treatment option recommended by the system, or designate alternative corrosion control treatment(s) from among those listed in paragraph (c)(1) of this section. When designating optimal treatment the State shall consider the effects that additional corrosion control treatment will have on water quality parameters and on other water quality treatment processes.

(2) The State shall notify the system of its decision on optimal corrosion control treatment in writing and explain the basis for this determination. If the State requests additional information to aid its review, the water system shall provide the information.

(e) *Installation of optimal corrosion control.* Each system shall properly install and operate throughout its distribution system the optimal corrosion control treatment designated by the State under paragraph (d) of this section.

(f) *State review of treatment and specification of optimal water quality control parameters.* The State shall evaluate the results of all lead and copper tap samples and water quality parameter samples submitted by the water system and determine whether the system has properly installed and operated the optimal corrosion control treatment designated by the State in paragraph (d) of this section. Upon reviewing the results of tap water and water quality parameter monitoring by the system, both before and after the system installs optimal corrosion control treatment, the State shall designate:

(1) A minimum value or a range of values for pH measured at each entry point to the distribution system;

(2) A minimum pH value, measured in all tap samples. Such value shall be equal to or greater than 7.0, unless the State determines that meeting a pH level of 7.0 is not technologically feasible or is not necessary for the system to optimize corrosion control;

(3) If a corrosion inhibitor is used, a minimum concentration or a range of concentrations for the inhibitor, measured at each entry point to the distribution system and in all tap samples, that the State determines is necessary to form a passivating film on the interior walls of the pipes of the distribution system;

(4) If alkalinity is adjusted as part of optimal corrosion control treatment, a minimum concentration or a range of concentrations for alkalinity, measured at each entry point to the distribution system and in all tap samples;

(5) If calcium carbonate stabilization is used as part of corrosion control, a minimum concentration or a range of concentrations for calcium, measured in all tap samples.

The values for the applicable water quality control parameters listed above shall be those that the State determines to reflect optimal corrosion control treatment for the system. The State may designate values for additional water quality control parameters determined by the State to reflect optimal corrosion control for the system. The State shall notify the system in writing of these determinations and explain the basis for its decisions.

(g) *Continued operation and monitoring.* All systems optimizing corrosion control shall continue to operate and maintain optimal corrosion control treatment, including maintaining water quality parameters at or above minimum values or within ranges designated by the State under paragraph (f) of this section, in accordance with this paragraph for all samples collected under §141.87(d) through (f). Compliance with the requirements of this paragraph shall be determined every six months, as specified under §141.87(d). A water system is out of compliance with the requirements of this paragraph for a six-month period if it has excursions for any State-specified parameter on more than nine days during the period. An excursion occurs whenever the daily value for one or more of the water quality parameters measured at a sampling location is below the minimum value or outside the range designated by the State. Daily values are calculated as follows. States have discretion to delete results of obvious sampling errors from this calculation.

(1) On days when more than one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the average of all results collected during the day regardless of whether they are collected through continuous monitoring, grab sampling, or a combination of both. If EPA has approved an alternative formula under §142.16 of this chapter in the State's application for a

program revision submitted pursuant to § 142.12 of this chapter, the State's formula shall be used to aggregate multiple measurements taken at a sampling point for the water quality parameter in lieu of the formula in this paragraph.

(2) On days when only one measurement for the water quality parameter is collected at the sampling location, the daily value shall be the result of that measurement.

(3) On days when no measurement is collected for the water quality parameter at the sampling location, the daily value shall be the daily value calculated on the most recent day on which the water quality parameter was measured at the sample site.

(h) *Modification of State treatment decisions.* Upon its own initiative or in response to a request by a water system or other interested party, a State may modify its determination of the optimal corrosion control treatment under paragraph (d) of this section or optimal water quality control parameters under paragraph (f) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The State may modify its determination where it concludes that such change is necessary to ensure that the system continues to optimize corrosion control treatment. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the State's decision, and provide an implementation schedule for completing the treatment modifications.

(i) *Treatment decisions by EPA in lieu of the State.* Pursuant to the procedures in § 142.19, the EPA Regional Administrator may review treatment determinations made by a State under paragraphs (d), (f), or (h) of this section and issue federal treatment determinations consistent with the requirements of those paragraphs where the Regional Administrator finds that:

(1) A State has failed to issue a treatment determination by the applicable deadlines contained in § 141.81,

(2) A State has abused its discretion in a substantial number of cases or in cases affecting a substantial population, or

(3) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

[56 FR 26548, June 7, 1991, as amended at 65 FR 2004, Jan. 12, 2000]

§ 141.83 Source water treatment requirements.

Systems shall complete the applicable source water monitoring and treatment requirements (described in the referenced portions of paragraph (b) of this section, and in §§ 141.86, and 141.88) by the following deadlines.

(a) *Deadlines for completing source water treatment steps*—(1) *Step 1:* A system exceeding the lead or copper action level shall complete lead and copper source water monitoring (§ 141.88(b)) and make a treatment recommendation to the State (§ 141.83(b)(1)) no later than 180 days after the end of the monitoring period during which the lead or copper action level was exceeded.

(2) *Step 2:* The State shall make a determination regarding source water treatment (§ 141.83(b)(2)) within 6 months after submission of monitoring results under step 1.

(3) *Step 3:* If the State requires installation of source water treatment, the system shall install the treatment (§ 141.83(b)(3)) within 24 months after completion of step 2.

(4) *Step 4:* The system shall complete follow-up tap water monitoring (§ 141.86(d)(2) and source water monitoring (§ 141.88(c)) within 36 months after completion of step 2.

(5) *Step 5:* The State shall review the system's installation and operation of source water treatment and specify maximum permissible source water levels (§ 141.83(b)(4)) within 6 months after completion of step 4.

(6) *Step 6:* The system shall operate in compliance with the State-specified maximum permissible lead and copper source water levels (§ 141.83(b)(4)) and continue source water monitoring (§ 141.88(d)).

(b) *Description of source water treatment requirements*—(1) *System treatment recommendation.* Any system which exceeds the lead or copper action level shall recommend in writing to the State the installation and operation of one of the source water treatments listed in paragraph (b)(2) of this section. A system may recommend that no treatment be installed based upon a demonstration that source water treatment is not necessary to minimize lead and copper levels at users' taps.

(2) *State determination regarding source water treatment.* The State shall complete an evaluation of the results of all source water samples submitted by the water system to determine whether source water treatment is necessary to minimize lead or copper levels in water delivered to users' taps. If the State determines that treatment is needed, the State shall either require installation and operation of the source water treatment recommended by the system (if any) or require the installation and operation of another source water treatment from among the following: Ion exchange, reverse osmosis, lime softening or coagulation/filtration. If the State requests additional information to aid in its review, the water system shall provide the information by the date specified by the State in its request. The State shall notify the system in writing of its determination and set forth the basis for its decision.

(3) *Installation of source water treatment.* Each system shall properly install and operate the source water treatment designated by the State under paragraph (b)(2) of this section.

(4) *State review of source water treatment and specification of maximum permissible source water levels.* The State shall review the source water samples taken by the water system both before and after the system installs source water treatment, and determine whether the system has properly installed and operated the source water treatment designated by the State. Based upon its review, the State shall designate the maximum permissible lead and copper concentrations for finished water entering the distribution system. Such levels shall reflect the contaminant removal capability of the treatment properly operated and maintained. The State shall notify the system in writing and explain the basis for its decision.

(5) *Continued operation and maintenance.* Each water system shall maintain lead and copper levels below the maximum permissible concentrations designated by the State at each sampling point monitored in accordance with §141.88. The system is out of compliance with this paragraph if the level of lead or copper at any sampling point is greater than the maximum permissible concentration designated by the State.

(6) *Modification of State treatment decisions.* Upon its own initiative or in response to a request by a water system or other interested party, a State may modify its determination of the source water treatment under paragraph (b)(2) of this section, or maximum permissible lead and copper concentrations for finished water entering the distribution system under paragraph (b)(4) of this section. A request for modification by a system or other interested party shall be in writing, explain why the modification is appropriate, and provide supporting documentation. The State may modify its determination where it concludes that such change is necessary to ensure that the system continues to minimize lead and copper concentrations in source water. A revised determination shall be made in writing, set forth the new treatment requirements, explain the basis for the State's decision, and provide an implementation schedule for completing the treatment modifications.

(7) *Treatment decisions by EPA in lieu of the State.* Pursuant to the procedures in §142.19, the EPA Regional Administrator may review treatment determinations made by a State under paragraphs (b) (2), (4), or (6) of this section and issue Federal treatment determinations consistent with the requirements of those paragraphs where the Administrator finds that:

(i) A State has failed to issue a treatment determination by the applicable deadlines contained in §141.83(a),

(ii) A state has abused its discretion in a substantial number of cases or in cases affecting a substantial population, or

(iii) The technical aspects of a State's determination would be indefensible in an expected Federal enforcement action taken against a system.

[56 FR 26548, June 7, 1991, as amended at 72 FR 57815, Oct. 10, 2007]

§ 141.84 Lead service line replacement requirements.

(a) Systems that fail to meet the lead action level in tap samples taken pursuant to § 141.86(d)(2), after installing corrosion control and/or source water treatment (whichever sampling occurs later), shall replace lead service lines in accordance with the requirements of this section. If a system is in violation of § 141.81 or § 141.83 for failure to install source water or corrosion control treatment, the State may require the system to commence lead service line replacement under this section after the date by which the system was required to conduct monitoring under § 141.86(d)(2) has passed.

(b)(1) A water system shall replace annually at least 7 percent of the initial number of lead service lines in its distribution system. The initial number of lead service lines is the number of lead lines in place at the time the replacement program begins. The system shall identify the initial number of lead service lines in its distribution system, including an identification of the portion(s) owned by the system, based on a materials evaluation, including the evaluation required under § 141.86(a) and relevant legal authorities (e.g., contracts, local ordinances) regarding the portion owned by the system. The first year of lead service line replacement shall begin on the first day following the end of the monitoring period in which the action level was exceeded under paragraph (a) of this section. If monitoring is required annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs. If the State has established an alternate monitoring period, then the end of the monitoring period will be the last day of that period.

(2) Any water system resuming a lead service line replacement program after the cessation of its lead service line replacement program as allowed by paragraph (f) of this section shall update its inventory of lead service lines to include those sites that were previously determined not to require replacement through the sampling provision under paragraph (c) of this section. The system will then divide the updated number of remaining lead service lines by the number of remaining years in the program to determine the number of lines that must be replaced per year (7 percent lead service line replacement is based on a 15-year replacement program, so, for example, systems resuming lead service line replacement after previously conducting two years of replacement would divide the updated inventory by 13). For those systems that have completed a 15-year lead service line replacement program, the State will determine a schedule for replacing or retesting lines that were previously tested out under the replacement program when the system re-exceeds the action level.

(c) A system is not required to replace an individual lead service line if the lead concentration in all service line samples from that line, taken pursuant to § 141.86(b)(3), is less than or equal to 0.015 mg/L.

(d) A water system shall replace that portion of the lead service line that it owns. In cases where the system does not own the entire lead service line, the system shall notify the owner of the line, or the owner's authorized agent, that the system will replace the portion of the service line that it owns and shall offer to replace the owner's portion of the line. A system is not required to bear the cost of replacing the privately-owned portion of the line, nor is it required to replace the privately-owned portion where the owner chooses not to pay the cost of replacing the privately-owned portion of the line, or where replacing the privately-owned portion would be precluded by State, local or common law. A water system that does not replace the entire length of the service line also shall complete the following tasks.

(1) At least 45 days prior to commencing with the partial replacement of a lead service line, the water system shall provide notice to the resident(s) of all buildings served by the line explaining that they may experience a temporary increase of lead levels in

their drinking water, along with guidance on measures consumers can take to minimize their exposure to lead. The State may allow the water system to provide notice under the previous sentence less than 45 days prior to commencing partial lead service line replacement where such replacement is in conjunction with emergency repairs. In addition, the water system shall inform the resident(s) served by the line that the system will, at the system's expense, collect a sample from each partially-replaced lead service line that is representative of the water in the service line for analysis of lead content, as prescribed under §141.86(b)(3), within 72 hours after the completion of the partial replacement of the service line. The system shall collect the sample and report the results of the analysis to the owner and the resident(s) served by the line within three business days of receiving the results. Mailed notices post-marked within three business days of receiving the results shall be considered ''on time.''

(2) The water system shall provide the information required by paragraph (d)(1) of this section to the residents of individual dwellings by mail or by other methods approved by the State. In instances where multi-family dwellings are served by the line, the water system shall have the option to post the information at a conspicuous location.

(e) The State shall require a system to replace lead service lines on a shorter schedule than that required by this section, taking into account the number of lead service lines in the system, where such a shorter replacement schedule is feasible. The State shall make this determination in writing and notify the system of its finding within 6 months after the system is triggered into lead service line replacement based on monitoring referenced in paragraph (a) of this section.

(f) Any system may cease replacing lead service lines whenever first draw samples collected pursuant to §141.86(b)(2) meet the lead action level during each of two consecutive monitoring periods and the system submits the results to the State. If first draw tap samples collected in any such system thereafter exceeds the lead action level, the system shall recommence replacing lead service lines pursuant to paragraph (b)(2) of this section.

(g) To demonstrate compliance with paragraphs (a) through (d) of this section, a system shall report to the State the information specified in §141.90(e).

[56 FR 26548, June 7, 1991; 57 FR 28788, June 29, 1992, as amended at 65 FR 2005, Jan. 12, 2000; 72 FR 57815, Oct. 10, 2007]

§ 141.85 Public education and supplemental monitoring requirements.

All water systems must deliver a consumer notice of lead tap water monitoring results to persons served by the water system at sites that are tested, as specified in paragraph (d) of this section. A water system that exceeds the lead action level based on tap water samples collected in accordance with §141.86 shall deliver the public education materials contained in paragraph (a) of this section in accordance with the requirements in paragraph (b) of this section. Water systems that exceed the lead action level must sample the tap water of any customer who requests it in accordance with paragraph (c) of this section.

(a) *Content of written public education materials*—(1) *Community water systems and non-transient non-community water systems*. Water systems must include the following elements in printed materials (e.g., brochures and pamphlets) in the same order as listed below. In addition, language in paragraphs (a)(1)(i) through (ii) and (a)(1)(vi) of this section must be included in the materials, exactly as written, except for the text in brackets in these paragraphs for which the water system must include system-specific information. Any additional information presented by a water system must be consistent with the information below and be in plain language that can be understood by the general public. Water systems must submit all written public education materials to the State prior to delivery. The State may require the system to obtain approval of the content of written public materials prior to delivery.

(i) IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER. [INSERT NAME OF WATER

SYSTEM] found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and young children. Please read this information closely to see what you can do to reduce lead in your drinking water.

(ii) *Health effects of lead.* Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. The greatest risk of lead exposure is to infants, young children, and pregnant women. Scientists have linked the effects of lead on the brain with lowered IQ in children. Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults. Lead is stored in the bones, and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

(iii) *Sources of lead.* (A) Explain what lead is.

(B) Explain possible sources of lead in drinking water and how lead enters drinking water. Include information on home/building plumbing materials and service lines that may contain lead.

(C) Discuss other important sources of lead exposure in addition to drinking water (e.g., paint).

(iv) Discuss the steps the consumer can take to reduce their exposure to lead in drinking water.

(A) Encourage running the water to flush out the lead.

(B) Explain concerns with using hot water from the tap and specifically caution against the use of hot water for preparing baby formula.

(C) Explain that boiling water does not reduce lead levels.

(D) Discuss other options consumers can take to reduce exposure to lead in drinking water, such as alternative sources or treatment of water.

(E) Suggest that parents have their child's blood tested for lead.

(v) Explain why there are elevated levels of lead in the system's drinking water (if known) and what the water system is doing to reduce the lead levels in homes/buildings in this area.

(vi) For more information, call us at [INSERT YOUR NUMBER] [(IF APPLICABLE), or visit our Web site at [INSERT YOUR WEB SITE HERE]]. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's Web site at *http://www.epa.gov/lead* or contact your health care provider.

(2) *Community water systems.* In addition to including the elements specified in paragraph (a)(1) of this section, community water systems must:

(i) Tell consumers how to get their water tested.

(ii) Discuss lead in plumbing components and the difference between low lead and lead free.

(b) *Delivery of public education materials.* (1) For public water systems serving a large proportion of non-English speaking consumers, as determined by the State, the public education materials must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the public education materials or to request assistance in the appropriate language.

(2) A community water system that exceeds the lead action level on the basis of tap water samples collected in accordance with §141.86, and that is not already conducting public education tasks under this section, must conduct the public education tasks under this section within 60 days after the end of the monitoring period in which the exceedance occurred:

(i) Deliver printed materials meeting the content requirements of paragraph (a) of this section to all bill paying customers.

(ii)(A) Contact customers who are most at risk by delivering education materials that meet the content requirements of paragraph (a) of this section to local public health agencies even if they are not located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users.

The water system must contact the local public health agencies directly by phone or in person. The local public health agencies may provide a specific list of additional community based organizations serving target populations, which may include organizations outside the service area of the water system. If such lists are provided, systems must deliver education materials that meet the content requirements of paragraph (a) of this section to all organizations on the provided lists.

(B) Contact customers who are most at risk by delivering materials that meet the content requirements of paragraph (a) of this section to the following organizations listed in 1 through 6 that are located within the water system's service area, along with an informational notice that encourages distribution to all the organization's potentially affected customers or community water system's users:

(*1*) Public and private schools or school boards.

(*2*) Women, Infants and Children (WIC) and Head Start programs.

(*3*) Public and private hospitals and medical clinics.

(*4*) Pediatricians.

(*5*) Family planning clinics.

(*6*) Local welfare agencies.

(C) Make a good faith effort to locate the following organizations within the service area and deliver materials that meet the content requirements of paragraph (a) of this section to them, along with an informational notice that encourages distribution to all potentially affected customers or users. The good faith effort to contact at-risk customers may include requesting a specific contact list of these organizations from the local public health agencies, even if the agencies are not located within the water system's service area:

(*1*) Licensed childcare centers

(*2*) Public and private preschools.

(*3*) Obstetricians-Gynecologists and Midwives.

(iii) No less often than quarterly, provide information on or in each water bill as long as the system exceeds the action level for lead. The message on the water bill must include the following statement exactly as written except for the text in brackets for which the water system must include system-specific information: [INSERT NAME OF WATER SYSTEM] found high levels of lead in drinking water in some homes. Lead can cause serious health problems. For more information please call [INSERT NAME OF WATER SYSTEM] [or visit (INSERT YOUR WEB SITE HERE)]. The message or delivery mechanism can be modified in consultation with the State; specifically, the State may allow a separate mailing of public education materials to customers if the water system cannot place the information on water bills.

(iv) Post material meeting the content requirements of paragraph (a) of this section on the water system's Web site if the system serves a population greater than 100,000.

(v) Submit a press release to newspaper, television and radio stations.

(vi) In addition to paragraphs (b)(2)(i) through (v) of this section, systems must implement at least three activities from one or more categories listed below. The educational content and selection of these activities must be determined in consultation with the State.

(A) Public Service Announcements.

(B) Paid advertisements.

(C) Public Area Information Displays.

(D) E-mails to customers.

(E) Public Meetings.

(F) Household Deliveries.

(G) Targeted Individual Customer Contact.

(H) Direct material distribution to all multi-family homes and institutions.

(I) Other methods approved by the State.

(vii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate monitoring period, the last day of that period.

(3) As long as a community water system exceeds the action level, it must repeat the activities pursuant to paragraph (b)(2) of this section as described in paragraphs (b)(3)(i) through (iv) of this section.

(i) A community water system shall repeat the tasks contained in paragraphs (b)(2)(i), (ii) and (vi) of this section every 12 months.

(ii) A community water system shall repeat tasks contained in paragraph (b)(2)(iii) of this section with each billing cycle.

(iii) A community water system serving a population greater than 100,000 shall post and retain material on a publicly accessible Web site pursuant to paragraph (b)(2)(iv) of this section.

(iv) The community water system shall repeat the task in paragraph (b)(2)(v) of this section twice every 12 months on a schedule agreed upon with the State. The State can allow activities in paragraph (b)(2) of this section to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the State in advance of the 60-day deadline.

(4) Within 60 days after the end of the monitoring period in which the exceedance occurred (unless it already is repeating public education tasks pursuant to paragraph (b)(5) of this section), a non-transient non-community water system shall deliver the public education materials specified by paragraph (a) of this section as follows:

(i) Post informational posters on lead in drinking water in a public place or common area in each of the buildings served by the system; and

(ii) Distribute informational pamphlets and/or brochures on lead in drinking water to each person served by the non-transient non-community water system. The State may allow the system to utilize electronic transmission in lieu of or combined with printed materials as long as it achieves at least the same coverage.

(iii) For systems that are required to conduct monitoring annually or less frequently, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or, if the State has established an alternate monitoring period, the last day of that period.

(5) A non-transient non-community water system shall repeat the tasks contained in paragraph (b)(4) of this section at least once during each calendar year in which the system exceeds the lead action level. The State can allow activities in (b)(4) of this section to extend beyond the 60-day requirement if needed for implementation purposes on a case-by-case basis; however, this extension must be approved in writing by the State in advance of the 60-day deadline.

(6) A water system may discontinue delivery of public education materials if the system has met the lead action level during the most recent six-month monitoring period conducted pursuant to §141.86. Such a system shall recommence public education in accordance with this section if it subsequently exceeds the lead action level during any monitoring period.

(7) A community water system may apply to the State, in writing (unless the State has waived the requirement for prior State approval), to use only the text specified in paragraph (a)(1) of this section in lieu of the text in paragraphs (a)(1) and (a)(2) of this section and to perform the tasks listed in paragraphs (b)(4) and (b)(5) of this section in lieu of the tasks in paragraphs (b)(2) and (b)(3) of this section if:

(i) The system is a facility, such as a prison or a hospital, where the population served is not capable of or is prevented from making improvements to plumbing or installing point of use treatment devices; and

(ii) The system provides water as part of the cost of services provided and does not separately charge for water consumption.

(8) A community water system serving 3,300 or fewer people may limit certain aspects of their public education programs as follows:

(i) With respect to the requirements of paragraph (b)(2)(vi) of this section, a system serving 3,300 or fewer must implement at least one of the activities listed in that paragraph.

(ii) With respect to the requirements of paragraph (b)(2)(ii) of this section, a system serving 3,300 or fewer people may limit the distribution of the public education materials required under that paragraph to facilities and organizations served by the system that are most likely to be visited regularly by pregnant women and children.

(iii) With respect to the requirements of paragraph (b)(2)(v) of this section, the State may waive this requirement for systems serving 3,300 or fewer persons as long as system distributes notices to every household served by the system.

(c) *Supplemental monitoring and notification of results.* A water system that fails to meet the lead action level on the basis of tap samples collected in accordance with §141.86 shall offer to sample the tap water of any customer who requests it. The system is not required to pay for collecting or analyzing the sample, nor is the system required to collect and analyze the sample itself.

(d) *Notification of results*—(1) *Reporting requirement.* All water systems must provide a notice of the individual tap results from lead tap water monitoring carried out under the requirements of §141.86 to the persons served by the water system at the specific sampling site from which the sample was taken (e.g., the occupants of the residence where the tap was tested).

(2) *Timing of notification.* A water system must provide the consumer notice as soon as practical, but no later than 30 days after the system learns of the tap monitoring results.

(3) *Content.* The consumer notice must include the results of lead tap water monitoring for the tap that was tested, an explanation of the health effects of lead, list steps consumers can take to reduce exposure to lead in drinking water and contact information for the water utility. The notice must also provide the maximum contaminant level goal and the action level for lead and the definitions for these two terms from §141.153(c).

(4) *Delivery.* The consumer notice must be provided to persons served at the tap that was tested, either by mail or by another method approved by the State. For example, upon approval by the State, a non-transient non-community water system could post the results on a bulletin board in the facility to allow users to review the information. The system must provide the notice to customers at sample taps tested, including consumers who do not receive water bills.

[72 FR 57815, Oct. 10, 2007]

§ 141.86 Monitoring requirements for lead and copper in tap water.

(a) *Sample site location.* (1) By the applicable date for commencement of monitoring under paragraph (d)(1) of this section, each water system shall complete a materials evaluation of its distribution system in order to identify a pool of targeted sampling sites that meets the requirements of this section, and which is sufficiently large to ensure that the water system can collect the number of lead and copper tap samples required in paragraph (c) of this section. All sites from which first draw samples are collected shall be selected from this pool of targeted sampling sites. Sampling sites may not include faucets that have point-of-use or point-of-entry treatment devices designed to remove inorganic contaminants.

(2) A water system shall use the information on lead, copper, and galvanized steel that it is required to collect under §141.42(d) of this part [special monitoring for corrosivity characteristics] when conducting a materials evaluation. When an evaluation of the information collected pursuant to §141.42(d) is insufficient to locate the requisite number of lead and copper sampling sites that meet the targeting criteria in paragraph (a) of this section, the water system shall review the sources of information listed below in order to identify a sufficient number of sampling sites. In addition, the system shall seek to collect such information where possible in the course of its normal operations (e.g., checking service line materials when reading water meters or performing maintenance activities):

(i) All plumbing codes, permits, and records in the files of the building department(s) which indicate the plumbing materials that are installed within publicly and privately owned structures connected to the distribution system;

(ii) All inspections and records of the distribution system that indicate the material composition of the service connections that connect a structure to the distribution system; and

(iii) All existing water quality information, which includes the results of all prior analyses of the system or individual structures connected to the system, indicating locations that may be particularly susceptible to high lead or copper concentrations.

(3) The sampling sites selected for a community water system's sampling pool (''tier 1 sampling sites'') shall consist of single family structures that:

(i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) Are served by a lead service line. When multiple-family residences comprise at least 20 percent of the structures served by a water system, the system may include these types of structures in its sampling pool.

(4) Any community water system with insufficient tier 1 sampling sites shall complete its sampling pool with ''tier 2 sampling sites'', consisting of buildings, including multiple-family residences that:

(i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) Are served by a lead service line.

(5) Any community water system with insufficient tier 1 and tier 2 sampling sites shall complete its sampling pool with ''tier 3 sampling sites'', consisting of single family structures that contain copper pipes with lead solder installed before 1983. A community water system with insufficient tier 1, tier 2, and tier 3 sampling sites shall complete its sampling pool with representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

(6) The sampling sites selected for a non-transient noncommunity water system (''tier 1 sampling sites'') shall consist of buildings that:

(i) Contain copper pipes with lead solder installed after 1982 or contain lead pipes; and/or

(ii) Are served by a lead service line.

(7) A non-transient non-community water system with insufficient tier 1 sites that meet the targeting criteria in paragraph (a)(6) of this section shall complete its sampling pool with sampling sites that contain copper pipes with lead solder installed before 1983. If additional sites are needed to complete the sampling pool, the non-transient non-community water system shall use representative sites throughout the distribution system. For the purpose of this paragraph, a representative site is a site in which the plumbing materials used at that site would be commonly found at other sites served by the water system.

(8) Any water system whose distribution system contains lead service lines shall draw 50 percent of the samples it collects during each monitoring period from sites that contain lead pipes, or copper pipes with lead solder, and 50 percent of the samples from sites served by a lead service line. A water system that cannot identify a sufficient number of sampling sites served by a lead service line shall collect first-draw samples from all of the sites identified as being served by such lines.

(b) *Sample collection methods.* (1) All tap samples for lead and copper collected in accordance with this subpart, with the exception of lead service line samples collected under §141.84(c) and samples collected under paragraph (b)(5) of this section, shall be first-draw samples.

(2) Each first-draw tap sample for lead and copper shall be one liter in volume and have stood motionless in the plumbing system of each sampling site for at least six hours. First-draw samples from residential housing shall be collected from the cold water kitchen tap or bathroom sink tap. First-draw samples from a nonresidential building shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. Non-first-draw samples collected in lieu of first-draw samples pursuant to paragraph (b)(5) of this section shall be one liter in volume and shall be collected at an interior tap from which water is typically drawn for consumption. First-draw samples may be collected by the system or the system may allow residents to collect first-draw samples after instructing the residents of the sampling procedures specified in this paragraph. To avoid problems of residents handling nitric acid, acidification of first-draw samples may be done up to 14

days after the sample is collected. After acidification to resolubilize the metals, the sample must stand in the original container for the time specified in the approved EPA method before the sample can be analyzed. If a system allows residents to perform sampling, the system may not challenge, based on alleged errors in sample collection, the accuracy of sampling results.

(3) Each service line sample shall be one liter in volume and have stood motionless in the lead service line for at least six hours. Lead service line samples shall be collected in one of the following three ways:

(i) At the tap after flushing the volume of water between the tap and the lead service line. The volume of water shall be calculated based on the interior diameter and length of the pipe between the tap and the lead service line;

(ii) Tapping directly into the lead service line; or

(iii) If the sampling site is a building constructed as a single-family residence, allowing the water to run until there is a significant change in temperature which would be indicative of water that has been standing in the lead service line.

(4) A water system shall collect each first draw tap sample from the same sampling site from which it collected a previous sample. If, for any reason, the water system cannot gain entry to a sampling site in order to collect a follow-up tap sample, the system may collect the follow-up tap sample from another sampling site in its sampling pool as long as the new site meets the same targeting criteria, and is within reasonable proximity of the original site.

(5) A non-transient non-community water system, or a community water system that meets the criteria of §141.85(b)(7), that does not have enough taps that can supply first-draw samples, as defined in §141.2, may apply to the State in writing to substitute non-first-draw samples. Such systems must collect as many first-draw samples from appropriate taps as possible and identify sampling times and locations that would likely result in the longest standing time for the remaining sites. The State has the discretion to waive the requirement for prior State approval of non-first-draw sample sites selected by the system, either through State regulation or written notification to the system.

(c) *Number of samples.* Water systems shall collect at least one sample during each monitoring period specified in paragraph (d) of this section from the number of sites listed in the first column (''standard monitoring'') of the table in this paragraph. A system conducting reduced monitoring under paragraph (d)(4) of this section shall collect at least one sample from the number of sites specified in the second column (''reduced monitoring'') of the table in this paragraph during each monitoring period specified in paragraph (d)(4) of this section. Such reduced monitoring sites shall be representative of the sites required for standard monitoring. A public water system that has fewer than five drinking water taps, that can be used for human consumption meeting the sample site criteria of paragraph (a) of this section to reach the required number of sample sites listed in paragraph (c) of this section, must collect at least one sample from each tap and then must collect additional samples from those taps on different days during the monitoring period to meet the required number of sites. Alternatively the State may allow these public water systems to collect a number of samples less than the number of sites specified in paragraph (c) of this section, provided that 100 percent of all taps that can be used for human consumption are sampled. The State must approve this reduction of the minimum number of samples in writing based on a request from the system or onsite verification by the State. States may specify sampling locations when a system is conducting reduced monitoring. The table is as follows:

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
>100,000	100	50
10,001 to 100,000	60	30
3,301 to 10,000	40	20
501 to 3,300	20	10
101 to 500	10	5

System size (number of people served)	Number of sites (standard monitoring)	Number of sites (reduced monitoring)
≤100	5	5

(d) *Timing of monitoring*—(1) *Initial tap sampling.* The first six-month monitoring period for small, medium-size and large systems shall begin on the following dates:

System size (No. people served)	First six-month monitoring period begins on
>50,000	January 1, 1992.
3,301 to 50,000	July 1, 1992.
≤3,300	July 1, 1993.

(i) All large systems shall monitor during two consecutive six-month periods.

(ii) All small and medium-size systems shall monitor during each six-month monitoring period until:

(A) The system exceeds the lead or copper action level and is therefore required to implement the corrosion control treatment requirements under §141.81, in which case the system shall continue monitoring in accordance with paragraph (d)(2) of this section, or

(B) The system meets the lead and copper action levels during two consecutive six-month monitoring periods, in which case the system may reduce monitoring in accordance with paragraph (d)(4) of this section.

(2) *Monitoring after installation of corrosion control and source water treatment.* (i) Any large system which installs optimal corrosion control treatment pursuant to §141.81(d)(4) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.81(d)(5).

(ii) Any small or medium-size system which installs optimal corrosion control treatment pursuant to §141.81(e)(5) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.81(e)(6).

(iii) Any system which installs source water treatment pursuant to §141.83(a)(3) shall monitor during two consecutive six-month monitoring periods by the date specified in §141.83(a)(4).

(3) *Monitoring after State specifies water quality parameter values for optimal corrosion control.* After the State specifies the values for water quality control parameters under §141.82(f), the system shall monitor during each subsequent six-month monitoring period, with the first monitoring period to begin on the date the State specifies the optimal values under §141.82(f).

(4) *Reduced monitoring.* (i) A small or medium-size water system that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the number of samples in accordance with paragraph (c) of this section, and reduce the frequency of sampling to once per year. A small or medium water system collecting fewer than five samples as specified in paragraph (c) of this section, that meets the lead and copper action levels during each of two consecutive six-month monitoring periods may reduce the frequency of sampling to once per year. In no case can the system reduce the number of samples required below the minimum of one sample per available tap. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(ii) Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f) during each of two consecutive six-month monitoring periods may reduce the frequency of monitoring to once per year and reduce the number of lead and copper samples in accordance with paragraph (c) of this section if it receives written approval from the State. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period. The State shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with §141.90, and shall notify the system in writing when it determines the system is eligible to commence reduced monitoring pursuant to this paragraph. The State shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iii) A small or medium-size water system that meets the lead and copper action levels during three consecutive years of monitoring may reduce the frequency of monitoring for lead and copper from annually to once every three years. Any water system that meets the lead action level and maintains the range of values for the water quality control parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f) during three consecutive years of monitoring may reduce the frequency of monitoring from annually to once every three years if it receives written approval from the State. Samples collected once every three years shall be collected no later than every third calendar year. The State shall review monitoring, treatment, and other relevant information submitted by the water system in accordance with § 141.90, and shall notify the system in writing when it determines the system is eligible to reduce the frequency of monitoring to once every three years. The State shall review, and where appropriate, revise its determination when the system submits new monitoring or treatment data, or when other data relevant to the number and frequency of tap sampling becomes available.

(iv) A water system that reduces the number and frequency of sampling shall collect these samples from representative sites included in the pool of targeted sampling sites identified in paragraph (a) of this section. Systems sampling annually or less frequently shall conduct the lead and copper tap sampling during the months of June, July, August, or September unless the State has approved a different sampling period in accordance with paragraph (d)(4)(iv)(A) of this section.

(A) The State, at its discretion, may approve a different period for conducting the lead and copper tap sampling for systems collecting a reduced number of samples. Such a period shall be no longer than four consecutive months and must represent a time of normal operation where the highest levels of lead are most likely to occur. For a non-transient non-community water system that does not operate during the months of June through September, and for which the period of normal operation where the highest levels of lead are most likely to occur is not known, the State shall designate a period that represents a time of normal operation for the system. This sampling shall begin during the period approved or designated by the State in the calendar year immediately following the end of the second consecutive six-month monitoring period for systems initiating annual monitoring and during the three-year period following the end of the third consecutive calendar year of annual monitoring for systems initiating triennial monitoring.

(B) Systems monitoring annually, that have been collecting samples during the months of June through September and that receive State approval to alter their sample collection period under paragraph (d)(4)(iv)(A) of this section, must collect their next round of samples during a time period that ends no later than 21 months after the previous round of sampling. Systems monitoring triennially that have been collecting samples during the months of June through September, and receive State approval to alter the sampling collection period as per paragraph (d)(4)(iv)(A) of this section, must collect their next round of samples during a time period that ends no later than 45 months after the previous round of sampling. Subsequent rounds of sampling must be collected annually or triennially, as required by this section. Small systems with waivers, granted pursuant to paragraph (g) of this section, that have been collecting samples during the months of June through September and receive State approval to alter their sample collection period under paragraph (d)(4)(iv)(A) of this section must collect their next round of samples before the end of the 9-year period.

(v) Any water system that demonstrates for two consecutive 6-month monitoring periods that the tap water lead level computed under § 141.80(c)(3) is less than or equal to 0.005 mg/L and the tap water copper level computed under § 141.80(c)(3) is less than or equal to 0.65 mg/L may reduce the number of samples in accordance with paragraph (c) of this section and reduce the frequency of sampling to once every three calendar years.

(vi)(A) A small or medium-size water system subject to reduced monitoring that exceeds the lead or copper action level shall resume sampling in accordance with paragraph (d)(3) of this section and collect the number of samples specified for standard monitoring under paragraph (c) of this section. Such a system shall also conduct water quality parameter monitoring in accordance with §141.87(b), (c) or (d) (as appropriate) during the monitoring period in which it exceeded the action level. Any such system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (c) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of paragraph (d)(4)(i) of this section and/or may resume triennial monitoring for lead and copper at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (d)(4)(iii) or (d)(4)(v) of this section.

(B) Any water system subject to the reduced monitoring frequency that fails to meet the lead action level during any four-month monitoring period or that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State under §141.82(f) for more than nine days in any six-month period specified in §141.87(d) shall conduct tap water sampling for lead and copper at the frequency specified in paragraph (d)(3) of this section, collect the number of samples specified for standard monitoring under paragraph (c) of this section, and shall resume monitoring for water quality parameters within the distribution system in accordance with §141.87(d). This standard tap water sampling shall begin no later than the six-month period beginning January 1 of the calendar year following the lead action level exceedance or water quality parameter excursion. Such a system may resume reduced monitoring for lead and copper at the tap and for water quality parameters within the distribution system under the following conditions:

(*1*) The system may resume annual monitoring for lead and copper at the tap at the reduced number of sites specified in paragraph (c) of this section after it has completed two subsequent six-month rounds of monitoring that meet the criteria of paragraph (d)(4)(ii) of this section and the system has received written approval from the State that it is appropriate to resume reduced monitoring on an annual frequency. This sampling shall begin during the calendar year immediately following the end of the second consecutive six-month monitoring period.

(*2*) The system may resume triennial monitoring for lead and copper at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (d)(4)(iii) or (d)(4)(v) of this section and the system has received written approval from the State that it is appropriate to resume triennial monitoring.

(*3*) The system may reduce the number of water quality parameter tap water samples required in accordance with §141.87(e)(1) and the frequency with which it collects such samples in accordance with §141.87(e)(2). Such a system may not resume triennial monitoring for water quality parameters at the tap until it demonstrates, in accordance with the requirements of §141.87(e)(2), that it has re-qualified for triennial monitoring.

(vii) Any water system subject to a reduced monitoring frequency under paragraph (d)(4) of this section shall notify the State in writing in accordance with §141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State may require the system to resume sampling in accordance with paragraph (d)(3) of this section and collect the number of samples specified for standard monitoring under paragraph (c) of this section or take other appropriate steps such as increased water quality parameter monitoring or re-evaluation of its corrosion control treatment given the potentially different water quality considerations.

(e) *Additional monitoring by systems.* The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the State in making any determinations (*i.e.*, calculating the 90th percentile lead or copper level) under this subpart.

(f) *Invalidation of lead or copper tap water samples.* A sample invalidated under this paragraph does not count toward determining lead or copper 90th percentile levels under §141.80(c)(3) or toward meeting the minimum monitoring requirements of paragraph (c) of this section.

(1) The State may invalidate a lead or copper tap water sample at least if one of the following conditions is met.

(i) The laboratory establishes that improper sample analysis caused erroneous results.

(ii) The State determines that the sample was taken from a site that did not meet the site selection criteria of this section.

(iii) The sample container was damaged in transit.

(iv) There is substantial reason to believe that the sample was subject to tampering.

(2) The system must report the results of all samples to the State and all supporting documentation for samples the system believes should be invalidated.

(3) To invalidate a sample under paragraph (f)(1) of this section, the decision and the rationale for the decision must be documented in writing. States may not invalidate a sample solely on the grounds that a follow-up sample result is higher or lower than that of the original sample.

(4) The water system must collect replacement samples for any samples invalidated under this section if, after the invalidation of one or more samples, the system has too few samples to meet the minimum requirements of paragraph (c) of this section. Any such replacement samples must be taken as soon as possible, but no later than 20 days after the date the State invalidates the sample or by the end of the applicable monitoring period, whichever occurs later. Replacement samples taken after the end of the applicable monitoring period shall not also be used to meet the monitoring requirements of a subsequent monitoring period. The replacement samples shall be taken at the same locations as the invalidated samples or, if that is not possible, at locations other than those already used for sampling during the monitoring period.

(g) *Monitoring waivers for small systems.* Any small system that meets the criteria of this paragraph may apply to the State to reduce the frequency of monitoring for lead and copper under this section to once every nine years (*i.e.*, a ‘‘full waiver’’) if it meets all of the materials criteria specified in paragraph (g)(1) of this section and all of the monitoring criteria specified in paragraph (g)(2) of this section. If State regulations permit, any small system that meets the criteria in paragraphs (g)(1) and (2) of this section only for lead, or only for copper, may apply to the State for a waiver to reduce the frequency of tap water monitoring to once every nine years for that contaminant only (*i.e.*, a ‘‘partial waiver’’).

(1) *Materials criteria.* The system must demonstrate that its distribution system and service lines and all drinking water supply plumbing, including plumbing conveying drinking water within all residences and buildings connected to the system, are free of lead-containing materials and/or copper-containing materials, as those terms are defined in this paragraph, as follows:

(i) *Lead.* To qualify for a full waiver, or a waiver of the tap water monitoring requirements for lead (*i.e.*, a ‘‘lead waiver’’), the water system must provide certification and supporting documentation to the State that the system is free of all lead-containing materials, as follows:

(A) It contains no plastic pipes which contain lead plasticizers, or plastic service lines which contain lead plasticizers; and

(B) It is free of lead service lines, lead pipes, lead soldered pipe joints, and leaded brass or bronze alloy fittings and fixtures, unless such fittings and fixtures meet the specifications of any standard established pursuant to 42 U.S.C. 300g–6(e) (SDWA section 1417(e)).

(ii) *Copper.* To qualify for a full waiver, or a waiver of the tap water monitoring requirements for copper (*i.e.*, a ''copper waiver''), the water system must provide certification and supporting documentation to the State that the system contains no copper pipes or copper service lines.

(2) *Monitoring criteria for waiver issuance.* The system must have completed at least one 6-month round of standard tap water monitoring for lead and copper at sites approved by the State and from the number of sites required by paragraph (c) of this section and demonstrate that the 90th percentile levels for any and all rounds of monitoring conducted since the system became free of all lead-containing and/or copper-containing materials, as appropriate, meet the following criteria.

(i) *Lead levels.* To qualify for a full waiver, or a lead waiver, the system must demonstrate that the 90th percentile lead level does not exceed 0.005 mg/L.

(ii) *Copper levels.* To qualify for a full waiver, or a copper waiver, the system must demonstrate that the 90th percentile copper level does not exceed 0.65 mg/L.

(3) *State approval of waiver application.* The State shall notify the system of its waiver determination, in writing, setting forth the basis of its decision and any condition of the waiver. As a condition of the waiver, the State may require the system to perform specific activities (e.g., limited monitoring, periodic outreach to customers to remind them to avoid installation of materials that might void the waiver) to avoid the risk of lead or copper concentration of concern in tap water. The small system must continue monitoring for lead and copper at the tap as required by paragraphs (d)(1) through (d)(4) of this section, as appropriate, until it receives written notification from the State that the waiver has been approved.

(4) *Monitoring frequency for systems with waivers.* (i) A system with a full waiver must conduct tap water monitoring for lead and copper in accordance with paragraph (d)(4)(iv) of this section at the reduced number of sampling sites identified in paragraph (c) of this section at least once every nine years and provide the materials certification specified in paragraph (g)(1) of this section for both lead and copper to the State along with the monitoring results. Samples collected every nine years shall be collected no later than every ninth calendar year.

(ii) A system with a partial waiver must conduct tap water monitoring for the waived contaminant in accordance with paragraph (d)(4)(iv) of this section at the reduced number of sampling sites specified in paragraph (c) of this section at least once every nine years and provide the materials certification specified in paragraph (g)(1) of this section pertaining to the waived contaminant along with the monitoring results. Such a system also must continue to monitor for the non-waived contaminant in accordance with requirements of paragraph (d)(1) through (d)(4) of this section, as appropriate.

(iii) Any water system with a full or partial waiver shall notify the State in writing in accordance with §141.90(a)(3) of any upcoming long-term change in treatment or addition of a new source, as described in that section. The State must review and approve the addition of a new source or long-term change in water treatment before it is implemented by the water system. The State has the authority to require the system to add or modify waiver conditions (e.g., require recertification that the system is free of lead-containing and/or copper-containing materials, require additional round(s) of monitoring), if it deems such modifications are necessary to address treatment or source water changes at the system.

(iv) If a system with a full or partial waiver becomes aware that it is no longer free of lead-containing or copper-containing materials, as appropriate, (e.g., as a result of new construction or repairs), the system shall notify the State in writing no later than 60 days after becoming aware of such a change.

(5) *Continued eligibility.* If the system continues to satisfy the requirements of paragraph (g)(4) of this section, the waiver will be renewed automatically, unless any of the conditions listed in

paragraph (g)(5)(i) through (g)(5)(iii) of this section occurs. A system whose waiver has been revoked may re-apply for a waiver at such time as it again meets the appropriate materials and monitoring criteria of paragraphs (g)(1) and (g)(2) of this section.

(i) A system with a full waiver or a lead waiver no longer satisfies the materials criteria of paragraph (g)(1)(i) of this section or has a 90th percentile lead level greater than 0.005 mg/L.

(ii) A system with a full waiver or a copper waiver no longer satisfies the materials criteria of paragraph (g)(1)(ii) of this section or has a 90th percentile copper level greater than 0.65 mg/L.

(iii) The State notifies the system, in writing, that the waiver has been revoked, setting forth the basis of its decision.

(6) *Requirements following waiver revocation.* A system whose full or partial waiver has been revoked by the State is subject to the corrosion control treatment and lead and copper tap water monitoring requirements, as follows:

(i) If the system exceeds the lead and/or copper action level, the system must implement corrosion control treatment in accordance with the deadlines specified in §141.81(e), and any other applicable requirements of this subpart.

(ii) If the system meets both the lead and the copper action level, the system must monitor for lead and copper at the tap no less frequently than once every three years using the reduced number of sample sites specified in paragraph (c) of this section.

(7) *Pre-existing waivers.* Small system waivers approved by the State in writing prior to April 11, 2000 shall remain in effect under the following conditions:

(i) If the system has demonstrated that it is both free of lead-containing and copper-containing materials, as required by paragraph (g)(1) of this section and that its 90th percentile lead levels and 90th percentile copper levels meet the criteria of paragraph (g)(2) of this section, the waiver remains in effect so long as the system continues to meet the waiver eligibility criteria of paragraph (g)(5) of this section. The first round of tap water monitoring conducted pursuant to paragraph (g)(4) of this section shall be completed no later than nine years after the last time the system has monitored for lead and copper at the tap.

(ii) If the system has met the materials criteria of paragraph (g)(1) of this section but has not met the monitoring criteria of paragraph (g)(2) of this section, the system shall conduct a round of monitoring for lead and copper at the tap demonstrating that it meets the criteria of paragraph (g)(2) of this section no later than September 30, 2000. Thereafter, the waiver shall remain in effect as long as the system meets the continued eligibility criteria of paragraph (g)(5) of this section. The first round of tap water monitoring conducted pursuant to paragraph (g)(4) of this section shall be completed no later than nine years after the round of monitoring conducted pursuant to paragraph (g)(2) of this section.

[56 FR 26548, June 7, 1991; 56 FR 32113, July 15, 1991; 57 FR 28788, June 29, 1992, as amended at 65 FR 2007, Jan. 12, 2000; 72 FR 57817, Oct. 10, 2007]

§ 141.87 Monitoring requirements for water quality parameters.

All large water systems, and all small- and medium-size systems that exceed the lead or copper action level shall monitor water quality parameters in addition to lead and copper in accordance with this section. The requirements of this section are summarized in the table at the end of this section.

(a) *General requirements*—(1) *Sample collection methods.* (i) Tap samples shall be representative of water quality throughout the distribution system taking into account the number of persons served, the different sources of water, the different treatment methods employed by the system, and seasonal variability. Tap sampling under this section is not required to be conducted at taps targeted for lead and copper sampling under §141.86(a). [Note: Systems may find it convenient to conduct tap sampling for water quality parameters at sites used for coliform sampling under 40 CFR 141.21.]

(ii) Samples collected at the entry point(s) to the distribution system shall be from locations representative of each source after treatment. 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).

(2) *Number of samples.* (i) Systems shall collect two tap samples for applicable water quality parameters during each monitoring period specified under paragraphs (b) through (e) of this section from the following number of sites.

System size (No. people served)	No. of sites for water quality parameters
>100,000	25
10,001–100,000	10
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
≤100	1

(ii) Except as provided in paragraph (c)(3) of this section, systems shall collect two samples for each applicable water quality parameter at each entry point to the distribution system during each monitoring period specified in paragraph (b) of this section. During each monitoring period specified in paragraphs (c)–(e) of this section, systems shall collect one sample for each applicable water quality parameter at each entry point to the distribution system.

(b) *Initial sampling* All large water systems shall measure the applicable water quality parameters as specified below at taps and at each entry point to the distribution system during each six-month monitoring period specified in § 141.86(d)(1). All small and medium-size systems shall measure the applicable water quality parameters at the locations specified below during each six-month monitoring period specified in § 141.86(d)(1) during which the system exceeds the lead or copper action level.

(1) At taps:

(i) pH;

(ii) Alkalinity;

(iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;

(iv) Silica, when an inhibitor containing a silicate compound is used;

(v) Calcium;

(vi) Conductivity; and

(vii) Water temperature.

(2) At each entry point to the distribution system: all of the applicable parameters listed in paragraph (b)(1) of this section.

(c) *Monitoring after installation of corrosion control.* Any large system which installs optimal corrosion control treatment pursuant to § 141.81(d)(4) shall measure the water quality parameters at the locations and frequencies specified below during each six-month monitoring period specified in § 141.86(d)(2)(i). Any small or medium-size system which installs optimal corrosion control treatment shall conduct such monitoring during each six-month monitoring period specified in § 141.86(d)(2)(ii) in which the system exceeds the lead or copper action level.

(1) At taps, two samples for:

(i) pH;

(ii) Alkalinity;

(iii) Orthophosphate, when an inhibitor containing a phosphate compound is used;

(iv) Silica, when an inhibitor containing a silicate compound is used;

(v) Calcium, when calcium carbonate stabilization is used as part of corrosion control.

(2) Except as provided in paragraph (c)(3) of this section, at each entry point to the distribution system, at least one sample no less frequently than every two weeks (biweekly) for:

(i) pH;

(ii) When alkalinity is adjusted as part of optimal corrosion control, a reading of the dosage rate of the chemical used to adjust alkalinity, and the alkalinity concentration; and

(iii) When a corrosion inhibitor is used as part of optimal corrosion control, a reading of the dosage rate of the inhibitor used, and the concentration of orthophosphate or silica (whichever is applicable).

(3) Any ground water system can limit entry point sampling described in paragraph (c)(2) of this section to those entry points that are representative of water quality and treatment conditions throughout the system. If water from untreated ground water sources mixes with water from treated ground

water sources, the system must monitor for water quality parameters both at representative entry points receiving treatment and representative entry points receiving no treatment. Prior to the start of any monitoring under this paragraph, the system shall provide to the State written information identifying the selected entry points and documentation, including information on seasonal variability, sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(d) *Monitoring after State specifies water quality parameter values for optimal corrosion control.* After the State specifies the values for applicable water quality control parameters reflecting optimal corrosion control treatment under §141.82(f), all large systems shall measure the applicable water quality parameters in accordance with paragraph (c) of this section and determine compliance with the requirements of §141.82(g) every six months with the first six-month period to begin on either January 1 or July 1, whichever comes first, after the State specifies the optimal values under §141.82(f). Any small or medium-size system shall conduct such monitoring during each six-month period specified in this paragraph in which the system exceeds the lead or copper action level. For any such small and medium-size system that is subject to a reduced monitoring frequency pursuant to §141.86(d)(4) at the time of the action level exceedance, the start of the applicable six-month monitoring period under this paragraph shall coincide with the start of the applicable monitoring period under §141.86(d)(4). Compliance with State-designated optimal water quality parameter values shall be determined as specified under §141.82(g).

(e) *Reduced monitoring.* (1) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment during each of two consecutive six-month monitoring periods under paragraph (d) of this section shall continue monitoring at the entry point(s) to the distribution system as specified in paragraph (c)(2) of this section. Such system may collect two tap samples for applicable water quality parameters from the following reduced number of sites during each six-month monitoring period.

System size (No. of people served)	Reduced No. of sites for water quality parameters
>100,000	10
10,001 to 100,000	7
3,301 to 10,000	3
501 to 3,300	2
101 to 500	1
≤100	1

(2)(i) Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f) during three consecutive years of monitoring may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in this paragraph (e)(1) of this section from every six months to annually. This sampling begins during the calendar year immediately following the end of the monitoring period in which the third consecutive year of six-month monitoring occurs. Any water system that maintains the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under §141.82(f), during three consecutive years of annual monitoring under this paragraph may reduce the frequency with which it collects the number of tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section from annually to every three years. This sampling begins no later than the third calendar year following the end of the monitoring period in which the third consecutive year of monitoring occurs.

(ii) A water system may reduce the frequency with which it collects tap samples for applicable water quality parameters specified in paragraph (e)(1) of this section to every three years if it demonstrates during two consecutive monitoring periods that its tap water lead level at the 90th percentile is less than or equal to the PQL for lead specified in §141.89 (a)(1)(ii), that its tap water copper level at the 90th percentile is less than or equal to 0.65 mg/L for copper in §141.80(c)(2), and that it also has maintained the range of values for the water quality parameters reflecting optimal corrosion control treatment specified by the State under § 141.82(f). Monitoring conducted every three years shall be done no later than every third calendar year.

(3) A water system that conducts sampling annually shall collect these samples evenly throughout the year so as to reflect seasonal variability.

(4) Any water system subject to the reduced monitoring frequency that fails to operate at or above the minimum value or within the range of values for the water quality parameters specified by the State in § 141.82(f) for more than nine days in any six-month period specified in § 141.82(g) shall resume distribution system tap water sampling in accordance with the number and frequency requirements in paragraph (d) of this section. Such a system may resume annual monitoring for water quality parameters at the tap at the reduced number of sites specified in paragraph (e)(1) of this section after it has completed two subsequent consecutive six-month rounds of monitoring that meet the criteria of that paragraph and/or may resume triennial monitoring for water quality parameters at the tap at the reduced number of sites after it demonstrates through subsequent rounds of monitoring that it meets the criteria of either paragraph (e)(2)(i) or (e)(2)(ii) of this section.

(f) *Additional monitoring by systems.* The results of any monitoring conducted in addition to the minimum requirements of this section shall be considered by the system and the State in making any determinations (*i.e.*, determining concentrations of water quality parameters) under this section or § 141.82.

SUMMARY OF MONITORING REQUIREMENTS FOR WATER QUALITY PARAMETERS[1]

Monitoring period	Parameters[2]	Location	Frequency
Initial monitoring	pH, alkalinity, orthophosphate or silica[3], calcium, conductivity, temperature.	Taps and at entry point(s) to distribution system.	Every 6 months.
After installation of corrosion control.	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps	Every 6 months.
	pH, alkalinity, dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5].	Entry point(s) to distribution system[6].	No less frequently than every two weeks.
After State specifies parameter values for optimal corrosion control.	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps	Every 6 months.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5].	Entry point(s) to distribution system[6].	No less frequently than every two weeks.
Reduced monitoring	pH, alkalinity, orthophosphate or silica[3], calcium[4].	Taps	Every 6 months, annually[7] or every 3 years[8]; reduced number of sites.
	pH, alkalinity dosage rate and concentration (if alkalinity adjusted as part of corrosion control), inhibitor dosage rate and inhibitor residual[5].	Entry point(s) to distribution system[6].	No less frequently than every two weeks.

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[1] Table is for illustrative purposes; consult the text of this section for precise regulatory requirements.

[2] Small and medium-size systems have to monitor for water quality parameters only during monitoring periods in which the system exceeds the lead or copper action level.

[3] Orthophosphate must be measured only when an inhibitor containing a phosphate compound is used. Silica must be measured only when an inhibitor containing silicate compound is used.

[4] Calcium must be measured only when calcium carbonate stabilization is used as part of corrosion control.

[5] Inhibitor dosage rates and inhibitor residual concentrations (orthophosphate or silica) must be measured only when an inhibitor is used.

[6] Ground water systems may limit monitoring to representative locations throughout the system.

[7] Water systems may reduce frequency of monitoring for water quality parameters at the tap from every six months to annually if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of monitoring.

[8] Water systems may further reduce the frequency of monitoring for water quality parameters at the tap from annually to once every 3 years if they have maintained the range of values for water quality parameters reflecting optimal corrosion control during 3 consecutive years of annual monitoring. Water systems may accelerate to triennial monitoring for water quality parameters at the tap if they have maintained 90th percentile lead levels less than or equal to 0.005 mg/L, 90th percentile copper levels less than or equal to 0.65 mg/L, and the range of water quality parameters designated by the State under § 141.82(f) as representing optimal corrosion control during two consecutive six-month monitoring periods.

[56 FR 26548, June 7, 1991; 57 FR 28788, June 29, 1992, as amended at 59 FR 33862, June 30, 1994; 65 FR 2010, Jan. 12, 2000; 72 FR 57818, Oct. 10, 2007]

§ 141.88 Monitoring requirements for lead and copper in source water.

(a) *Sample location, collection methods, and number of samples.* (1) A water system that fails to meet the lead or copper action level on the basis of tap samples collected in accordance with § 141.86 shall collect lead and copper source water samples in accordance with the following requirements regarding sample location, number of samples, and collection methods:

(i) 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). The system shall take one sample at the same sampling point unless conditions make another sampling point more representative of each source or treatment plant.

(ii) 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). 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.

NOTE TO PARAGRAPH (a)(1)(ii): For the purposes of this paragraph, surface water systems include systems with a combination of surface and ground sources.

(iii) 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).

(iv) The State may reduce the total number of samples which must be analyzed by allowing the use of compositing. Compositing of samples must be done by certified laboratory personnel. Composite samples from a maximum of five samples are allowed, provided that if the lead concentration in the composite sample is greater than or equal to 0.001 mg/L or the copper concentration is greater than or equal to 0.160 mg/L, then either:

(A) A follow-up sample shall be taken and analyzed within 14 days at each sampling point included in the composite; or

(B) If duplicates of or sufficient quantities from the original samples from each sampling point used in the composite are available, the system may use these instead of resampling.

(2) Where the results of sampling indicate an exceedance of maximum permissible source water levels established under § 141.83(b)(4), 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. If a State-required confirmation sample is taken for lead or copper, then the results of the initial and confirmation sample shall be averaged in determining compliance with the State-specified maximum permissible levels. Any sample value below the detection limit shall be considered to be zero. Any value above the detection limit but below the PQL shall either be considered as the measured value or be considered one-half the PQL.

(b) *Monitoring frequency after system exceeds tap water action level.* Any system which exceeds the lead or copper action level at the tap shall collect one source water sample from each entry point to the distribution system no later than six months after the end of the monitoring period during which the lead or copper action level was exceeded. For monitoring periods that are annual or less frequent, the end of the monitoring period is September 30 of the calendar year in which the sampling occurs, or if the State has established an alternate monitoring period, the last day of that period.

(c) *Monitoring frequency after installation of source water treatment.* Any system which installs source water treatment pursuant to § 141.83(a)(3) shall collect an additional source water sample from each entry point to the distribution system during two consecutive six-month monitoring periods by the deadline specified in § 141.83(a)(4).

(d) *Monitoring frequency after State specifies maximum permissible source water levels or determines that source water treatment is not needed.* (1) A system shall monitor at the frequency specified below in cases where the State specifies maximum permissible source water levels under § 141.83(b)(4) or determines that the system is not required to install source water treatment under § 141.83(b)(2).

(i) A water system using only groundwater shall collect samples once during the three-year compliance period (as that term is defined in § 141.2) in effect when the applicable State determination under paragraph (d)(1) of this section is made. Such systems shall collect samples once during each subsequent compliance period. Triennial samples shall be collected every third calendar year.

(ii) A water system using surface water (or a combination of surface and ground water) shall collect samples once during each calendar year, the first annual monitoring period to begin during the year in which the applicable State determination is made under paragraph (d)(1) of this section.

(2) A system is not required to conduct source water sampling for lead and/or copper if the system meets the action level for the specific contaminant in tap water samples during the entire source water sampling period applicable to the system under paragraph (d)(1) (i) or (ii) of this section.

(e) *Reduced monitoring frequency.* (1) A water system using only ground water may reduce the monitoring frequency for lead and copper in source water to once during each nine-year compliance cycle (as that term is defined in § 141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in § 141.83(b)(4) during at least three consecutive compliance periods under paragraph (d)(1) of this section; or

(ii) The State has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive compliance periods in which sampling was conducted under paragraph (d)(1) of this section, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

(2) A water system using surface water (or a combination of surface water and ground water) may reduce the monitoring frequency in paragraph (d)(1) of this section to once during each nine-year compliance cycle (as that term is defined in § 141.2) provided that the samples are collected no later than every ninth calendar year and if the system meets one of the following criteria:

(i) The system demonstrates that finished drinking water entering the distribution system has been maintained below the maximum permissible lead and copper concentrations specified by the State in § 141.83(b)(4) for at least three consecutive years; or

(ii) The State has determined that source water treatment is not needed and the system demonstrates that, during at least three consecutive years, the concentration of lead in source water was less than or equal to 0.005 mg/L and the concentration of copper in source water was less than or equal to 0.65 mg/L.

(3) A water system that uses a new source of water is not eligible for reduced monitoring for lead and/or copper until concentrations in samples collected from the new source during three consecutive monitoring periods are below the maximum permissible lead and copper concentrations specified by the State in § 141.83(a)(5).

[56 FR 26548, June 7, 1991; 57 FR 28788 and 28789, June 29, 1992, as amended at 65 FR 2012, Jan. 12, 2000; 72 FR 57819, Oct. 10, 2007]

§ 141.89 Analytical methods.

(a) Analyses for lead, copper, pH, conductivity, calcium, alkalinity, orthophosphate, silica, and temperature shall be conducted with the methods in § 141.23(k)(1).

(1) Analyses for alkalinity, calcium, conductivity, orthophosphate, pH, silica, and temperature may be performed by any person acceptable to the State. Analyses under this section for lead and copper shall only be conducted by laboratories that have been certified by EPA or the State. To obtain certification to conduct analyses for lead and copper, laboratories must:

(i) Analyze Performance Evaluation samples, which include lead and copper, provided by or acceptable to EPA or the State at least once a year by each method for which the laboratory desires certification; and

(ii) Achieve quantitative acceptance limits as follows:

(A) For lead: ±30 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.005 mg/L. The Practical Quantitation Level, or PQL for lead is 0.005 mg/L.

(B) For Copper: ±10 percent of the actual amount in the Performance Evaluation sample when the actual amount is greater than or equal to 0.050 mg/L. The Practical Quantitation Level, or PQL for copper is 0.050 mg/L.

(iii) Achieve the method detection limit for lead of 0.001 mg/L according to the procedures in appendix B of part 136 of this title. This need only be accomplished if the laboratory will be processing source water composite samples under § 141.88(a)(1)(iv).

(iv) Be currently certified by EPA or the State to perform analyses to the specifications described in paragraph (a)(1) of this section.

(2) States have the authority to allow the use of previously collected monitoring data for purposes of monitoring, if the data were collected and analyzed in accordance with the requirements of this subpart.

(3) All lead and copper levels measured between the PQL and MDL must be either reported as measured or they can be reported as one-half the PQL specified for lead and copper in paragraph (a)(1)(ii) of this section. All levels below the lead and copper MDLs must be reported as zero.

(4) All copper levels measured between the PQL and the MDL must be either reported as measured or they can be reported as one-half the PQL (0.025 mg/L). All levels below the copper MDL must be reported as zero.

(b) [Reserved]

[56 FR 26548, June 7, 1991, as amended at 57 FR 28789, June 29, 1992; 57 FR 31847, July 17, 1992; 59 FR 33863, June 30, 1994; 59 FR 62470, Dec. 5, 1994; 64 FR 67466, Dec. 1, 1999; 65 FR 2012, Jan. 12, 2000; 72 FR 57819, Oct. 10, 2007]

§ 141.90 Reporting requirements.

All water systems shall report all of the following information to the State in accordance with this section.

(a) *Reporting requirements for tap water monitoring for lead and copper and for water quality parameter monitoring.* (1) Except as provided in paragraph (a)(1)(viii) of this section, a water system shall report the information specified below for all tap water samples specified in § 141.86 and for all water quality parameter samples specified in § 141.87 within the first 10 days following the end of each applicable monitoring period specified in § 141.86 and § 141.87 (*i.e.*, every six months, annually, every 3 years, or every 9 years). For monitoring periods with a duration less than six months, the end of the monitoring period is the last date samples can be collected during that period as specified in §§ 141.86 and 141.87.

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under § 141.86(a) (3), (4), (5), (6), and/or (7) under which the site was selected for the system's sampling pool;

(ii) Documentation for each tap water lead or copper sample for which the water system requests invalidation pursuant to § 141.86(f)(2);

(iii) [Reserved]

(iv) The 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period (calculated in accordance with § 141.80(c)(3)), unless the State calculates the system's 90th percentile lead and copper levels under paragraph (h) of this section;

(v) With the exception of initial tap sampling conducted pursuant to § 141.86(d)(1), the system shall designate any site which was not sampled during previous monitoring periods, and include an explanation of why sampling sites have changed;

(vi) The results of all tap samples for pH, and where applicable, alkalinity, calcium, conductivity, temperature, and orthophosphate or silica collected under § 141.87 (b)–(e);

(vii) The results of all samples collected at the entry point(s) to the distribution system for applicable water quality parameters under § 141.87 (b)–(e);

(viii) A water system shall report the results of all water quality parameter samples collected under § 141.87(c) through (f) during each six-month monitoring period specified in § 141.87(d) within the first 10 days following the end of the monitoring period unless the State has specified a more frequent reporting requirement.

(2) For a non-transient non-community water system, or a community water system meeting the criteria of § 141.85(b)(7), that does not have enough taps that can provide first-draw samples, the system must either:

(i) Provide written documentation to the State identifying standing times and locations for enough non-first-draw samples to make up its sampling pool under § 141.86(b)(5) by the start of the first applicable monitoring period under § 141.86(d) that commences after April 11, 2000, unless the State has waived prior State approval of non-first-draw sample sites selected by the system pursuant to § 141.86(b)(5); or

(ii) If the State has waived prior approval of non-first-draw sample sites selected by the system, identify, in writing, each site that did not meet the six-hour minimum standing time and the length of standing time for that particular substitute sample collected pursuant to § 141.86(b)(5) and include this information with the lead and copper tap sample results required to be submitted pursuant to paragraph (a)(1)(i) of this section.

(3) At a time specified by the State, or if no specific time is designated by the State, then as early as possible prior to the addition of a new source or any long-term change in water treatment, a water system deemed to have optimized corrosion control under § 141.81(b)(3), a water system subject to reduced monitoring pursuant to § 141.86(d)(4), or a water system subject to a monitoring waiver pursuant to § 141.86(g), shall submit written documentation to the State describing the change or addition. The State must review and approve the addition of a new source or long-term change in treatment before it is implemented by the water system. Examples of long-term treatment changes include the addition of a new treatment process or modification of an existing treatment process. Examples of modifications include switching secondary disinfectants, switching coagulants (e.g., alum to ferric chloride), and switching corrosion inhibitor products (e.g., orthophosphate to blended phosphate). Long-term changes can include dose changes to existing chemicals if the system is planning long-term changes to its finished water pH or residual inhibitor concentration. Long-term treatment changes would not include chemical dose fluctuations associated with daily raw water quality changes.

(4) Any small system applying for a monitoring waiver under § 141.86(g), or subject to a waiver granted pursuant to § 141.86(g)(3), shall provide the following information to the State in writing by the specified deadline:

(i) By the start of the first applicable monitoring period in § 141.86(d), any small water system applying for a monitoring waiver shall provide the documentation required to demonstrate that it meets the waiver criteria of §§ 141.86(g)(1) and (2).

(ii) No later than nine years after the monitoring previously conducted pursuant to § 141.86(g)(2) or § 141.86(g)(4)(i), each small system desiring to maintain its monitoring waiver shall provide the information required by §§ 141.86(g)(4)(i) and (ii).

(iii) No later than 60 days after it becomes aware that it is no longer free of lead-containing and/or copper-containing material, as appropriate, each small system with a monitoring waiver shall provide written notification to the State, setting forth the circumstances resulting in the lead-containing and/or copper-containing materials being introduced into the system and what corrective action, if any, the system plans to remove these materials.

(iv) By October 10, 2000, any small system with a waiver granted prior to

April 11, 2000 and that has not previously met the requirements of § 141.86(g)(2) shall provide the information required by that paragraph.

(5) Each ground water system that limits water quality parameter monitoring to a subset of entry points under § 141.87(c)(3) shall provide, by the commencement of such monitoring, written correspondence to the State that identifies the selected entry points and includes information sufficient to demonstrate that the sites are representative of water quality and treatment conditions throughout the system.

(b) *Source water monitoring reporting requirements.* (1) A water system shall report the sampling results for all source water samples collected in accordance with § 141.88 within the first 10 days following the end of each source water monitoring period (*i.e.*, annually, per compliance period, per compliance cycle) specified in § 141.88.

(2) With the exception of the first round of source water sampling conducted pursuant to § 141.88(b), the system shall specify any site which was not sampled during previous monitoring periods, and include an explanation of why the sampling point has changed.

(c) *Corrosion control treatment reporting requirements.* By the applicable dates under § 141.81, systems shall report the following information:

(1) For systems demonstrating that they have already optimized corrosion control, information required in § 141.81(b) (2) or (3).

(2) For systems required to optimize corrosion control, their recommendation regarding optimal corrosion control treatment under § 141.82(a).

(3) For systems required to evaluate the effectiveness of corrosion control treatments under § 141.82(c), the information required by that paragraph.

(4) For systems required to install optimal corrosion control designated by the State under § 141.82(d), a letter certifying that the system has completed installing that treatment.

(d) *Source water treatment reporting requirements.* By the applicable dates in § 141.83, systems shall provide the following information to the State:

(1) If required under § 141.83(b)(1), their recommendation regarding source water treatment;

(2) For systems required to install source water treatment under § 141.83(b)(2), a letter certifying that the system has completed installing the treatment designated by the State within 24 months after the State designated the treatment.

(e) *Lead service line replacement reporting requirements.* Systems shall report the following information to the State to demonstrate compliance with the requirements of § 141.84:

(1) No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in § 141.84(a), the system must submit written documentation to the State of the material evaluation conducted as required in § 141.86(a), identify the initial number of lead service lines in its distribution system at the time the system exceeds the lead action level, and provide the system's schedule for annually replacing at least 7 percent of the initial number of lead service lines in its distribution system.

(2) No later than 12 months after the end of a monitoring period in which a system exceeds the lead action level in sampling referred to in § 141.84(a), and every 12 months thereafter, the system shall demonstrate to the State in writing that the system has either:

(i) Replaced in the previous 12 months at least 7 percent of the initial lead service lines (or a greater number of lines specified by the State under § 141.84(e)) in its distribution system, or

(ii) Conducted sampling which demonstrates that the lead concentration in all service line samples from an individual line(s), taken pursuant to § 141.86(b)(3), is less than or equal to 0.015 mg/L. In such cases, the total number of lines replaced and/or which meet the criteria in § 141.84(c) shall equal at least 7 percent of the initial number of lead lines identified under paragraph (e)(1) of this section (or the percentage specified by the State under § 141.84(e)).

(3) The annual letter submitted to the State under paragraph (e)(2) of this section shall contain the following information:

(i) The number of lead service lines scheduled to be replaced during the previous year of the system's replacement schedule;

(ii) The number and location of each lead service line replaced during the previous year of the system's replacement schedule;

(iii) If measured, the water lead concentration and location of each lead service line sampled, the sampling method, and the date of sampling.

(4) Any system which collects lead service line samples following partial lead service line replacement required by § 141.84 shall report the results to the State within the first ten days of the month following the month in which the system receives the laboratory results, or as specified by the State. States, at their discretion may eliminate this requirement to report these monitoring results. Systems shall also report any additional information as specified by the State, and in a time and manner prescribed by the State, to verify that all partial lead service line replacement activities have taken place.

(f) *Public education program reporting requirements.* (1) Any water system that is subject to the public education requirements in § 141.85 shall, within ten days after the end of each period in which the system is required to perform public education in accordance with § 141.85(b), send written documentation to the State that contains:

(i) A demonstration that the system has delivered the public education materials that meet the content requirements in § 141.85(a) and the delivery requirements in § 141.85(b); and

(ii) A list of all the newspapers, radio stations, television stations, and facilities and organizations to which the system delivered public education materials during the period in which the system was required to perform public education tasks.

(2) Unless required by the State, a system that previously has submitted the information required by paragraph (f)(1)(ii) of this section need not resubmit the information required by paragraph (f)(1)(ii) of this section, as long as there have been no changes in the distribution list and the system certifies that the public education materials were distributed to the same list submitted previously.

(3) No later than 3 months following the end of the monitoring period, each system must mail a sample copy of the consumer notification of tap results to the State along with a certification that the notification has been distributed in a manner consistent with the requirements of § 141.85(d).

(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.

(h) *Reporting of 90th percentile lead and copper concentrations where the State calculates a system's 90th percentile concentrations.* A water system is not required to report the 90th percentile lead and copper concentrations measured from among all lead and copper tap water samples collected during each monitoring period, as required by paragraph (a)(1)(iv) of this section if:

(1) The State has previously notified the water system that it will calculate the water system's 90th percentile lead and copper concentrations, based on the lead and copper tap results submitted pursuant to paragraph (h)(2)(i) of this section, and has specified a date before the end of the applicable monitoring period by which the system must provide the results of lead and copper tap water samples;

(2) The system has provided the following information to the State by the date specified in paragraph (h)(1) of this section:

(i) The results of all tap samples for lead and copper including the location of each site and the criteria under § 141.86(a)(3), (4), (5), (6), and/or (7) under which the site was selected for the system's sampling pool, pursuant to paragraph (a)(1)(i) of this section; and

(ii) An identification of sampling sites utilized during the current monitoring period that were not sampled during previous monitoring periods, and an explanation why sampling sites have changed; and

(3) The State has provided the results of the 90th percentile lead and copper

calculations, in writing, to the water system before the end of the monitoring period.

[56 FR 26548, June 7, 1991; 57 FR 28789, June 29, 1992, as amended at 59 FR 33864, June 30, 1994; 65 FR 2012, Jan. 12, 2000; 72 FR 57819, Oct. 10, 2007]

§ 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.

Subpart J—Use of Non-Centralized Treatment Devices

SOURCE: 52 FR 25716, July 8, 1987, unless otherwise noted.

§ 141.100 Criteria and procedures for public water systems using point-of-entry devices.

(a) Public water systems may use point-of-entry devices to comply with maximum contaminant levels only if they meet the requirements of this section.

(b) It is the responsibility of the public water system to operate and maintain the point-of-entry treatment system.

(c) The public water system must develop and obtain State approval for a monitoring plan before point-of-entry devices are installed for compliance. Under the plan approved by the State, point-of-entry devices must provide health protection equivalent to central water treatment. ‘‘Equivalent’’ means that the water would meet all national primary drinking water regulations and would be of acceptable quality similar to water distributed by a well-operated central treatment plant. In addition to the VOCs, monitoring must include physical measurements and observations such as total flow treated and mechanical condition of the treatment equipment.

(d) Effective technology must be properly applied under a plan approved by the State and the microbiological safety of the water must be maintained.

(1) The State must require adequate certification of performance, field testing, and, if not included in the certification process, a rigorous engineering design review of the point-of-entry devices.

(2) The design and application of the point-of-entry devices must consider the tendency for increase in heterotrophic bacteria concentrations in water treated with activated carbon. It may be necessary to use frequent backwashing, post-contactor disinfection, and Heterotrophic Plate Count monitoring to ensure that the microbiological safety of the water is not compromised.

(e) *All consumers shall be protected.* Every building connected to the system must have a point-of-entry device installed, maintained, and adequately monitored. The State must be assured that every building is subject to treatment and monitoring, and that the rights and responsibilities of the public water system customer convey with title upon sale of property.

[52 FR 25716, July 8, 1987; 53 FR 25111, July 1, 1988]

§ 141.101 Use of bottled water.

Public water systems shall not use bottled water to achieve compliance with an MCL. Bottled water may be used on a temporary basis to avoid unreasonable risk to health.

[63 FR 31934, June 11, 1998]

Subpart K—Treatment Techniques

SOURCE: 56 FR 3594, Jan. 30, 1991, unless otherwise noted.

§ 141.110 General requirements.

The requirements of subpart K of this part constitute national primary drinking water regulations. These regulations establish treatment techniques in lieu of maximum contaminant levels for specified contaminants.

§ 141.111 Treatment techniques for acrylamide and epichlorohydrin.

Each public water system must certify annually in writing to the State (using third party or manufacturer's certification) that when acrylamide and epichlorohydrin are used in drinking water systems, the combination (or product) of dose and monomer level does not exceed the levels specified as follows:

Acrylamide = 0.05% dosed at 1 ppm (or equivalent)
Epichlorohydrin = 0.01% dosed at 20 ppm (or equivalent)

Certifications can rely on manufacturers or third parties, as approved by the State.

Subpart L—Disinfectant Residuals, Disinfection Byproducts, and Disinfection Byproduct Precursors

§ 141.130 General requirements.

(a) The requirements of this subpart L constitute national primary drinking water regulations.

(1) The regulations in this subpart establish criteria under which community water systems (CWSs) and nontransient, noncommunity water systems (NTNCWSs) which add a chemical disinfectant to the water in any part of the drinking water treatment process must modify their practices to meet MCLs and MRDLs in §§ 141.64 and 141.65, respectively, and must meet the treatment technique requirements for disinfection byproduct precursors in § 141.135.

(2) The regulations in this subpart establish criteria under which transient NCWSs that use chlorine dioxide as a disinfectant or oxidant must modify their practices to meet the MRDL for chlorine dioxide in § 141.65.

(3) EPA has established MCLs for TTHM and HAA5 and treatment technique requirements for disinfection byproduct precursors to limit the levels of known and unknown disinfection byproducts which may have adverse health effects. These disinfection byproducts may include chloroform; bromodichloromethane; dibromochloromethane; bromoform; dichloroacetic acid; and trichloroacetic acid.

(b) *Compliance dates*—(1) *CWSs and NTNCWSs*. Unless otherwise noted, systems must comply with the requirements of this subpart as follows. Subpart H systems serving 10,000 or more persons must comply with this subpart beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and systems using only ground water not under the direct influence of surface water must comply with this subpart beginning January 1, 2004.

(2) *Transient NCWSs*. Subpart H systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2002. Subpart H systems serving fewer than 10,000 persons and using chlorine dioxide as a disinfectant or oxidant and systems using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with any requirements for chlorine dioxide in this subpart beginning January 1, 2004.

(c) Each CWS and NTNCWS regulated under paragraph (a) of this section must be operated by qualified personnel who meet the requirements specified by the State and are included in a State register of qualified operators.

(d) *Control of disinfectant residuals*. Notwithstanding the MRDLs in § 141.65, systems may increase residual disinfectant levels in the distribution system of chlorine or chloramines (but not chlorine dioxide) to a level and for a time necessary to protect public health, to address specific microbiological contamination problems caused by circumstances such as, but not limited to, distribution line breaks, storm run-off events, source water contamination events, or cross-connection events.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001]

§ 141.131 Analytical requirements.

(a) *General*. (1) Systems must use only the analytical methods specified in this section, or their equivalent as approved by EPA, to demonstrate compliance with the requirements of this subpart and with the requirements of subparts U and V of this part. These methods are effective for compliance monitoring February 16, 1999, unless a different effective date is specified in this section or by the State.

(2) The following documents are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies may be inspected at EPA's Drinking Water Docket, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington, DC 20460, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html.* EPA Method 552.1 is in Methods for the Determination of Organic Compounds in Drinking Water-Supplement II, USEPA, August 1992, EPA/600/R–92/129 (available through National Information Technical Service (NTIS), PB92–207703). EPA Methods 502.2, 524.2, 551.1, and 552.2 are in Methods for the Determination of Organic Compounds in Drinking Water-Supplement III, USEPA, August 1995, EPA/600/R–95/131 (available through NTIS, PB95–261616). EPA Method 300.0 is in Methods for the Determination of Inorganic Substances in Environmental Samples, USEPA, August 1993, EPA/600/R–93/100 (available through NTIS, PB94–121811). EPA Methods 300.1 and 321.8 are in Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1, USEPA, August 2000, EPA 815–R–00–014 (available through NTIS, PB2000–106981). EPA Method 317.0, Revision 2.0, ''Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography with the Addition of a Postcolumn Reagent for Trace Bromate Analysis,'' USEPA, July 2001, EPA 815–B–01–001, EPA Method 326.0, Revision 1.0, ''Determination of Inorganic Oxyhalide Disinfection By-Products in Drinking Water Using Ion Chromatography Incorporating the Addition of a Suppressor Acidified Postcolumn Reagent for Trace Bromate Analysis,'' USEPA, June 2002, EPA 815–R–03–007, EPA Method 327.0, Revision 1.1, ''Determination of Chlorine Dioxide and Chlorite Ion in Drinking Water Using Lissamine Green B and Horseradish Peroxidase with Detection by Visible Spectrophotometry,'' USEPA, May 2005, EPA 815–R–05–008 and EPA Method 552.3, Revision 1.0, ''Determination of Haloacetic Acids and Dalapon in Drinking Water by Liquid-liquid Microextraction, Derivatization, and Gas Chromatography with Electron Capture Detection,'' USEPA, July 2003, EPA–815–B–03–002 can be accessed and downloaded directly on-line at *http://www.epa.gov/safewater/methods/sourcalt.html.* EPA Method 415.3, Revision 1.1, ''Determination of Total Organic Carbon and Specific UV Absorbance at 254 nm in Source Water and Drinking Water,'' USEPA, February 2005, EPA/600/R–05/055 can be accessed and downloaded directly on-line at *www.epa.gov/nerlcwww/ordmeth.htm.* Standard Methods 4500–Cl D, 4500–Cl E, 4500–Cl F, 4500–Cl G, 4500–Cl H, 500–Cl I, 4500–ClO_2 D, 4500–ClO_2 E, 6251 B, and 5910 B shall be followed in accordance with Standard Methods for the Examination of Water and Wastewater, 19th or 20th Editions, American Public Health Association, 1995 and 1998, respectively. The cited methods published in either edition may be used. Standard Methods 5310 B, 5310 C, and 5310 D shall be followed in accordance with the Supplement to the 19th Edition of Standard Methods for the Examination of Water and Wastewater, or the Standard Methods for the Examination of Water and Wastewater, 20th Edition, American Public Health Association, 1996 and 1998, respectively. The cited methods published in either edition may be used. Copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005. Standard Methods 4500–Cl D–00, 4500–Cl E–00, 4500–Cl F–00, 4500–Cl G–00, 4500–Cl H–00, 4500–Cl I–00, 4500–ClO_2 E–00, 6251 B–94, 5310 B–00, 5310 C–00, 5310 D–00 and 5910 B–00 are available at *http://www.standardmethods.org* or at EPA's Water Docket. The year in which each method was approved by the Standard Methods Committee is designated by the last two digits in the method number. The methods listed are the only Online versions that are IBR-approved. ASTM Methods D 1253–86 and D 1253–86 (Reapproved 1996) shall be followed in accordance with the Annual Book of

ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 1996 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D1253–03 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2004 or any ASTM edition containing the IBR-approved version of the method may be used. ASTM Method D 6581–00 shall be followed in accordance with the Annual Book of ASTM Standards, Volume 11.01, American Society for Testing and Materials International, 2001 or any ASTM edition containing the IBR-approved version of the method may be used; copies may be obtained from the American Society for Testing and Materials International, 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959.

(b) *Disinfection byproducts.* (1) Systems must measure disinfection byproducts by the methods (as modified by the footnotes) listed in the following table or one of the alternative methods listed in appendix A to subpart C of this part:

APPROVED METHODS FOR DISINFECTION BYPRODUCT COMPLIANCE MONITORING

Contaminant and methodology[1]	EPA method	Standard method[2]	SM online[9]	ASTM method[3]
TTHM				
P&T/GC/ElCD & PID	502.2[4].			
P&T/GC/MS	524.2.			
LLE/GC/ECD	551.1.			
HAA5				
LLE (diazomethane)/GC/ECD		6251 B[5]	6251 B–94.	
SPE (acidic methanol)/GC/ECD.	552.1[5].			
LLE (acidic methanol)/GC/ECD.	552.2, 552.3.			
Bromate				
Ion chromatography	300.1			D 6581–00
Ion chromatography & post column reaction.	317.0 Rev 2.0[6], 326.0[6].			
IC/ICP–MS	321.8[6] [7].			
Chlorite				
Amperometric titration		4500–ClO_2 E[8]	4500–ClO_2 E–00[8].	
Spectrophotometry	327.0 Rev 1.1[8].			
Ion chromatography	300.0, 300.1, 317.0 Rev 2.0, 326.0.			D 6581–00

[1] P&T = purge and trap; GC = gas chromatography; ElCD = electrolytic conductivity detector; PID = photoionization detector; MS = mass spectrometer; LLE = liquid/liquid extraction; ECD = electron capture detector; SPE = solid phase extraction; IC = ion chromatography; ICP–MS = inductively coupled plasma/mass spectrometer.

[2] 19th and 20th editions of Standard Methods for the Examination of Water and Wastewater, 1995 and 1998, respectively, American Public Health Association; either of these editions may be used.

[3] Annual Book of ASTM Standards, 2001 or any year containing the cited version of the method, Vol 11.01.

[4] If TTHMs are the only analytes being measured in the sample, then a PID is not required.

[5] The samples must be extracted within 14 days of sample collection.

[6] Ion chromatography & post column reaction or IC/ICP-MS must be used for monitoring of bromate for purposes of demonstrating eligibility of reduced monitoring, as prescribed in § 141.132(b)(3)(ii).

[7] Samples must be preserved at the time of sampling with 50 mg ethylenediamine (EDA)/L of sample and must be analyzed within 28 days.

[8] Amperometric titration or spectrophotometry may be used for routine daily monitoring of chlorite at the entrance to the distribution system, as prescribed in § 141.132(b)(2)(i)(A). Ion chromatography must be used for routine monthly monitoring of chlorite and additional monitoring of chlorite in the distribution system, as prescribed in § 141.132(b)(2)(i)(B) and (b)(2)(ii).

[9] The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at *http://www.standardmethods.org.*

(2) Analyses under this section for disinfection byproducts must be conducted by laboratories that have received certification by EPA or the State, except as specified under paragraph (b)(3) of this section. To receive certification to conduct analyses for the DBP contaminants in §§ 141.64, 141.135, and subparts U and V of this part, the laboratory must:

(i) Analyze Performance Evaluation (PE) samples that are acceptable to EPA or the State at least once during each consecutive 12 month period by each method for which the laboratory desires certification.

(ii) Until March 31, 2007, in these analyses of PE samples, the laboratory must achieve quantitative results within the acceptance limit on a minimum of 80% of the analytes included in each PE sample. The acceptance limit is defined as the 95% confidence interval calculated around the mean of the PE study between a maximum and minimum acceptance limit of ±50% and ±15% of the study mean.

(iii) Beginning April 1, 2007, the laboratory must achieve quantitative results on the PE sample analyses that are within the following acceptance limits:

DBP	Acceptance limits (percent of true value)	Comments
TTHM		
Chloroform	±20	Laboratory must meet all 4 individual THM acceptance limits in order to successfully pass a PE sample for TTHM
Bromodichloromethane	±20	
Dibromochloromethane	±20	
Bromoform	±20	
HAA5		
Monochloroacetic Acid	±40	Laboratory must meet the acceptance limits for 4 out of 5 of the HAA5 compounds in order to successfully pass a PE sample for HAA5
Dichloroacetic Acid	±40	
Trichloroacetic Acid	±40	
Monobromoacetic Acid	±40	
Dibromoacetic Acid	±40	
Chlorite	±30	
Bromate	±30	

(iv) Beginning April 1, 2007, report quantitative data for concentrations at least as low as the ones listed in the following table for all DBP samples analyzed for compliance with §§ 141.64, 141.135, and subparts U and V of this part:

DBP	Minimum reporting level (mg/L) [1]	Comments
TTHM [2]		
Chloroform	0.0010	
Bromodichloromethane	0.0010	
Dibromochloromethane	0.0010	
Bromoform	0.0010	
HAA5 [2]		
Monochloroacetic Acid	0.0020	
Dichloroacetic Acid	0.0010	
Trichloroacetic Acid	0.0010	
Monobromoacetic Acid	0.0010	
Dibromoacetic Acid	0.0010	
Chlorite	0.020	Applicable to monitoring as prescribed in § 141.132(b)(2)(1)(B) and (b)(2)(ii).
Bromate	0.0050 or 0.0010	Laboratories that use EPA Methods 317.0 Revision 2.0, 326.0 or 321.8 must meet a 0.0010 mg/L MRL for bromate.

[1] The calibration curve must encompass the regulatory minimum reporting level (MRL) concentration. Data may be reported for concentrations lower than the regulatory MRL as long as the precision and accuracy criteria are met by analyzing an MRL check standard at the lowest reporting limit chosen by the laboratory. The laboratory must verify the accuracy of the calibration curve at the MRL concentration by analyzing an MRL check standard with a concentration less than or equal to 110% of the MRL with each batch of samples. The measured concentration for the MRL check standard must be ±50% of the expected value, if any field sample in the batch has a concentration less than 5 times the regulatory MRL. Method requirements to analyze higher concentration check standards and meet tighter acceptance criteria for them must be met in addition to the MRL check standard requirement.

[2] When adding the individual trihalomethane or haloacetic acid concentrations to calculate the TTHM or HAA5 concentrations, respectively, a zero is used for any analytical result that is less than the MRL concentration for that DBP, unless otherwise specified by the State.

(3) A party approved by EPA or the State must measure daily chlorite samples at the entrance to the distribution system.

(c) *Disinfectant residuals.* (1) Systems must measure residual disinfectant concentration for free chlorine, combined chlorine (chloramines), and chlorine dioxide by the methods listed in the following table or one of the alternative methods listed in appendix A to subpart C of this part:

Methodology	SM (19th or 20th ed)	SM Online[2]	ASTM method	EPA method	Residual measured[1]			
					Free Cl_2	Combined Cl_2	Total Cl_2	ClO_2
Amperometric Titration	4500–Cl D	4500–Cl D–00	D 1253–86 (96), 03		X	X	X	
Low Level Amperometric Titration.	4500–Cl E	4500–Cl E–00					X	
DPD Ferrous Titrimetric	4500–Cl F	4500–Cl F–00			X	X	X	
DPD Colorimetric	4500–Cl G	4500–Cl G–00			X	X	X	
Syringaldazine (FACTS)	4500–Cl H	4500–Cl H–00			X			
Iodometric Electrode	4500–Cl I	4500–Cl I–00					X	
DPD	4500–ClO_2 D							X
Amperometric Method II	4500–ClO_2 E	4500–ClO_2 E–00						X
Lissamine Green Spectrophotometric.				327.0 Rev 1.1				X

[1] X indicates method is approved for measuring specified disinfectant residual. Free chlorine or total chlorine may be measured for demonstrating compliance with the chlorine MRDL and combined chlorine, or total chlorine may be measured for demonstrating compliance with the chloramine MRDL.

[2] The Standard Methods Online version that is approved is indicated by the last two digits in the method number which is the year of approval by the Standard Method Committee. Standard Methods Online are available at *http://www.standardmethods.org*.

(2) If approved by the State, systems may also measure residual disinfectant concentrations for chlorine, chloramines, and chlorine dioxide by using DPD colorimetric test kits.

(3) A party approved by EPA or the State must measure residual disinfectant concentration.

(d) *Additional analytical methods.* Systems required to analyze parameters not included in paragraphs (b) and (c) of this section must use the following methods or one of the alternative methods listed in appendix A to subpart C of this part. A party approved by EPA or the State must measure these parameters.

(1) *Alkalinity.* All methods allowed in §141.89(a) for measuring alkalinity.

(2) *Bromide.* EPA Methods 300.0, 300.1, 317.0 Revision 2.0, 326.0, or ASTM D 6581–00.

(3) *Total Organic Carbon (TOC).* Standard Method 5310 B or 5310 B–00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C–00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D–00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. Inorganic carbon must be removed from the samples prior to analysis. TOC samples may not be filtered prior to analysis. TOC samples must be acidified at the time of sample collection to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified TOC samples must be analyzed within 28 days.

(4) *Specific Ultraviolet Absorbance (SUVA).* SUVA is equal to the UV absorption at 254nm (UV_{254}) (measured in m^{-1} divided by the dissolved organic carbon (DOC) concentration (measured as mg/L). In order to determine SUVA, it is necessary to separately measure UV_{254} and DOC. When determining SUVA, systems must use the methods stipulated in paragraph (d)(4)(i) of this section to measure DOC and the method stipulated in paragraph (d)(4)(ii) of this section to measure UV_{254}. SUVA must be determined on water prior to the addition of disinfectants/oxidants by the system. DOC and UV_{254} samples used to determine a SUVA value must be taken at the same time and at the same location.

(i) *Dissolved Organic Carbon (DOC).* Standard Method 5310 B or 5310 B–00 (High-Temperature Combustion Method) or Standard Method 5310 C or 5310 C–00 (Persulfate-Ultraviolet or Heated-Persulfate Oxidation Method) or Standard Method 5310 D or 5310 D–00 (Wet-Oxidation Method) or EPA Method 415.3 Revision 1.1. DOC samples must be filtered through the 0.45 µm pore-diameter filter as soon as practical after sampling, not to exceed 48 hours. After filtration, DOC samples must be acidified to achieve pH less than or equal to 2 with minimal addition of the acid specified in the method or by the instrument manufacturer. Acidified DOC samples must be analyzed within 28 days of sample collection. Inorganic carbon must be removed from the samples prior to analysis. Water passed through the filter prior to filtration of the sample must serve as the filtered blank. This filtered blank must be analyzed using procedures identical to those used for analysis of the samples and must meet the following criteria: DOC <0.5 mg/L.

(ii) Ultraviolet Absorption at 254 nm (UV_{254}). Standard Method 5910 B or 5910 B–00 (Ultraviolet Absorption Method) or EPA Method 415.3 Revision 1.1. UV absorption must be measured at 253.7 nm (may be rounded off to 254 nm). Prior to analysis, UV_{254} samples must be filtered through a 0.45 µm pore-diameter filter. The pH of UV_{254} samples may not be adjusted. Samples must be analyzed as soon as practical after sampling, not to exceed 48 hours.

(5) *pH.* All methods allowed in § 141.23(k)(1) for measuring pH.

(6) *Magnesium.* All methods allowed in § 141.23(k)(1) for measuring magnesium.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001; 71 FR 479, Jan. 4, 2006; 71 FR 37168, June 29, 2006; 74 FR 30958, June 29, 2009]

§ 141.132 Monitoring requirements.

(a) *General requirements.* (1) Systems must take all samples during normal operating conditions.

(2) Systems may consider multiple wells drawing water from a single aquifer as one treatment plant for determining the minimum number of TTHM and HAA5 samples required, with State approval in accordance with criteria developed under § 142.16(h)(5) of this chapter.

(3) Failure to monitor in accordance with the monitoring plan required under paragraph (f) of this section is a monitoring violation.

(4) Failure to monitor will be treated as a violation for the entire period covered by the annual average where compliance is based on a running annual average of monthly or quarterly samples or averages and the system's failure to monitor makes it impossible to determine compliance with MCLs or MRDLs.

(5) Systems may use only data collected under the provisions of this subpart to qualify for reduced monitoring.

(b) *Monitoring requirements for disinfection byproducts*—(1) *TTHMs and HAA5*—(i) *Routine monitoring.* Systems must monitor at the frequency indicated in the following table:

ROUTINE MONITORING FREQUENCY FOR TTHM AND HAA5

Type of system	Minimum monitoring frequency	Sample location in the distribution system
Subpart H system serving at least 10,000 persons.	Four water samples per quarter per treatment plant.	At least 25 percent of all samples collected each quarter at locations representing maximum residence time. Remaining samples taken at locations representative of at least average residence time in the distribution system and representing the entire distribution system, taking into account number of persons served, different sources of water, and different treatment methods.[1]
Subpart H system serving from 500 to 9,999 persons.	One water sample per quarter per treatment plant.	Locations representing maximum residence time.[1]
Subpart H system serving fewer than 500 persons.	One sample per year per treatment plant during month of warmest water temperature.	Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in paragraph (b)(1)(iv) of this section.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	One water sample per quarter per treatment plant[2].	Locations representing maximum residence time.[1]

ROUTINE MONITORING FREQUENCY FOR TTHM AND HAA5—Continued

Type of system	Minimum monitoring frequency	Sample location in the distribution system
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	One sample per year per treatment plant[2] during month of warmest water temperature.	Locations representing maximum residence time.[1] If the sample (or average of annual samples, if more than one sample is taken) exceeds the MCL, the system must increase monitoring to one sample per treatment plant per quarter, taken at a point reflecting the maximum residence time in the distribution system, until the system meets criteria in paragraph (b)(1)(iv) of this section.

[1] If a system elects to sample more frequently than the minimum required, at least 25 percent of all samples collected each quarter (including those taken in excess of the required frequency) must be taken at locations that represent the maximum residence time of the water in the distribution system. The remaining samples must be taken at locations representative of at least average residence time in the distribution system.

[2] Multiple wells drawing water from a single aquifer may be considered one treatment plant for determining the minimum number of samples required, with State approval in accordance with criteria developed under § 142.16(h)(5) of this chapter.

(ii) Systems may reduce monitoring, except as otherwise provided, in accordance with the following table:

REDUCED MONITORING FREQUENCY FOR TTHM AND HAA5

If you are a . . .	You may reduce monitoring if you have monitored at least one year and your . . .	To this level
Subpart H system serving at least 10,000 persons which has a source water annual average TOC level, before any treatment, ≤4.0 mg/L.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One sample per treatment plant per quarter at distribution system location reflecting maximum residence time.
Subpart H system serving from 500 to 9,999 persons which has a source water annual average TOC level, before any treatment, ≤4.0 mg/L.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature. NOTE: Any Subpart H system serving fewer than 500 persons may not reduce its monitoring to less than one sample per treatment plant per year.
System using only ground water not under direct influence of surface water using chemical disinfectant and serving at least 10,000 persons.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L.	One sample per treatment plant per year at distribution system location reflecting maximum residence time during month of warmest water temperature
System using only ground water not under direct influence of surface water using chemical disinfectant and serving fewer than 10,000 persons.	TTHM annual average ≤0.040 mg/L and HAA5 annual average ≤0.030 mg/L for two consecutive years OR TTHM annual average ≤0.020 mg/L and HAA5 annual average ≤0.015 mg/L for one year.	One sample per treatment plant per three year monitoring cycle at distribution system location reflecting maximum residence time during month of warmest water temperature, with the three-year cycle beginning on January 1 following quarter in which system qualifies for reduced monitoring.

(iii) *Monitoring requirements for source water TOC.* In order to qualify for reduced monitoring for TTHM and HAA5 under paragraph (b)(1)(ii) of this section, subpart H systems not monitoring under the provisions of paragraph (d) of this section must take monthly TOC samples every 30 days at a location prior to any treatment, beginning April 1, 2008 or earlier, if specified by the State. In addition to meeting other criteria for reduced monitoring in paragraph (b)(1)(ii) of this section, the source water TOC running annual average must be ≤4.0 mg/L (based on the most recent four quarters of monitoring) on a continuing basis at each treatment plant to reduce or remain on reduced monitoring for TTHM and HAA5. Once qualified for reduced monitoring for TTHM and HAA5 under paragraph (b)(1)(ii) of this section, a system may reduce source water TOC monitoring to quarterly TOC samples taken every 90 days at a location prior to any treatment.

(iv) Systems on a reduced monitoring schedule may remain on that reduced schedule as long as the average of all samples taken in the year (for systems which must monitor quarterly) or the result of the sample (for systems which must monitor no more frequently than annually) is no more than 0.060 mg/L and 0.045 mg/L for TTHMs and HAA5, respectively. Systems that do not meet these levels must resume monitoring at the frequency identified in paragraph (b)(1)(i) of this section (minimum monitoring frequency column) in the quarter immediately following the monitoring period in which the system exceeds 0.060 mg/L or 0.045 mg/L for TTHMs and HAA5, respectively. For systems using only ground water not under the direct influence of surface water and serving fewer than 10,000 persons, if either the TTHM annual average is >0.080 mg/L or the HAA5 annual average is >0.060 mg/L, the system must go to the increased monitoring identified in paragraph (b)(1)(i) of this section (sample location column) in the quarter immediately following the monitoring period in which the system exceeds 0.080 mg/L or 0.060 mg/L for TTHMs or HAA5 respectively.

(v) Systems on increased monitoring may return to routine monitoring if, after at least one year of monitoring their TTHM annual average is ≤0.060 mg/L and their HAA5 annual average is ≤0.045 mg/L.

(vi) The State may return a system to routine monitoring at the State's discretion.

(2) *Chlorite.* Community and nontransient noncommunity water systems using chlorine dioxide, for disinfection or oxidation, must conduct monitoring for chlorite.

(i) *Routine monitoring.* (A) *Daily monitoring.* Systems must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the chlorite MCL, the system must take additional samples in the distribution system the following day at the locations required by paragraph (b)(2)(ii) of this section, in addition to the sample required at the entrance to the distribution system.

(B) *Monthly monitoring.* Systems must take a three-sample set each month in the distribution system. The system must take one sample at each of the following locations: near the first customer, at a location representative of average residence time, and at a location reflecting maximum residence time in the distribution system. Any additional routine sampling must be conducted in the same manner (as three-sample sets, at the specified locations). The system may use the results of additional monitoring conducted under paragraph (b)(2)(ii) of this section to meet the requirement for monitoring in this paragraph.

(ii) *Additional monitoring.* On each day following a routine sample monitoring result that exceeds the chlorite MCL at the entrance to the distribution system, the system is required to take three chlorite distribution system samples at the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) *Reduced monitoring.* (A) Chlorite monitoring at the entrance to the distribution system required by paragraph (b)(2)(i)(A) of this section may not be reduced.

(B) Chlorite monitoring in the distribution system required by paragraph (b)(2)(i)(B) of this section may be reduced to one three-sample set per quarter after one year of monitoring where no individual chlorite sample taken in the distribution system under paragraph (b)(2)(i)(B) of this section has exceeded the chlorite MCL and the system has not been required to conduct monitoring under paragraph (b)(2)(ii) of this section. The system may remain on the reduced monitoring schedule until either any of the three individual chlorite samples taken quarterly in the distribution system under paragraph (b)(2)(i)(B) of this section exceeds the chlorite MCL or the system is required to conduct monitoring under paragraph (b)(2)(ii) of this section, at which time the system must revert to routine monitoring.

(3) *Bromate*—(i) *Routine monitoring.* Community and nontransient noncommunity systems using ozone, for disinfection or oxidation, must take one sample per month for each treatment plant in the system using ozone. Systems must take samples monthly at the entrance to the distribution system while the ozonation system is operating under normal conditions.

(ii) *Reduced monitoring.* (A) Until March 31, 2009, systems required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's average source water bromide concentration is less than 0.05 mg/L based on representative monthly bromide measurements for one year. The system may remain on reduced bromate monitoring until the running annual average source water bromide concentration, computed quarterly, is equal to or greater than 0.05 mg/L based on representative monthly measurements. If the running annual average source water bromide concentration is ≥0.05 mg/L, the system must resume routine monitoring required by paragraph (b)(3)(i) of this section in the following month.

(B) Beginning April 1, 2009, systems may no longer use the provisions of paragraph (b)(3)(ii)(A) of this section to qualify for reduced monitoring. A system required to analyze for bromate may reduce monitoring from monthly to quarterly, if the system's running annual average bromate concentration is ≤0.0025 mg/L based on monthly bromate measurements under paragraph (b)(3)(i) of this section for the most recent four quarters, with samples analyzed using Method 317.0 Revision 2.0, 326.0 or 321.8. If a system has qualified for reduced bromate monitoring under paragraph (b)(3)(ii)(A) of this section, that system may remain on reduced monitoring as long as the running annual average of quarterly bromate samples ≤0.0025 mg/L based on samples analyzed using Method 317.0 Revision 2.0, 326.0, or 321.8. If the running annual average bromate concentration is >0.0025 mg/L, the system must resume routine monitoring required by paragraph (b)(3)(i) of this section.

(c) *Monitoring requirements for disinfectant residuals*—(1) *Chlorine and chloramines*—(i) *Routine monitoring.* Until March 31, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in §141.21. Beginning April 1, 2016, community and non-transient non-community water systems that use chlorine or chloramines must measure the residual disinfectant level in the distribution system at the same point in the distribution system and at the same time as total coliforms are sampled, as specified in §§141.854 through 141.858. Subpart H systems of this part may use the results of residual disinfectant concentration sampling conducted under §141.74(b)(6)(i) for unfiltered systems or §141.74(c)(3)(i) for systems which filter, in lieu of taking separate samples.

(ii) *Reduced monitoring.* Monitoring may not be reduced.

(2) *Chlorine dioxide*—(i) *Routine monitoring.* Community, nontransient noncommunity, and transient noncommunity water systems that use chlorine dioxide for disinfection or oxidation must take daily samples at the entrance to the distribution system. For any daily sample that exceeds the MRDL, the system must take samples in the distribution system the following day at the locations required by paragraph (c)(2)(ii) of this section, in addition to the sample required at the entrance to the distribution system.

(ii) *Additional monitoring.* On each day following a routine sample monitoring result that exceeds the MRDL, the system is required to take three chlorine dioxide distribution system samples. If chlorine dioxide or chloramines are used to maintain a disinfectant residual in the distribution system, or if chlorine is used to maintain a disinfectant residual in the distribution system and there are no disinfection addition points after the entrance to the distribution system (*i.e.*, no booster chlorination), the system must take three samples as close to the first customer as possible, at intervals of at least six hours. If chlorine is used to maintain a disinfectant residual in the distribution system and there are one or more disinfection addition points after the entrance to the distribution system (*i.e.*, booster chlorination), the system must take one sample at each of the following locations: as close to the first customer as possible, in a location representative of average residence time, and as close to the end of the distribution system as possible (reflecting maximum residence time in the distribution system).

(iii) *Reduced monitoring.* Chlorine dioxide monitoring may not be reduced.

(d) *Monitoring requirements for disinfection byproduct precursors (DBPP)*—(1) *Routine monitoring.* Subpart H systems which use conventional filtration treatment (as defined in § 141.2) must monitor each treatment plant for TOC no later than the point of combined filter effluent turbidity monitoring and representative of the treated water. All systems required to monitor under this paragraph (d)(1) must also monitor for TOC in the source water prior to any treatment at the same time as monitoring for TOC in the treated water. These samples (source water and treated water) are referred to as paired samples. At the same time as the source water sample is taken, all systems must monitor for alkalinity in the source water prior to any treatment. Systems must take one paired sample and one source water alkalinity sample per month per plant at a time representative of normal operating conditions and influent water quality.

(2) *Reduced monitoring.* Subpart H systems with an average treated water TOC of less than 2.0 mg/L for two consecutive years, or less than 1.0 mg/L for one year, may reduce monitoring for both TOC and alkalinity to one paired sample and one source water alkalinity sample per plant per quarter. The system must revert to routine monitoring in the month following the quarter when the annual average treated water TOC ≥2.0 mg/L.

(e) *Bromide.* Systems required to analyze for bromate may reduce bromate monitoring from monthly to once per quarter, if the system demonstrates that the average source water bromide concentration is less than 0.05 mg/L based upon representative monthly measurements for one year. The system must continue bromide monitoring to remain on reduced bromate monitoring.

(f) *Monitoring plans.* Each system required to monitor under this subpart must develop and implement a monitoring plan. The system must maintain the plan and make it available for inspection by the State and the general public no later than 30 days following the applicable compliance dates in § 141.130(b). All Subpart H systems serving more than 3300 people must submit a copy of the monitoring plan to the State no later than the date of the first report required under § 141.134. The State may also require the plan to be submitted by any other system. After review, the State may require changes in any plan elements. The plan must include at least the following elements.

(1) Specific locations and schedules for collecting samples for any parameters included in this subpart.

(2) How the system will calculate compliance with MCLs, MRDLs, and treatment techniques.

(3) If approved for monitoring as a consecutive system, or if providing water to a consecutive system, under the provisions of § 141.29, the sampling plan must reflect the entire distribution system.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3776, Jan. 16, 2001; 69 FR 38856, June 29, 2004; 71 FR 482, Jan. 4, 2006; 78 FR 10348, Feb. 13, 2013]

§ 141.133 Compliance requirements.

(a) *General requirements.* (1) Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system fails to monitor for TTHM, HAA5, or bromate, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average. Where compliance is based on a running annual average of monthly or quarterly samples or averages and the system failure to monitor makes it impossible to determine compliance with MRDLs for chlorine and chloramines, this failure to monitor will be treated as a monitoring violation for the entire period covered by the annual average.

(2) All samples taken and analyzed under the provisions of this subpart must be included in determining compliance, even if that number is greater than the minimum required.

(3) If, during the first year of monitoring under § 141.132, any individual quarter's average will cause the running annual average of that system to exceed the MCL for total trihalomethanes, haloacetic acids

(five), or bromate; or the MRDL for chlorine or chloramine, the system is out of compliance at the end of that quarter.

(b) *Disinfection byproducts*—(1) *TTHMs and HAA5.* (i) For systems monitoring quarterly, compliance with MCLs in § 141.64 must be based on a running annual arithmetic average, computed quarterly, of quarterly arithmetic averages of all samples collected by the system as prescribed by § 141.132(b)(1).

(ii) For systems monitoring less frequently than quarterly, systems demonstrate MCL compliance if the average of samples taken that year under the provisions of § 141.132(b)(1) does not exceed the MCLs in § 141.64. If the average of these samples exceeds the MCL, the system must increase monitoring to once per quarter per treatment plant and such a system is not in violation of the MCL until it has completed one year of quarterly monitoring, unless the result of fewer than four quarters of monitoring will cause the running annual average to exceed the MCL, in which case the system is in violation at the end of that quarter. Systems required to increase monitoring frequency to quarterly monitoring must calculate compliance by including the sample which triggered the increased monitoring plus the following three quarters of monitoring.

(iii) If the running annual arithmetic average of quarterly averages covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to § 141.32 or § 141.202, whichever is effective for your system, in addition to reporting to the State pursuant to § 141.134.

(iv) If a PWS fails to complete four consecutive quarters of monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(2) *Bromate.* Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly samples (or, for months in which the system takes more than one sample, the average f all samples taken during the month) collected by the system as prescribed by § 141.132(b)(3). If the average of samples covering any consecutive four-quarter period exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to § 141.134. If a PWS fails to complete 12 consecutive months' monitoring, compliance with the MCL for the last four-quarter compliance period must be based on an average of the available data.

(3) *Chlorite.* Compliance must be based on an arithmetic average of each three sample set taken in the distribution system as prescribed by § 141.132(b)(2)(i)(B) and § 141.132(b)(2)(ii). If the arithmetic average of any three sample set exceeds the MCL, the system is in violation of the MCL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to § 141.134.

(c) *Disinfectant residuals*—(1) *Chlorine and chloramines.* (i) Compliance must be based on a running annual arithmetic average, computed quarterly, of monthly averages of all samples collected by the system under § 141.132(c)(1). If the average covering any consecutive four-quarter period exceeds the MRDL, the system is in violation of the MRDL and must notify the public pursuant to subpart Q, in addition to reporting to the State pursuant to § 141.134.

(ii) In cases where systems switch between the use of chlorine and chloramines for residual disinfection during the year, compliance must be determined by including together all monitoring results of both chlorine and chloramines in calculating compliance. Reports submitted pursuant to § 141.134 must clearly indicate which residual disinfectant was analyzed for each sample.

(2) *Chlorine dioxide.* (i) *Acute violations.* Compliance must be based on consecutive daily samples collected by the system under § 141.132(c)(2). If any daily sample taken at the entrance to the distribution system exceeds the MRDL, and on the following day one (or more) of the three samples taken in the distribution system exceed the MRDL, the system is in violation of the MRDL and must take immediate corrective action to lower the level of chlorine dioxide below the MRDL and

must notify the public pursuant to the procedures for acute health risks in subpart Q in addition to reporting to the State pursuant to § 141.134. Failure to take samples in the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system will also be considered an MRDL violation and the system must notify the public of the violation in accordance with the provisions for acute violations under subpart Q in addition to reporting to the State pursuant to § 141.134.

(ii) *Nonacute violations.* Compliance must be based on consecutive daily samples collected by the system under § 141.132(c)(2). If any two consecutive daily samples taken at the entrance to the distribution system exceed the MRDL and all distribution system samples taken are below the MRDL, the system is in violation of the MRDL and must take corrective action to lower the level of chlorine dioxide below the MRDL at the point of sampling and will notify the public pursuant to the procedures for nonacute health risks in subpart Q in addition to reporting to the State pursuant to § 141.134. Failure to monitor at the entrance to the distribution system the day following an exceedance of the chlorine dioxide MRDL at the entrance to the distribution system is also an MRDL violation and the system must notify the public of the violation in accordance with the provisions for nonacute violations under § 141.32(e)(78) in addition to reporting to the State pursuant to § 141.134.

(d) *Disinfection byproduct precursors (DBPP).* Compliance must be determined as specified by § 141.135(c). Systems may begin monitoring to determine whether Step 1 TOC removals can be met 12 months prior to the compliance date for the system. This monitoring is not required and failure to monitor during this period is not a violation. However, any system that does not monitor during this period, and then determines in the first 12 months after the compliance date that it is not able to meet the Step 1 requirements in § 141.135(b)(2) and must therefore apply for alternate minimum TOC removal (Step 2) requirements, is not eligible for retroactive approval of alternate minimum TOC removal (Step 2) requirements as allowed pursuant to § 141.135(b)(3) and is in violation. Systems may apply for alternate minimum TOC removal (Step 2) requirements any time after the compliance date. For systems required to meet Step 1 TOC removals, if the value calculated under § 141.135(c)(1)(iv) is less than 1.00, the system is in violation of the treatment technique requirements and must notify the public pursuant to subpart Q of this part, in addition to reporting to the State pursuant to § 141.134.

[63 FR 69466, Dec. 16, 1998, as amended at 65 FR 26022, May 4, 2000; 65 FR 40521, June 30, 2000; 66 FR 3777, Jan. 16, 2001; 69 FR 38856, June 29, 2004; 71 FR 482, Jan. 4, 2006]

§ 141.134 Reporting and recordkeeping requirements.

(a) Systems required to sample quarterly or more frequently must report to the State within 10 days after the end of each quarter in which samples were collected, notwithstanding the provisions of § 141.31. Systems required to sample less frequently than quarterly must report to the State within 10 days after the end of each monitoring period in which samples were collected.

(b) *Disinfection byproducts.* Systems must report the information specified in the following table:

If you are a * * *	You must report * * *
(1) System monitoring for TTHMs and HAA5 under the requirements of § 141.132(b) on a quarterly or more frequent basis.	(i) The number of samples taken during the last quarter. (ii) The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of all samples taken in the last quarter. (iv) The annual arithmetic average of the quarterly arithmetic averages of this section for the last four quarters. (v) Whether, based on § 141.133(b)(1), the MCL was violated.

If you are a * * *	You must report * * *
(2) System monitoring for TTHMs and HAA5 under the requirements of § 141.132(b) less frequently than quarterly (but as least annually).	(i) The number of samples taken during the last year. (ii) The location, date, and result of each sample taken during the last monitoring period. (iii) The arithmetic average of all samples taken over the last year. (iv) Whether, based on § 141.133(b)(1), the MCL was violated.
(3) System monitoring for TTHMs and HAA5 under the requriements of § 141.132(b) less frequently than annually.	(i) The location, date, and result of each sample taken (ii) Whether, based on § 141.133(b)(1), the MCL was violated.
(4) System monitoring for chlorite under the requirements of § 141.132(b).	(i) The number of entry point samples taken each month for the last 3 months. (ii) The location, date, and result of each sample (both entry point and distribution system) taken during the last quarter. (iii) For each month in the reporting period, the arithmetic average of all samples taken in each three samples set taken in the distribution system. (iv) Whether, based on § 141.133(b)(3), the MCL was violated, in which month, and how many times it was violated each month.
(5) System monitoring for bromate under the requirements of § 141.132(b).	(i)The number of samples taken during the last quarter. (ii)The location, date, and result of each sample taken during the last quarter. (iii) The arithmetic average of the monthly arithmetic averages of all samples taken in the last year. (iv) Whether, based on § 141.133(b)(2), the MCL was violated.

[1] The State may choose to perform calculations and determine whether the MCL was exceeded, in lieu of having the system report that information

(c) *Disinfectants.* Systems must report the information specified in the following table:

If you are a * * *	You must report * * *
(1) System monitoring for chlorine or chloramines under the requirements of § 141.132(c).	(i) The number of samples taken during each month of the last quarter. (ii) The month arithmetic average of all samples taken in each month for the last 12 months. (iii) The arithmetic average of the monthly averages for the last 12 months. (iv) Whether, based on § 141.133(c)(1), the MRD was violated.
(2) System monitoring for chlorine dioxide under the requirements of § 141.132(c).	(i) The dates, result, and locations of samples taken during the last quarter. (ii) Whether, based on § 141.133(c)(2), the MRDL was violated. (iii) Whether the MRDL was exceeded in any two consecutive daily samples and whether the resulting violation was acuate or nonacute.

[1] The State may choose to perform calculations and determine whether the MRDL was exceeded, in lieu of having the system report that information.

(d) *Disinfection byproduct precursors and enhanced coagulation or enhanced softening.* Systems must report the information specified in the following table:

If you are a. . .	You must report. . .[1]
(1) System monitoring monthly or quarterly for TOC under the requirements of § 141.132(d) and required to meet the enhanced coagulation or enhanced softening requirements in § 141.135(b)(2) or (3).	(i) The number of paired (source water and treated water) samples taken during the last quarter. (ii) The location, date, and results of each paired sample and associated alkalinity taken during the last quarter. (iii) For each month in the reporting period that paired samples were taken, the arithmetic average of the percent reduction of TOC for each paired sample and the required TOC percent removal. (iv) Calculations for determining compliance with the TOC percent removal requirements, as provided in § 141.135(c)(1). (v) Whether the system is in compliance with the enhanced coagulation or enhanced softening percent removal requirements in § 141.135(b) for the last four quarters.
(2) System monitoring monthly or quarterly for TOC under the requirements of § 141.132(d) and meeting one or more of the alternative compliance criteria in § 141.135(a)(2) or (3).	(i) The alternative compliance criterion that the system is using. (ii) The number of paired samples taken during the last quarter.

If you are a. . .	You must report. . .[1]
	(iii) The location, date, and result of each paired sample and associated alkalinity taken during the last quarter. (iv) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water TOC for systems meeting a criterion in §§ 141.135(a)(2)(i) or (iii) or of treated water TOC for systems meeting the criterion in § 141.135(a)(2)(ii). (v) The running annual arithmetic average based on monthly averages (or quarterly samples) of source water SUVA for systems meeting the criterion in § 141.135(a)(2)(v) or of treated water SUVA for systems meeting the criterion in § 141.135(a)(2)(vi). (vi) The running annual average of source water alkalinity for systems meeting the criterion in § 141.135(a)(2)(iii) and of treated water alkalinity for systems meeting the criterion in § 141.135(a)(3)(i). (vii) The running annual average for both TTHM and HAA5 for systems meeting the criterion in § 141.135(a)(2)(iii) or (iv). (viii) The running annual average of the amount of magnesium hardness removal (as $CaCO_3$, in mg/L) for systems meeting the criterion in § 141.135(a)(3)(ii). (ix) Whether the system is in compliance with the particular alternative compliance criterion in § 141.135(a)(2) or (3).

[1] The State may choose to perform calculations and determine whether the treatment technique was met, in lieu of having the system report that information.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3778, Jan. 16, 2001; 66 FR 9903, Feb. 12, 2001]

§ 141.135 Treatment technique for control of disinfection byproduct (DBP) precursors.

(a) *Applicability*. (1) Subpart H systems using conventional filtration treatment (as defined in § 141.2) must operate with enhanced coagulation or enhanced softening to achieve the TOC percent removal levels specified in paragraph (b) of this section unless the system meets at least one of the alternative compliance criteria listed in paragraph (a)(2) or (a)(3) of this section.

(2) *Alternative compliance criteria for enhanced coagulation and enhanced softening systems*. Subpart H systems using conventional filtration treatment may use the alternative compliance criteria in paragraphs (a)(2)(i) through (vi) of this section to comply with this section in lieu of complying with paragraph (b) of this section. Systems must still comply with monitoring requirements in § 141.132(d).

(i) The system's source water TOC level, measured according to § 141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(ii) The system's treated water TOC level, measured according to § 141.131(d)(3), is less than 2.0 mg/L, calculated quarterly as a running annual average.

(iii) The system's source water TOC level, measured according to § 141.131(d)(3), is less than 4.0 mg/L, calculated quarterly as a running annual average; the source water alkalinity, measured according to § 141.131(d)(1), is greater than 60 mg/L (as $CaCO_3$), calculated quarterly as a running annual average; and either the TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively; or prior to the effective date for compliance in § 141.130(b), the system has made a clear and irrevocable financial commitment not later than the effective date for compliance in § 141.130(b) to use of technologies that will limit the levels of TTHMs and HAA5 to no more than 0.040 mg/L and 0.030 mg/L, respectively. Systems must submit evidence of a clear and irrevocable financial commitment, in addition to a schedule containing milestones and periodic progress reports for installation and operation of appropriate technologies, to the State for approval not later than the effective date for compliance in § 141.130(b). These technologies must be installed and operating not later than June 30, 2005. Failure to install and operate these technologies by the date in the approved schedule will constitute a violation of National Primary Drinking Water Regulations.

(iv) The TTHM and HAA5 running annual averages are no greater than 0.040 mg/L and 0.030 mg/L, respectively, and the system uses only chlorine for primary disinfection and maintenance of a residual in the distribution system.

(v) The system's source water SUVA, prior to any treatment and measured monthly according to §141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(vi) The system's finished water SUVA, measured monthly according to §141.131(d)(4), is less than or equal to 2.0 L/mg-m, calculated quarterly as a running annual average.

(3) *Additional alternative compliance criteria for softening systems.* Systems practicing enhanced softening that cannot achieve the TOC removals required by paragraph (b)(2) of this section may use the alternative compliance criteria in paragraphs (a)(3)(i) and (ii) of this section in lieu of complying with paragraph (b) of this section. Systems must still comply with monitoring requirements in §141.132(d).

(i) Softening that results in lowering the treated water alkalinity to less than 60 mg/L (as $CaCO_3$), measured monthly according to §141.131(d)(1) and calculated quarterly as a running annual average.

(ii) Softening that results in removing at least 10 mg/L of magnesium hardness (as $CaCO_3$), measured monthly according to §141.131(d)(6) and calculated quarterly as a running annual average.

(b) *Enhanced coagulation and enhanced softening performance requirements.* (1) Systems must achieve the percent reduction of TOC specified in paragraph (b)(2) of this section between the source water and the combined filter effluent, unless the State approves a system's request for alternate minimum TOC removal (Step 2) requirements under paragraph (b)(3) of this section.

(2) Required Step 1 TOC reductions, indicated in the following table, are based upon specified source water parameters measured in accordance with §141.131(d). Systems practicing softening are required to meet the Step 1 TOC reductions in the far-right column (Source water alkalinity >120 mg/L) for the specified source water TOC:

STEP 1 REQUIRED REMOVAL OF TOC BY ENHANCED COAGULATION AND ENHANCED SOFTENING FOR SUBPART H SYSTEMS USING CONVENTIONAL TREATMENT[1] [2]

Source-water TOC, mg/L	Source-water alkalinity, mg/L as $CaCO_3$ (in precentages)		
	0–60	>60–120	>120[3]
>2.0–4.0	35.0	25.0	15.0
>4.0–8.0	45.0	35.0	25.0
>8.0.	50.0	40.0	30.0

[1] Systems meeting at least one of the conditions in paragraph (a)(2)(i)–(vi) of this section are not required to operate with enhanced coagulation.

[2] Softening system meeting one of the alternative compliance criteria in paragraph (a)(3) of this section are not required to operate with enhanced softening.

[3] System practicing softening must meet the TOC removal requirements in this column.

(3) Subpart H conventional treatment systems that cannot achieve the Step 1 TOC removals required by paragraph (b)(2) of this section due to water quality parameters or operational constraints must apply to the State, within three months of failure to achieve the TOC removals required by paragraph (b)(2) of this section, for approval of alternative minimum TOC (Step 2) removal requirements submitted by the system. If the State approves the alternative minimum TOC removal (Step 2) requirements, the State may make those requirements retroactive for the purposes of determining compliance. Until the State approves the alternate minimum TOC removal (Step 2) requirements, the system must meet the Step 1 TOC removals contained in paragraph (b)(2) of this section.

(4) *Alternate minimum TOC removal (Step 2) requirements.* Applications made to the State by enhanced coagulation

systems for approval of alternate minimum TOC removal (Step 2) requirements under paragraph (b)(3) of this section must include, at a minimum, results of bench- or pilot-scale testing conducted under paragraph (b)(4)(i) of this section. The submitted bench- or pilot-scale testing must be used to determine the alternate enhanced coagulation level.

(i) *Alternate enhanced coagulation level is defined as* coagulation at a coagulant dose and pH as determined by the method described in paragraphs (b)(4)(i) through (v) of this section such that an incremental addition of 10 mg/L of alum (or equivalent amount of ferric salt) results in a TOC removal of ≤0.3 mg/L. The percent removal of TOC at this point on the ''TOC removal versus coagulant dose'' curve is then defined as the minimum TOC removal required for the system. Once approved by the State, this minimum requirement supersedes the minimum TOC removal required by the table in paragraph (b)(2) of this section. This requirement will be effective until such time as the State approves a new value based on the results of a new bench- and pilot-scale test. Failure to achieve State-set alternative minimum TOC removal levels is a violation of National Primary Drinking Water Regulations.

(ii) Bench- or pilot-scale testing of enhanced coagulation must be conducted by using representative water samples and adding 10 mg/L increments of alum (or equivalent amounts of ferric salt) until the pH is reduced to a level less than or equal to the enhanced coagulation Step 2 target pH shown in the following table:

ENHANCED COAGULATION STEP 2 TARGET PH

Alkalinity (mg/L as $CaCO_3$)	Target pH
0–60	5.5
>60–120	6.3
>120–240	7.0
>240	7.5

(iii) For waters with alkalinities of less than 60 mg/L for which addition of small amounts of alum or equivalent addition of iron coagulant drives the pH below 5.5 before significant TOC removal occurs, the system must add necessary chemicals to maintain the pH between 5.3 and 5.7 in samples until the TOC removal of 0.3 mg/L per 10 mg/L alum added (or equivalant addition of iron coagulant) is reached.

(iv) The system may operate at any coagulant dose or pH necessary (consistent with other NPDWRs) to achieve the minimum TOC percent removal approved under paragraph (b)(3) of this section.

(v) If the TOC removal is consistently less than 0.3 mg/L of TOC per 10 mg/L of incremental alum dose at all dosages of alum (or equivalant addition of iron coagulant), the water is deemed to contain TOC not amenable to enhanced coagulation. The system may then apply to the State for a waiver of enhanced coagulation requirements.

(c) *Compliance calculations.* (1) Subpart H systems other than those identified in paragraph (a)(2) or (a)(3) of this section must comply with requirements contained in paragraph (b)(2) or (b)(3) of this section. Systems must calculate compliance quarterly, beginning after the system has collected 12 months of data, by determining an annual average using the following method:

(i) Determine actual monthly TOC percent removal, equal to:

$$(1-(\text{treated water TOC}/\text{source water TOC}))\times 100$$

(ii) Determine the required monthly TOC percent removal (from either the table in paragraph (b)(2) of this section or from paragraph (b)(3) of this section).

(iii) Divide the value in paragraph (c)(1)(i) of this section by the value in paragraph (c)(1)(ii) of this section.

(iv) Add together the results of paragraph (c)(1)(iii) of this section for the last 12 months and divide by 12.

(v) If the value calculated in paragraph (c)(1)(iv) of this section is less than 1.00, the system is not in compliance with the TOC percent removal requirements.

(2) Systems may use the provisions in paragraphs (c)(2)(i) through (v) of this section in lieu of the calculations in paragraph (c)(1)(i) through (v) of this section to determine compliance with TOC percent removal requirements.

(i) In any month that the system's treated or source water TOC level, measured according to § 141.131(d)(3), is less than 2.0 mg/L, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.

(ii) In any month that a system practicing softening removes at least 10 mg/L of magnesium hardness (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.

(iii) In any month that the system's source water SUVA, prior to any treatment and measured according to § 141.131(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.

(iv) In any month that the system's finished water SUVA, measured according to § 141.131(d)(4), is ≤2.0 L/mg-m, the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.

(v) In any month that a system practicing enhanced softening lowers alkalinity below 60 mg/L (as $CaCO_3$), the system may assign a monthly value of 1.0 (in lieu of the value calculated in paragraph (c)(1)(iii) of this section) when calculating compliance under the provisions of paragraph (c)(1) of this section.

(3) Subpart H systems using conventional treatment may also comply with the requirements of this section by meeting the criteria in paragraph (a)(2) or (3) of this section.

(d) *Treatment technique requirements for DBP precursors.* The Administrator identifies the following as treatment techniques to control the level of disinfection byproduct precursors in drinking water treatment and distribution systems: For Subpart H systems using conventional treatment, enhanced coagulation or enhanced softening.

[63 FR 69466, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001; 71 FR 482, Jan. 4, 2006]

Subparts M–N [Reserved]

Subpart O—Consumer Confidence Reports

SOURCE: 63 FR 44526, Aug. 19, 1998, unless otherwise noted.

§ 141.151 Purpose and applicability of this subpart.

(a) This subpart establishes the minimum requirements for the content of annual reports that community water systems must deliver to their customers. These reports must contain information on the quality of the water delivered by the systems and characterize the risks (if any) from exposure to contaminants detected in the drinking water in an accurate and understandable manner.

(b) Notwithstanding the provisions of § 141.3, this subpart applies only to community water systems.

(c) For the purpose of this subpart, *customers* are defined as billing units or service connections to which water is delivered by a community water system.

(d) For the purpose of this subpart, detected means: at or above the levels prescribed by § 141.23(a)(4) for inorganic contaminants, at or above the levels prescribed by § 141.24(f)(7) for the contaminants listed in § 141.61(a), at or above the levels prescribed by § 141.24(h)(18) for the contaminants listed in § 141.61(c), at or above the levels prescribed by § 141.131(b)(2)(iv) for the contaminants or contaminant groups listed in § 141.64, and at or above the levels prescribed by § 141.25(c) for radioactive contaminants.

(e) A State that has primary enforcement responsibility may adopt by rule, after notice and comment, alternative requirements for the form and content of the reports. The alternative requirements must provide the same type and amount of information as required by §§ 141.153 and 141.154, and must be designed to achieve an equivalent level of public information and education as would be achieved under this subpart.

(f) For purpose of §§ 141.154 and 141.155 of this subpart, the term ''primacy agency'' refers to the State or tribal government entity that has jurisdiction over, and primary enforcement responsibility for, public water systems, even if that government does not have interim or final primary enforcement responsibility for this rule. Where the State or tribe does not have primary enforcement responsibility for public water systems, the term ''primacy agency'' refers to the appropriate EPA regional office.

[63 FR 44526, Aug. 19, 1998, as amended at 71 FR 483, Jan. 4, 2006]

§ 141.152 Effective dates.

(a) The regulations in this subpart shall take effect on September 18, 1998.

(b) Each existing community water system must deliver its first report by October 19, 1999, its second report by July 1, 2000, and subsequent reports by July 1 annually thereafter. The first report must contain data collected during, or prior to, calendar year 1998 as prescribed in § 141.153(d)(3). Each report thereafter must contain data collected during, or prior to, the previous calendar year.

(c) A new community water system must deliver its first report by July 1 of the year after its first full calendar year in operation and annually thereafter.

(d) A community water system that sells water to another community water system must deliver the applicable information required in § 141.153 to the buyer system:

(1) No later than April 19, 1999, by April 1, 2000, and by April 1 annually thereafter or

(2) On a date mutually agreed upon by the seller and the purchaser, and specifically included in a contract between the parties.

§ 141.153 Content of the reports.

(a) Each community water system must provide to its customers an annual report that contains the information specified in this section and § 141.154.

(b) Information on the source of the water delivered:

(1) Each report must identify the source(s) of the water delivered by the community water system by providing information on:

(i) The type of the water: e.g., surface water, ground water; and

(ii) The commonly used name (if any) and location of the body (or bodies) of water.

(2) If a source water assessment has been completed, the report must notify consumers of the availability of this information and the means to obtain it. In addition, systems are encouraged to highlight in the report significant sources of contamination in the source water area if they have readily available information. Where a system has received a source water assessment from the primacy agency, the report must include a brief summary of the system's susceptibility to potential sources of contamination, using language provided by the primacy agency or written by the operator.

(c) *Definitions.* (1) Each report must include the following definitions:

(i) *Maximum Contaminant Level Goal or MCLG:* The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

(ii) *Maximum Contaminant Level or MCL:* The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

(2) A report for a community water system operating under a variance or an exemption issued under § 1415 or 1416 of SDWA must include the following definition: *Variances and Exemptions:* State or EPA permission not to meet an MCL or a treatment technique under certain conditions.

(3) A report that contains data on contaminants that EPA regulates using any of the following terms must include the applicable definitions:

(i) *Treatment Technique:* A required process intended to reduce the level of a contaminant in drinking water.

(ii) *Action Level:* The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

(iii) *Maximum residual disinfectant level goal or MRDLG:* The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

(iv) *Maximum residual disinfectant level or MRDL:* The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

(4) A report that contains information regarding a Level 1 or Level 2 Assessment required under Subpart Y of this part must include the applicable definitions:

(i) *Level 1 Assessment:* A Level 1 assessment is a study of the water system to identify potential problems and determine (if possible) why total coliform bacteria have been found in our water system.

(ii) *Level 2 Assessment:* A Level 2 assessment is a very detailed study of the water system to identify potential problems and determine (if possible) why an *E. coli* MCL violation has occurred and/or why total coliform bacteria have been found in our water system on multiple occasions.

(d) Information on detected contaminants.

(1) This sub-section specifies the requirements for information to be included in each report for contaminants subject to mandatory monitoring (except *Cryptosporidium*). It applies to:

(i) Contaminants subject to a MCL, action level, maximum residual disinfectant level, or treatment technique (regulated contaminants).

(ii) Contaminants for which monitoring is required by §141.40 (unregulated contaminants); and

(iii) Disinfection by-products or microbial contaminants for which monitoring is required by §§141.142 and 141.143, except as provided under paragraph (e)(1) of this section, and which are detected in the finished water.

(2) The data relating to these contaminants must be displayed in one table or in several adjacent tables. Any additional monitoring results which a community water system chooses to include in its report must be displayed separately.

(3) The data must be derived from data collected to comply with EPA and State monitoring and analytical requirements during calendar year 1998 for the first report and subsequent calendar years thereafter except that:

(i) Where a system is allowed to monitor for regulated contaminants less often than once a year, the table(s) must include the date and results of the most recent sampling and the report must include a brief statement indicating that the data presented in the report are from the most recent testing done in accordance with the regulations. No data older than 5 years need be included.

(ii) Results of monitoring in compliance with §§141.142 and 141.143 need only be included for 5 years from the date of last sample or until any of the detected contaminants becomes regulated and subject to routine monitoring requirements, whichever comes first.

(4) For detected regulated contaminants (listed in appendix A to this subpart), the table(s) must contain:

(i) The MCL for that contaminant expressed as a number equal to or greater than 1.0 (as provided in appendix A to this subpart);

(ii) The MCLG for that contaminant expressed in the same units as the MCL;

(iii) If there is no MCL for a detected contaminant, the table must indicate that there is a treatment technique, or specify the action level, applicable to that contaminant, and the report must include the definitions for treatment technique and/or action level, as appropriate, specified in paragraph (c)(3) of this section;

(iv) For contaminants subject to an MCL, except turbidity, total coliform, fecal coliform and *E. coli*, the highest contaminant level used to determine compliance with an NPDWR and the range of detected levels, as follows:

(A) When compliance with the MCL is determined annually or less frequently: The highest detected level at any sampling point and the range of detected levels expressed in the same units as the MCL.

(B) When compliance with the MCL is determined by calculating a running annual average of all samples taken at a monitoring location: the highest average of any of the monitoring locations and the range of all monitoring locations expressed in the same units as the MCL. For the MCLs for TTHM and HAA5 in § 141.64(b)(2), systems must include the highest locational running annual average for TTHM and HAA5 and the range of individual sample results for all monitoring locations expressed in the same units as the MCL. If more than one location exceeds the TTHM or HAA5 MCL, the system must include the locational running annual averages for all locations that exceed the MCL.

(C) When compliance with the MCL is determined on a system-wide basis by calculating a running annual average of all samples at all monitoring locations: the average and range of detection expressed in the same units as the MCL. The system is required to include individual sample results for the IDSE conducted under subpart U of this part when determining the range of TTHM and HAA5 results to be reported in the annual consumer confidence report for the calendar year that the IDSE samples were taken.

NOTE TO PARAGRAPH (d)(4)(iv): When rounding of results to determine compliance with the MCL is allowed by the regulations, rounding should be done prior to multiplying the results by the factor listed in appendix A of this subpart.

(v) For turbidity.

(A) When it is reported pursuant to § 141.13: The highest average monthly value.

(B) When it is reported pursuant to the requirements of § 141.71: the highest monthly value. The report should include an explanation of the reasons for measuring turbidity.

(C) When it is reported pursuant to § 141.73 or § 141.173 or § 141.551: the highest single measurement and the lowest monthly percentage of samples meeting the turbidity limits specified in § 141.73 or § 141.173, or § 141.551 for the filtration technology being used. The report should include an explanation of the reasons for measuring turbidity;

(vi) For lead and copper: the 90th percentile value of the most recent round of sampling and the number of sampling sites exceeding the action level;

(vii) For total coliform analytical results until March 31, 2016:

(A) The highest monthly number of positive samples for systems collecting fewer than 40 samples per month; or

(B) The highest monthly percentage of positive samples for systems collecting at least 40 samples per month;

(viii) For fecal coliform and *E. coli* until March 31, 2016: The total number of positive samples;

(ix) The likely source(s) of detected contaminants to the best of the operator's knowledge. Specific information regarding contaminants may be available in sanitary surveys and source water assessments, and should be used when available to the operator. If the operator lacks specific information on the likely source, the report must include one or more of the typical sources for that contaminant listed in appendix A to this subpart that is most applicable to the system.

(x) For *E. coli* analytical results under subpart Y: The total number of positive samples.

(5) If a community water system distributes water to its customers from multiple hydraulically independent distribution systems that are fed by different raw water sources, the table should contain a separate column for each service area and the report should identify each separate distribution system. Alternatively, systems could produce separate reports tailored to include data for each service area.

(6) The table(s) must clearly identify any data indicating violations of MCLs, MRDLs, or treatment techniques, and the report must contain a clear and readily understandable explanation of the violation including: the length of the violation, the potential adverse health effects, and actions taken by the system to address the violation. To describe the potential health effects, the system must use the relevant language of appendix A to this subpart.

(7) For detected unregulated contaminants for which monitoring is required (except *Cryptosporidium*), the table(s) must contain the average and range at which the contaminant was detected. The report may include a brief explanation of the reasons for

monitoring for unregulated contaminants.

(e) Information on *Cryptosporidium,* radon, and other contaminants:

(1) If the system has performed any monitoring for *Cryptosporidium,* including monitoring performed to satisfy the requirements of § 141.143, which indicates that *Cryptosporidium* may be present in the source water or the finished water, the report must include:

(i) A summary of the results of the monitoring; and

(ii) An explanation of the significance of the results.

(2) If the system has performed any monitoring for radon which indicates that radon may be present in the finished water, the report must include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results.

(3) If the system has performed additional monitoring which indicates the presence of other contaminants in the finished water, EPA strongly encourages systems to report any results which may indicate a health concern. To determine if results may indicate a health concern, EPA recommends that systems find out if EPA has proposed an NPDWR or issued a health advisory for that contaminant by calling the Safe Drinking Water Hotline (800–426–4791). EPA considers detects above a proposed MCL or health advisory level to indicate possible health concerns. For such contaminants, EPA recommends that the report include:

(i) The results of the monitoring; and

(ii) An explanation of the significance of the results noting the existence of a health advisory or a proposed regulation.

(f) Compliance with NPDWR. In addition to the requirements of § 141.153(d)(6), the report must note any violation that occurred during the year covered by the report of a requirement listed below, and include a clear and readily understandable explanation of the violation, any potential adverse health effects, and the steps the system has taken to correct the violation.

(1) Monitoring and reporting of compliance data;

(2) Filtration and disinfection prescribed by subpart H of this part. For systems which have failed to install adequate filtration or disinfection equipment or processes, or have had a failure of such equipment or processes which constitutes a violation, the report must include the following language as part of the explanation of potential adverse health effects: Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

(3) Lead and copper control requirements prescribed by subpart I of this part. For systems that fail to take one or more actions prescribed by §§ 141.80(d), 141.81, 141.82, 141.83 or 141.84, the report must include the applicable language of appendix A to this subpart for lead, copper, or both.

(4) Treatment techniques for Acrylamide and Epichlorohydrin prescribed by subpart K of this part. For systems that violate the requirements of subpart K of this part, the report must include the relevant language from appendix A to this subpart.

(5) Recordkeeping of compliance data.

(6) Special monitoring requirements prescribed by §§ 141.40 and 141.41; and

(7) Violation of the terms of a variance, an exemption, or an administrative or judicial order.

(g) Variances and Exemptions. If a system is operating under the terms of a variance or an exemption issued under § 1415 or 1416 of SDWA, the report must contain:

(1) An explanation of the reasons for the variance or exemption;

(2) The date on which the variance or exemption was issued;

(3) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(4) A notice of any opportunity for public input in the review, or renewal, of the variance or exemption.

(h) Additional information:

(1) The report must contain a brief explanation regarding contaminants which may reasonably be expected to be found in drinking water including bottled water. This explanation may

include the language of paragraphs (h)(1) (i) through (iii) or systems may use their own comparable language. The report also must include the language of paragraph (h)(1)(iv) of this section.

(i) The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

(ii) Contaminants that may be present in source water include:

(A) *Microbial contaminants*, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

(B) *Inorganic contaminants*, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining, or farming.

(C) *Pesticides and herbicides*, which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

(D) *Organic chemical contaminants*, including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

(E) *Radioactive contaminants*, which can be naturally-occurring or be the result of oil and gas production and mining activities.

(iii) In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

(iv) Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency's Safe Drinking Water Hotline (800–426–4791).

(2) The report must include the telephone number of the owner, operator, or designee of the community water system as a source of additional information concerning the report.

(3) In communities with a large proportion of non-English speaking residents, as determined by the Primacy Agency, the report must contain information in the appropriate language(s) regarding the importance of the report or contain a telephone number or address where such residents may contact the system to obtain a translated copy of the report or assistance in the appropriate language.

(4) The report must include information (e.g., time and place of regularly scheduled board meetings) about opportunities for public participation in decisions that may affect the quality of the water.

(5) The systems may include such additional information as they deem necessary for public education consistent with, and not detracting from, the purpose of the report.

(6) *Systems required to comply with subpart S.* (i) Any ground water system that receives notice from the State of a significant deficiency or notice from a laboratory of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d) must inform its customers of any significant deficiency that is uncorrected at the time of the next report or of any fecal indicator-positive ground water source sample in the next report. The system must continue to inform the public annually until the State determines that particular significant deficiency is corrected or the fecal contamination in the ground water source is addressed under §141.403(a). Each report must include the following elements.

(A) The nature of the particular significant deficiency or the source of the fecal contamination (if the source is known) and the date the significant deficiency was identified by the State or the dates of the fecal indicator-positive ground water source samples;

(B) If the fecal contamination in the ground water source has been addressed under §141.403(a) and the date of such action;

(C) For each significant deficiency or fecal contamination in the ground water source that has not been addressed under §141.403(a), the State-approved plan and schedule for correction, including interim measures, progress to date, and any interim measures completed; and

(D) If the system receives notice of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d), the potential health effects using the health effects language of Appendix A of subpart O.

(ii) If directed by the State, a system with significant deficiencies that have been corrected before the next report is issued must inform its customers of the significant deficiency, how the deficiency was corrected, and the date of correction under paragraph (h)(6)(i) of this section.

(7) *Systems required to comply with subpart Y.* (i) Any system required to comply with the Level 1 assessment requirement or a Level 2 assessment requirement that is not due to an *E. coli* MCL violation must include in the report the text found in paragraph (h)(7)(i)(A) and paragraphs (h)(7)(i)(B) and (C) of this section as appropriate, filling in the blanks accordingly and the text found in paragraphs (h)(7)(i)(D)(1) and (2) of this section if appropriate.

(A) Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

(B) During the past year we were required to conduct [INSERT NUMBER OF LEVEL 1ASSESSMENTS] Level 1 assessment(s). [INSERT NUMBER OF LEVEL 1 ASSESSMENTS] Level 1 assessment(s) were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(C) During the past year [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were required to be completed for our water system. [INSERT NUMBER OF LEVEL 2 ASSESSMENTS] Level 2 assessments were completed. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(D) Any system that has failed to complete all the required assessments or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

(*1*) During the past year we failed to conduct all of the required assessment(s).

(*2*) During the past year we failed to correct all identified defects that were found during the assessment.

(ii) Any system required to conduct a Level 2 assessment due to an *E. coli* MCL violation must include in the report the text found in paragraphs (h)(7)(ii)(A) and (B) of this section, filling in the blanks accordingly and the text found in paragraphs (h)(7)(ii)(C)(1) and (2) of this section, if appropriate.

(A) *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We found *E. coli* bacteria, indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

(B) We were required to complete a Level 2 assessment because we found *E. coli* in our water system. In addition, we were required to take [INSERT NUMBER OF CORRECTIVE ACTIONS] corrective actions and we completed [INSERT NUMBER OF CORRECTIVE ACTIONS] of these actions.

(C) Any system that has failed to complete the required assessment or correct all identified sanitary defects, is in violation of the treatment technique requirement and must also include one or both of the following statements, as appropriate:

(*1*) We failed to conduct the required assessment.

(*2*) We failed to correct all sanitary defects that were identified during the assessment that we conducted.

(iii) If a system detects *E. coli* and has violated the *E. coli MCL*, in addition to completing the table as required in paragraph (d)(4) of this section, the system must include one or more of the following statements to describe any noncompliance, as applicable:

(A) We had an *E. coli*-positive repeat sample following a total coliform-positive routine sample.

(B) We had a total coliform-positive repeat sample following an *E. coli*-positive routine sample.

(C) We failed to take all required repeat samples following an *E. coli*-positive routine sample.

(D) We failed to test for *E. coli* when any repeat sample tests positive for total coliform.

(iv) If a system detects *E. coli* and has not violated the *E. coli MCL*, in addition to completing the table as required in paragraph (d)(4) of this section, the system may include a statement that explains that although they have detected *E. coli*, they are not in violation of the *E. coli* MCL.

[63 FR 44526, Aug. 19, 1998, as amended at 63 FR 69516, Dec. 16, 1998; 64 FR 34733, June 29, 1999; 65 FR 26022, May 4, 2000; 67 FR 1836, Jan. 14, 2002; 71 FR 483, Jan. 4, 2006; 71 FR 65651, Nov. 8, 2006; 78 FR 10348, Feb. 13, 2013]

§ 141.154 Required additional health information.

(a) All reports must prominently display the following language: Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from the Safe Drinking Water Hotline (800–426–4791).

(b) Ending in the report due by July 1, 2001, a system which detects arsenic at levels above 0.025 mg/L, but below the 0.05 mg/L, and beginning in the report due by July 1, 2002, a system that detects arsenic above 0.005 mg/L and up to and including 0.010 mg/L:

(1) Must include in its report a short informational statement about arsenic, using language such as: While your drinking water meets EPA's standard for arsenic, it does contain low levels of arsenic. EPA's standard balances the current understanding of arsenic's possible health effects against the costs of removing arsenic from drinking water. EPA continues to research the health effects of low levels of arsenic, which is a mineral known to cause cancer in humans at high concentrations and is linked to other health effects such as skin damage and circulatory problems.

(2) May write its own educational statement, but only in consultation with the Primacy Agency.

(c) A system which detects nitrate at levels above 5 mg/l, but below the MCL:

(1) Must include a short informational statement about the impacts of nitrate on children using language such as: Nitrate in drinking water at levels above 10 ppm is a health risk for infants of less than six months of age. High nitrate levels in drinking water can cause blue baby syndrome. Nitrate levels may rise quickly for short periods of time because of rainfall or agricultural activity. If you are caring for an infant you should ask advice from your health care provider.

(2) May write its own educational statement, but only in consultation with the Primacy Agency.

(d) Every report must include the following lead-specific information:

(1) A short informational statement about lead in drinking water and its effects on children. The statement must include the following information:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. [NAME OF UTILITY] is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at *http://www.epa.gov/safewater/lead*.

(2) A system may write its own educational statement, but only in consultation with the State.

(e) Community water systems that detect TTHM above 0.080 mg/l, but below the MCL in § 141.12, as an annual average, monitored and calculated under the provisions of § 141.30, must include health effects language for TTHMs prescribed by appendix A.

(f) Beginning in the report due by July 1, 2002, and ending January 22, 2006, a community water system that detects arsenic above 0.010 mg/L and up to and including 0.05 mg/L must include the arsenic health effects language prescribed by appendix A to subpart O of this part.

[63 FR 44526, Aug. 19, 1998, as amended at 63 FR 69475, Dec. 16, 1998; 64 FR 34733, June 29, 1999; 65 FR 26023, May 4, 2000; 66 FR 7064, Jan. 22, 2001; 68 FR 14506, Mar. 25, 2003; 72 FR 57820, Oct. 10, 2007]

§ 141.155 Report delivery and recordkeeping.

(a) Except as provided in paragraph (g) of this section, each community water system must mail or otherwise directly deliver one copy of the report to each customer.

(b) The system must make a good faith effort to reach consumers who do not get water bills, using means recommended by the primacy agency. EPA expects that an adequate good faith effort will be tailored to the consumers who are served by the system but are not bill-paying customers, such as renters or workers. A good faith effort to reach consumers would include a mix of methods appropriate to the particular system such as: Posting the reports on the Internet; mailing to postal patrons in metropolitan areas; advertising the availability of the report in the news media; publication in a local newspaper; posting in public places such as cafeterias or lunch rooms of public buildings; delivery of multiple copies for distribution by single-biller customers such as apartment buildings or large private employers; delivery to community organizations.

(c) No later than the date the system is required to distribute the report to its customers, each community water system must mail a copy of the report to the primacy agency, followed within 3 months by a certification that the report has been distributed to customers, and that the information is correct and consistent with the compliance monitoring data previously submitted to the primacy agency.

(d) No later than the date the system is required to distribute the report to its customers, each community water system must deliver the report to any other agency or clearinghouse identified by the primacy agency.

(e) Each community water system must make its reports available to the public upon request.

(f) Each community water system serving 100,000 or more persons must post its current year's report to a publicly-accessible site on the Internet.

(g) The Governor of a State or his designee, or the Tribal Leader where the tribe has met the eligibility requirements contained in § 142.72 for the purposes of waiving the mailing requirement, can waive the requirement of paragraph (a) of this section for community water systems serving fewer than 10,000 persons. In consultation with the tribal government, the Regional Administrator may waive the requirement of § 141.155(a) in areas in

Indian country where no tribe has been deemed eligible.

(1) Such systems must:

(i) Publish the reports in one or more local newspapers serving the area in which the system is located;

(ii) Inform the customers that the reports will not be mailed, either in the newspapers in which the reports are published or by other means approved by the State; and

(iii) Make the reports available to the public upon request.

(2) Systems serving 500 or fewer persons may forego the requirements of paragraphs (g)(1)(i) and (ii) of this section if they provide notice at least once per year to their customers by mail, door-to-door delivery or by posting in an appropriate location that the report is available upon request.

(h) Any system subject to this subpart must retain copies of its Consumer Confidence Report for no less than 3 years.

[63 FR 44526, Aug. 19, 1998, as amended at 65 FR 26023, May 4, 2000]

APPENDIX A TO SUBPART O OF PART 141—REGULATED CONTAMINANTS

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Microbiological contaminants:						
Total Coliform Bacteria †.	MCL (systems that collect ≥40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/ month) 1 positive monthly sample.		MCL (systems that collect ≥40 samples/month) 5% of monthly samples are positive; (systems that collect <40 samples/ month) 1 positive monthly sample..	0	Naturally present in the environment.	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
Total Coliform Bacteria ‡.	TT		TT	N/A	Naturally present in the environment.	Use language found in § 141.153(h)(7)(i)(A)
Fecal coliform and *E. coli* †	0		0	0	Human and animal fecal waste ...	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
E. coli ‡	Routine and repeat samples are total coliform-positive and either is *E. coli*-positive or system fails to take repeat samples following *E. coli*-positive routine sample or system fails to analyze total coliform-positive repeat sample for *E. coli*.		Routine and repeat samples are total coliform-positive and either is *E. coli*-positive or system fails to take repeat samples following *E. coli*-positive routine sample or system fails to analyze total coliform-positive repeat sample for *E. coli*.	0	Human and animal fecal waste	*E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely-compromised immune systems.
Fecal Indicators (enterococci or coliphage).	TT		TT	N/A	Human and animal fecal waste	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
Total organic carbon (ppm).	TT		TT	N/A	Naturally present in the environment.	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection by products. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.

Turbidity (NTU)	TT		TT	N/A	Soil runoff	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
Radioactive contaminants:						
Beta/photon emitters (mrem/yr).	4 mrem/yr	–	4	0	Decay of natural and man-made deposits.	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta particle and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters (pCi/L)	15 pCi/L	–	15	0	Erosion of natural deposits	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium (pCi/L).	5 pCi/L	–	5	0	Erosion of natural deposits	Some people who drink water containing radium-226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium (pCi/L)	30 µg/L	–	30	0	Erosion of natural deposits	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
Inorganic contaminants:						
Antimony (ppb)	.006	1000	6	6	Discharge from petroleum refineries; fire retardants; ceramics; electronics; solder.	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Arsenic (ppb)	[1] 0.010	1000	[1] 10.	[1] 0	Erosion of natural deposits; Runoff from orchards; Runoff from glass and electronics production wastes.	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
Asbestos (MFL)	7 MFL		7	7	Decay of asbestos cement water mains; Erosion of natural deposits.	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
Barium (ppm)	2		2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
Beryllium (ppb)	.004	1000	4	4	Discharge from metal refineries and coal-burning factories; Discharge from electrical, aerospace, and defense industries.	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions
Bromate (ppb)	.010	1000	10	0	By-product of drinkig water disinfection.	Some people who drink water of containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
Cadmium (ppb)	.005	1000	5	5	Corrosion of galvanized pipes; Erosion of natural deposits; Discharge from metal refineries; Runoff from waste batteries and paints.	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
Chloramines (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.

Chlorine (ppm)	MRDL = 4		MRDL = 4	MRDLG = 4	Water additive used to control microbes.	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
Chlorine dioxide (ppb)	MRDL = .8	1000	MRDL = 800	MRDLG = 800	Water additive used to control micorbes.	Some infants and young children who drink water chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia.
Chlorite (ppm)	1		1	0.8	By-product of drinking water disinfection.	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
Chromium (ppb)	.1	1000	100	100	Discharge from steel and pulp mills; Erosion of natural deposits.	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
Copper (ppm)	AL = 1.3		AL = 1.3	1.3	Corrosion of household plumbing systems; Erosion of natural deposits.	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's disease should consult their personal doctor.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Cyanide (ppb)	.2	1000	200	200	Discharge from steel/metal factories; Discharge from plastic and fertilizer factories.	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
Fluoride (ppm)	4		4	4	Erosion of natural deposits; Water additive which promotes strong teeth; Discharge from fertilizer and aluminum factories.	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
Lead (ppb)	AL = .015	1000	AL = 15	0	Corrosion of household plumbing systems; Erosion of natural deposits.	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
Mercury [inorganic] (ppb).	.002	1000	2	2	Erosion of natural deposits; Dis charge from refineries and factories; Runoff from landfills; Runoff from cropland.	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.

Nitrate (ppm)	10		10	10	Runoff from fertilizer use; Leaching from septic tanks, sew age; Erosion of natural deposits.	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Nitrite (ppm)	1		1	1	Runoff from fertilizer use; Leaching from septic tanks, sew age; Erosion of natural deposits.	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
Selenium (ppb)	.05	1000	50	50	Discharge from petroleum and metal refineries; Erosion of natural deposits; Discharge from mines.	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
Thallium (ppb)	.002	1000	2	0.5	Leaching from ore-processing sites; Discharge from electronics, glass, and drug factories.	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
Synthetic organic contaminants including pesticides and herbicides:						
2,4-D (ppb)	.07	1000	70	70	Runoff from herbicide used on row crops.	Some people who drink water containing the weed killer 2,4-D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
2,4,5-TP [Silvex](ppb)	.05	1000	50	50	Residue of banned herbicide	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Acrylamide	TT		TT	0	Added to water during sewage/wastewater treatment.	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
Alachlor (ppb)	.002	1000	2	0	Runoff from herbicide used on row crops.	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
Atrazine (ppb)	.003	1000	3	3	Runoff from herbicide used on row crops.	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
Benzo(a)pyrene [PAH] (nanograms/l).	.0002	1,000,000	200	0	Leaching from linings of water storage tanks and distribution lines.	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
Carbofuran (ppb)	.04	1000	40	40	Leaching of soil fumigant used on rice and alfalfa.	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
Chlordane (ppb)	.002	1000	2	0	Residue of banned termiticide	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.

Dalapon (ppb)	.2	1000	200	200	Runoff from herbicide used on rights of way.	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
Di(2-ethylhexyl) adipate (ppb).	.4	1000	400	400	Discharge from chemical factories.	Some people who drink water containing di(2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties.
Di(2-ethylhexyl) phthalate (ppb).	.006	1000	6	0	Discharge from rubber and chemical factories.	Some people who drink water containing di(2-ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
Dibromochloropropane (ppt).	.0002	1,000,000	200	0	Runoff/leaching from soil fumigant used on soybeans, cotton, pineapples, and orchards.	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive problems and may have an increased risk of getting cancer.
Dinoseb (ppb)	.007	1000	7	7	Runoff from herbicide used on soybeans and vegetables.	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.
Diquat (ppb)	.02	1000	20	20	Runoff from herbicide use	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
Dioxin [2,3,7,8-TCDD] (ppq).	.00000003	1,000,000, 000	30	0	Emissions from waste incineration and other combustion; Discharge from chemical factories.	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
Endothall (ppb)	.1	1000	100	100	Runoff from herbicide use	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Endrin (ppb)	.002	1000	2	2	Residue of banned insecticide	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
Epichlorohydrin	TT		TT	0	Discharge from industrial chemical factories; An impurity of some water treatment chemicals.	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.
Ethylene dibromide (ppt).	.00005	1,000,000	50	0	Discharge from petroleum refineries.	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
Glyphosate (ppb)	.7	1000	700	700	Runoff from herbicide use	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
Heptachlor (ppt)	.0004	1,000,000	400	0	Residue of banned pesticide	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
Heptachlor epoxide (ppt).	.0002	1,000,000	200	0	Breakdown of heptachlor	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.

Hexachlorobenzene (ppb).	.001	1000	1	0	Discharge from metal refineries and agricultural chemical factories.	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
Hexachlorocyclopentadiene (ppb).	.05	1000	50	50	Discharge from chemical factories.	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
Lindane (ppt)	.0002	1,000,000	200	200	Runoff/leaching from insecticide used on cattle, lumber, gardens.	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
Methoxychlor (ppb)	.04	1000	40	40	Runoff/leaching from insecticide used on fruits, vegetables, alfalfa, livestock.	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
Oxamyl [Vydate] (ppb)	.2	1000	200	200	Runoff/leaching from insecticide used on apples, potatoes and tomatoes.	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
PCBs [Polychlorinated biphenyls] (ppt).	.0005	1,000,000	500	0	Runoff from landfills; Discharge of waste chemicals.	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
Pentachlorophenol (ppb).	.001	1000	1	0	Discharge from wood preserving factories.	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Picloram (ppb)	.5	1000	500	500	Herbicide runoff	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
Simazine (ppb)	.004	1000	4	4	Herbicide runoff	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
Toxaphene (ppb)	.003	1000	3	0	Runoff/leaching from insecticide used on cotton and cattle.	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
Volatile organic contaminants:						
Benzene (ppb)	.005	1000	5	0	Discharge from factories; Leaching from gas storage tanks and landfills.	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.
Carbon tetrachloride (ppb).	.005	1000	5	0	Discharge from chemical plants and other industrial activities.	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
Chlorobenzene (ppb)	.1	1000	100	100	Discharge from chemical and agricultural chemical factories.	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
o-Dichlorobenzene (ppb).	.6	1000	600	600	Discharge from industrial chemical factories.	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.

p-Dichlorobenzene (ppb).	.075	1000	75	75	Discharge from industrial chemical factories.	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
1,2-Dichloroethane (ppb).	.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
1,1-Dichloroethylene (ppb).	.007	1000	7	7	Discharge from industrial chemical factories.	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
cis-1,2-Dichloroethylene (ppb).	.07	1000	70	70	Discharge from industrial chemical factories.	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
trans-1,2-Dichloroethylene (ppb).	.1	1000	100	100	Discharge from industrial chemical factories.	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
Dichloromethane (ppb)	.005	1000	5	0	Discharge from pharmaceutical and chemical factories.	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
1,2-Dichloropropane (ppb).	.005	1000	5	0	Discharge from industrial chemical factories.	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
Ethylbenzene (ppb)	.7	1000	700	700	Discharge from petroleum refineries.	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
Haloacetic Acids (HAA) (ppb).	.060	1000	60	N/A	By-product of drinking water disinfection.	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant (units)	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
Styrene (ppb)	.1	1000	100	100	Discharge from rubber and plastic factories; Leaching from landfills.	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
Tetrachloroethylene (ppb).	.005	1000	5	0	Discharge from factories and dry cleaners.	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
1,2,4-Trichlorobenzene (ppb).	.07	1000	70	70	Discharge from textile-finishing factories.	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
1,1,1-Trichloroethane (ppb).	.2	1000	200	200	Discharge from metal degreasing sites and other factories.	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
1,1,2-Trichloroethane (ppb).	.005	1000	5	3	Discharge from industrial chemical factories.	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
Trichloroethylene (ppb)	.005	1000	5	0	Discharge from metal degreasing sites and other factories.	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.

TTHMs [Total trihalomethanes] (ppb).	0.10/.080	1000	100/80	N/A	By-product of drinking water disinfection.	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous systems, and may have an increased risk of getting cancer.
Toluene (ppm)	1		1	1	Discharge from petroleum factories.	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
Vinyl Chloride (ppb)	.002	1000	2	0	Leaching from PVC piping; Discharge from plastics factories.	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
Xylenes (ppm)	10		10	10	Discharge from petroleum factories; Discharge from chemical factories.	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.

† Until March 31, 2016.

‡ Beginning April 1, 2016.

[1] These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.

Key:

AL = Action Level
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MFL = million fibers per liter
MRDL = Maximum Residual Disinfectant Level
MRDLG = Maximum Residual Disinfectant Level Goal
mrem/year = millirems per year (a measure of radiation absorbed by the body)
N/A = Not Applicable
NTU = Nephelometric Turbidity Units (a measure of water clarity)
pCi/l = picocuries per liter (a measure of radioactivity)
ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (µg/l)
ppt = parts per trillion, or nanograms per liter
ppq = parts per quadrillion, or picograms per liter
TT = Treatment Technique

[65 FR 26024, May 4, 2000, as amended at 65 FR 76749, Dec. 7, 2000; 66 FR 7064, Jan. 22, 2001; 67 FR 70855, Nov. 27, 2002; 67 FR 73011, Dec. 9, 2002; 68 FR 14506, Mar. 25, 2003; 71 FR 65652, Nov. 8, 2006; 78 FR 10349, Feb. 13, 2013]

Subpart P—Enhanced Filtration and Disinfection—Systems Serving 10,000 or More People

SOURCE: 63 FR 69516, Dec. 16, 1998, unless otherwise noted.

§ 141.170 General requirements.

(a) The requirements of this subpart P constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under subpart H of this part. The requirements of this subpart are applicable to subpart H systems serving at least 10,000 people, beginning January 1, 2002 unless otherwise specified in this subpart. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium*, and turbidity. Each subpart H system serving at least 10,000 people must provide treatment of its source water that complies with these treatment technique requirements and are in addition to those identified in § 141.70. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(1) At least 99 percent (2-log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems.

(2) Compliance with the profiling and benchmark requirements under the provisions of § 141.172.

(b) A public water system subject to the requirements of this subpart is considered to be in compliance with the requirements of paragraph (a) of this section if:

(1) It meets the requirements for avoiding filtration in §§ 141.71 and 141.171 and the disinfection requirements in §§ 141.72 and 141.172; or

(2) It meets the applicable filtration requirements in either § 141.73 or § 141.173 and the disinfection requirements in §§ 141.72 and 141.172.

(c) Systems are not permitted to begin construction of uncovered finished water storage facilities beginning February 16, 1999.

(d) Subpart H systems that did not conduct optional monitoring under § 141.172 because they served fewer than 10,000 persons when such monitoring was required, but serve more than 10,000 persons prior to January 1, 2005 must comply with §§ 141.170, 141.171, 141.173, 141.174, and 141.175. These systems must also consult with the State to establish a disinfection benchmark. A system that decides to make a significant change to its disinfection practice, as described in § 141.172(c)(1)(i) through (iv) must consult with the State prior to making such change.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38856, June 29, 2004]

§ 141.171 Criteria for avoiding filtration.

In addition to the requirements of § 141.71, a public water system subject to the requirements of this subpart that does not provide filtration must meet all of the conditions of paragraphs (a) and (b) of this section.

(a) *Site-specific conditions*. In addition to site-specific conditions in § 141.71(b), systems must maintain the watershed control program under § 141.71(b)(2) to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. The watershed control program must, for *Cryptosporidium*:

(1) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

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

(b) During the onsite inspection conducted under the provisions of § 141.71(b)(3), the State must determine whether the watershed control program established under § 141.71(b)(2) is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of the system's program to monitor and control detrimental activities occurring in the watershed; and the extent to which the water system has maximized land ownership and/or controlled land use within the watershed.

§ 141.172 Disinfection profiling and benchmarking.

(a) *Determination of systems required to profile.* A public water system subject to the requirements of this subpart must determine its TTHM annual average using the procedure in paragraph (a)(1) of this section and its HAA5 annual average using the procedure in paragraph (a)(2) of this section. The annual average is the arithmetic average of the quarterly averages of four consecutive quarters of monitoring.

(1) The TTHM annual average must be the annual average during the same period as is used for the HAA5 annual average.

(i) Those systems that collected data under the provisions of subpart M (Information Collection Rule) must use the results of the samples collected during the last four quarters of required monitoring under § 141.142.

(ii) Those systems that use ''grandfathered'' HAA5 occurrence data that meet the provisions of paragraph (a)(2)(ii) of this section must use TTHM data collected at the same time under the provisions of §§ 141.12 and 141.30.

(iii) Those systems that use HAA5 occurrence data that meet the provisions of paragraph (a)(2)(iii)(A) of this section must use TTHM data collected at the same time under the provisions of §§ 141.12 and 141.30.

(2) The HAA5 annual average must be the annual average during the same period as is used for the TTHM annual average.

(i) Those systems that collected data under the provisions of subpart M (Information Collection Rule) must use the results of the samples collected during the last four quarters of required monitoring under § 141.142.

(ii) Those systems that have collected four quarters of HAA5 occurrence data that meets the routine monitoring sample number and location requirements for TTHM in §§ 141.12 and 141.30 and handling and analytical method requirements of § 141.142(b)(1) may use those data to determine whether the requirements of this section apply.

(iii) Those systems that have not collected four quarters of HAA5 occurrence data that meets the provisions of either paragraph (a)(2)(i) or (ii) of this section by March 16, 1999 must either:

(A) Conduct monitoring for HAA5 that meets the routine monitoring sample number and location requirements for TTHM in §§ 141.12 and 141.30 and handling and analytical method requirements of § 141.142(b)(1) to determine the HAA5 annual average and whether the requirements of paragraph (b) of this section apply. This monitoring must be completed so that the applicability determination can be made no later than March 31, 2000, or

(B) Comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with paragraph (b) of this section.

(3) The system may request that the State approve a more representative annual data set than the data set determined under paragraph (a)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.

(4) The State may require that a system use a more representative annual data set than the data set determined under paragraph (a)(1) or (2) of this section for the purpose of determining applicability of the requirements of this section.

(5) The system must submit data to the State on the schedule in paragraphs (a)(5)(i) through (v) of this section.

(i) Those systems that collected TTHM and HAA5 data under the provisions of subpart M (Information Collection Rule), as required by paragraphs (a)(1)(i) and (a)(2)(i) of this section, must submit the results of the samples collected during the last 12 months of required monitoring under § 141.142 not later than December 31, 1999.

(ii) Those systems that have collected four consecutive quarters of HAA5 occurrence data that meets the routine monitoring sample number and location for TTHM in §§ 141.12 and 141.30

and handling and analytical method requirements of § 141.142(b)(1), as allowed by paragraphs (a)(1)(ii) and (a)(2)(ii) of this section, must submit those data to the State not later than April 16, 1999. Until the State has approved the data, the system must conduct monitoring for HAA5 using the monitoring requirements specified under paragraph (a)(2)(iii) of this section.

(iii) Those systems that conduct monitoring for HAA5 using the monitoring requirements specified by paragraphs (a)(1)(iii) and (a)(2)(iii)(A) of this section, must submit TTHM and HAA5 data not later than March 31, 2000.

(iv) Those systems that elect to comply with all other provisions of this section as if the HAA5 monitoring had been conducted and the results required compliance with this section, as allowed under paragraphs (a)(2)(iii)(B) of this section, must notify the State in writing of their election not later than December 31, 1999.

(v) If the system elects to request that the State approve a more representative annual data set than the data set determined under paragraph (a)(2)(i) of this section, the system must submit this request in writing not later than December 31, 1999.

(6) Any system having either a TTHM annual average ≥0.064 mg/L or an HAA5 annual average ≥0.048 mg/L during the period identified in paragraphs (a)(1) and (2) of this section must comply with paragraph (b) of this section.

(b) *Disinfection profiling.* (1) Any system that meets the criteria in paragraph (a)(6) of this section must develop a disinfection profile of its disinfection practice for a period of up to three years.

(2) The system must monitor daily for a period of 12 consecutive calendar months to determine the total logs of inactivation for each day of operation, based on the CT99.9 values in Tables 1.1–1.6, 2.1, and 3.1 of § 141.74(b), as appropriate, through the entire treatment plant. This system must begin this monitoring not later than April 1, 2000. As a minimum, the system with a single point of disinfectant application prior to entrance to the distribution system must conduct the monitoring in paragraphs (b)(2)(i) through (iv) of this section. A system with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(2)(i) through (iv) of this section for each disinfection segment. The system must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in § 141.74(a), as follows:

(i) The temperature of the disinfected water must be measured once per day at each residual disinfectant concentration sampling point during peak hourly flow.

(ii) If the system uses chlorine, the pH of the disinfected water must be measured once per day at each chlorine residual disinfectant concentration sampling point during peak hourly flow.

(iii) The disinfectant contact time(s) (''T'') must be determined for each day during peak hourly flow.

(iv) The residual disinfectant concentration(s) (''C'') of the water before or at the first customer and prior to each additional point of disinfection must be measured each day during peak hourly flow.

(3) In lieu of the monitoring conducted under the provisions of paragraph (b)(2) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(3)(i) of this section. In addition to the monitoring conducted under the provisions of paragraph (b)(2) of this section to develop the disinfection profile, the system may elect to meet the requirements of paragraph (b)(3)(ii) of this section.

(i) A PWS that has three years of existing operational data may submit those data, a profile generated using those data, and a request that the State approve use of those data in lieu of monitoring under the provisions of paragraph (b)(2) of this section not later than March 31, 2000. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (b)(2) of this section. These data must also be representative of *Giardia lamblia* inactivation through the entire treatment plant and not just of certain treatment segments. Until the State approves this request, the system is required to conduct monitoring under the provisions of paragraph (b)(2) of this section.

(ii) In addition to the disinfection profile generated under paragraph (b)(2) of this section, a PWS that has existing operational data may use those data to develop a disinfection profile for additional years. Such systems may use these additional yearly disinfection profiles to develop a benchmark under the provisions of paragraph (c) of this section. The State must determine whether these operational data are substantially equivalent to data collected under the provisions of paragraph (b)(2) of this section. These data must also be representative of inactivation through the entire treatment plant and not just of certain treatment segments.

(4) The system must calculate the total inactivation ratio as follows:

(i) If the system uses only one point of disinfectant application, the system may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (b)(4)(i)(A) or (b)(4)(i)(B) of this section.

(A) Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

(B) Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, the system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine (Σ ($CTcalc/CT_{99.9}$)).

(ii) If the system uses more than one point of disinfectant application before the first customer, the system must determine the CT value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and (Σ($CTcalc/CT_{99.9}$)) must be calculated using the method in paragraph (b)(4)(i) of this section.

(iii) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (b)(4)(i) or (ii) of this section by 3.0.

(5) A system that uses either chloramines or ozone for primary disinfection must also calculate the logs of inactivation for viruses using a method approved by the State.

(6) The system must retain disinfection profile data in graphic form, as a spreadsheet, or in some other format acceptable to the State for review as part of sanitary surveys conducted by the State.

(c) *Disinfection benchmarking.* (1) Any system required to develop a disinfection profile under the provisions of paragraphs (a) and (b) of this section and that decides to make a significant change to its disinfection practice must consult with the State prior to making such change. Significant changes to disinfection practice are:

(i) Changes to the point of disinfection;

(ii) Changes to the disinfectant(s) used in the treatment plant;

(iii) Changes to the disinfection process; and

(iv) Any other modification identified by the State.

(2) Any system that is modifying its disinfection practice must calculate its disinfection benchmark using the procedure specified in paragraphs (c)(2)(i) through (ii) of this section.

(i) For each year of profiling data collected and calculated under paragraph (b) of this section, the system must determine the lowest average monthly *Giardia lamblia* inactivation in each year of profiling data. The system must determine the average *Giardia lamblia* inactivation for each calendar month for each year of profiling data by dividing the sum of daily *Giardia lamblia* of inactivation by the number of values calculated for that month.

(ii) The disinfection benchmark is the lowest monthly average value (for systems with one year of profiling data) or average of lowest monthly average values (for systems with more than one year of profiling data) of the monthly logs of *Giardia lamblia* inactivation in each year of profiling data.

(3) A system that uses either chloramines or ozone for primary disinfection must also calculate the disinfection benchmark for viruses using a method approved by the State.

(4) The system must submit information in paragraphs (c)(4)(i) through (iii) of this section to the State as part of its consultation process.

(i) A description of the proposed change;

(ii) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) under paragraph (b) of this section and benchmark as required by paragraph (c)(2) of this section; and

(iii) An analysis of how the proposed change will affect the current levels of disinfection.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001]

§ 141.173 Filtration.

A public water system subject to the requirements of this subpart that does not meet all of the criteria in this subpart and subpart H of this part for avoiding filtration must provide treatment consisting of both disinfection, as specified in § 141.72(b), and filtration treatment which complies with the requirements of paragraph (a) or (b) of this section or § 141.73 (b) or (c) by December 31, 2001.

(a) *Conventional filtration treatment or direct filtration.* (1) For systems using conventional filtration or direct filtration, the turbidity level of representative samples of a system's filtered water must be less than or equal to 0.3 NTU in at least 95 percent of the measurements taken each month, measured as specified in § 141.74(a) and (c).

(2) The turbidity level of representative samples of a system's filtered water must at no time exceed 1 NTU, measured as specified in § 141.74(a) and (c).

(3) A system that uses lime softening may acidify representative samples prior to analysis using a protocol approved by the State.

(b) *Filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration.* A public water system may use a filtration technology not listed in paragraph (a) of this section or in § 141.73(b) or (c) if it demonstrates to the State, using pilot plant studies or other means, that the alternative filtration technology, in combination with disinfection treatment that meets the requirements of § 141.72(b), consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts and 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts, and the State approves the use of the filtration technology. For each approval, the State will set turbidity performance requirements that the system must meet at least 95 percent of the time and that the system may not exceed at any time at a level that consistently achieves 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts, 99.99 percent removal and/or inactivation of viruses, and 99 percent removal of *Cryptosporidium* oocysts.

[63 FR 69516, Dec. 16, 1998, as amended at 65 FR 20313, Apr. 14, 2000; 66 FR 3779, Jan. 16, 2001]

§ 141.174 Filtration sampling requirements.

(a) Monitoring requirements for systems using filtration treatment. In addition to monitoring required by § 141.74, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must conduct continuous monitoring of turbidity for each individual filter using an approved method in § 141.74(a) and must calibrate turbidimeters using the procedure specified by the manufacturer. Systems must record the results of individual filter monitoring every 15 minutes.

(b) If there is a failure in the continuous turbidity monitoring equipment, the system must conduct grab sampling every four hours in lieu of continuous monitoring, but for no more than five working days following the failure of the equipment.

§ 141.175 Reporting and recordkeeping requirements.

In addition to the reporting and recordkeeping requirements in § 141.75, a public water system subject to the requirements of this subpart that provides conventional filtration treatment or direct filtration must report monthly to the State the information specified in paragraphs (a) and (b) of this section beginning January 1, 2002. In addition to the reporting and recordkeeping requirements in §141.75, a public water system subject to the requirements of this subpart that provides filtration approved under §141.173(b) must report monthly to the State the information specified in paragraph (a) of this section beginning January 1, 2002. The reporting in paragraph (a) of this section is in lieu of the reporting specified in §141.75(b)(1).

(a) Turbidity measurements as required by §141.173 must be reported within 10 days after the end of each month the system serves water to the public. Information that must be reported includes:

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

(2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to the turbidity limits specified in §141.173(a) or (b).

(3) The date and value of any turbidity measurements taken during the month which exceed 1 NTU for systems using conventional filtration treatment or direct filtration, or which exceed the maximum level set by the State under §141.173(b).

(b) Systems must maintain the results of individual filter monitoring taken under §141.174 for at least three years. Systems must report that they have conducted individual filter turbidity monitoring under §141.174 within 10 days after the end of each month the system serves water to the public. Systems must report individual filter turbidity measurement results taken under §141.174 within 10 days after the end of each month the system serves water to the public only if measurements demonstrate one or more of the conditions in paragraphs (b)(1) through (4) of this section. Systems that use lime softening may apply to the State for alternative exceedance levels for the levels specified in paragraphs (b)(1) through (4) of this section if they can demonstrate that higher turbidity levels in individual filters are due to lime carryover only and not due to degraded filter performance.

(1) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(2) For any individual filter that has a measured turbidity level of greater than 0.5 NTU in two consecutive measurements taken 15 minutes apart at the end of the first four hours of continuous filter operation after the filter has been backwashed or otherwise taken offline, the system must report the filter number, the turbidity, and the date(s) on which the exceedance occurred. In addition, the system must either produce a filter profile for the filter within 7 days of the exceedance (if the system is not able to identify an obvious reason for the abnormal filter performance) and report that the profile has been produced or report the obvious reason for the exceedance.

(3) For any individual filter that has a measured turbidity level of greater than 1.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of three consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must conduct a self-assessment of the filter within 14 days of the exceedance and report that the self-assessment was conducted. The self assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.

(4) For any individual filter that has a measured turbidity level of greater

than 2.0 NTU in two consecutive measurements taken 15 minutes apart at any time in each of two consecutive months, the system must report the filter number, the turbidity measurement, and the date(s) on which the exceedance occurred. In addition, the system must arrange for the conduct of a comprehensive performance evaluation by the State or a third party approved by the State no later than 30 days following the exceedance and have the evaluation completed and submitted to the State no later than 90 days following the exceedance.

(c) *Additional reporting requirements.* (1) If at any time the turbidity exceeds 1 NTU in representative samples of filtered water in a system using conventional filtration treatment or direct filtration, the system must inform the State as soon as possible, but no later than the end of the next business day.

(2) If at any time the turbidity in representative samples of filtered water exceeds the maximum level set by the State under §141.173(b) for filtration technologies other than conventional filtration treatment, direct filtration, slow sand filtration, or diatomaceous earth filtration, the system must inform the State as soon as possible, but no later than the end of the next business day.

[63 FR 69516, Dec. 16, 1998, as amended at 66 FR 3779, Jan. 16, 2001]

Subpart Q—Public Notification of Drinking Water Violations

SOURCE: 65 FR 26035, May 4, 2000, unless otherwise noted.

§ 141.201 General public notification requirements.

Public water systems in States with primacy for the public water system supervision (PWSS) program must comply with the requirements in this subpart no later than May 6, 2002 or on the date the State-adopted rule becomes effective, whichever comes first. Public water systems in jurisdictions where EPA directly implements the PWSS program must comply with the requirements in this subpart on October 31, 2000. Prior to these dates, public water systems must continue to comply with the public notice requirements in §141.32 of this part. The term ‘‘primacy agency’’ is used in this subpart to refer to either EPA or the State or the Tribe in cases where EPA, the State, or the Tribe exercises primary enforcement responsibility for this subpart.

(a) *Who must give public notice?* Each owner or operator of a public water system (community water systems, non-transient non-community water systems, and transient non-community water systems) must give notice for all violations of national primary drinking water regulations (NPDWR) and for other situations, as listed in Table 1. The term ‘‘NPDWR violations’’ is used in this subpart to include violations of the maximum contaminant level (MCL), maximum residual disinfection level (MRDL), treatment technique (TT), monitoring requirements, and testing procedures in this part 141. Appendix A to this subpart identifies the tier assignment for each specific violation or situation requiring a public notice.

TABLE 1 TO § 141.201—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A PUBLIC NOTICE

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(1) NPDWR violations:
  (i) Failure to comply with an applicable maximum contaminant level (MCL) or maximum residual disinfectant level (MRDL).
  (ii) Failure to comply with a prescribed treatment technique (TT).
  (iii) Failure to perform water quality monitoring, as required by the drinking water regulations.
  (iv) Failure to comply with testing procedures as prescribed by a drinking water regulation.
(2) Variance and exemptions under sections 1415 and 1416 of SDWA:
  (i) Operation under a variance or an exemption.
  (ii) Failure to comply with the requirements of any schedule that has been set under a variance or exemption.
(3) Special public notices:
  (i) Occurrence of a waterborne disease outbreak or other waterborne emergency.

TABLE 1 TO § 141.201—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A PUBLIC NOTICE—Continued

(ii) Exceedance of the nitrate MCL by non-community water systems (NCWS), where granted permission by the primacy agency under 141.11(d) of this part.
(iii) Exceedance of the secondary maximum contaminant level (SMCL) for fluoride.
(iv) Availability of unregulated contaminant monitoring data.
(v) Other violations and situations determined by the primacy agency to require a public notice under this subpart, not already listed in Appendix A.

(b) *What type of public notice is required for each violation or situation?* Public notice requirements are divided into three tiers, to take into account the seriousness of the violation or situation and of any potential adverse health effects that may be involved. The public notice requirements for each violation or situation listed in Table 1 of this section are determined by the tier to which it is assigned. Table 2 of this section provides the definition of each tier. Appendix A of this part identifies the tier assignment for each specific violation or situation.

TABLE 2 TO § 141.201—DEFINITION OF PUBLIC NOTICE TIERS

(1) *Tier 1 public notice*—required for NPDWR violations and situations with significant potential to have serious adverse effects on human health as a result of short-term exposure.
(2) *Tier 2 public notice*—required for all other NPDWR violations and situations with potential to have serious adverse effects on human health.
(3) *Tier 3 public notice*—required for all other NPDWR violations and situations not included in Tier 1 and Tier 2.

(c) *Who must be notified?* (1) Each public water system must provide public notice to persons served by the water system, in accordance with this subpart. Public water systems that sell or otherwise provide drinking water to other public water systems (*i.e.*, to consecutive systems) are required to give public notice to the owner or operator of the consecutive system; the consecutive system is responsible for providing public notice to the persons it serves.

(2) If a public water system has a violation in a portion of the distribution system that is physically or hydraulically isolated from other parts of the distribution system, the primacy agency may allow the system to limit distribution of the public notice to only persons served by that portion of the system which is out of compliance. Permission by the primacy agency for limiting distribution of the notice must be granted in writing.

(3) A copy of the notice must also be sent to the primacy agency, in accordance with the requirements under § 141.31(d).

§ 141.202 *Tier 1 Public Notice*—Form, manner, and frequency of notice.

(a) *Which violations or situations require a Tier 1 public notice?* Table 1 of this section lists the violation categories and other situations requiring a Tier 1 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

TABLE 1 TO § 141.202—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 1 PUBLIC NOTICE

(1) Violation of the MCL for total coliforms when fecal coliform or E. coli are present in the water distribution system (as specified in § 141.63(b)), or when the water system fails to test for fecal coliforms or E. coli when any repeat sample tests positive for coliform (as specified in § 141.21(e)); Violation of the MCL for *E. coli* (as specified in § 141.63(c));
(2) Violation of the MCL for nitrate, nitrite, or total nitrate and nitrite, as defined in § 141.62, or when the water system fails to take a confirmation sample within 24 hours of the system's receipt of the first sample showing an exceedance of the nitrate or nitrite MCL, as specified in § 141.23(f)(2);
(3) Exceedance of the nitrate MCL by non-community water systems, where permitted to exceed the MCL by the primacy agency under § 141.11(d), as required under § 141.209;

TABLE 1 TO § 141.202—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 1 PUBLIC NOTICE—Continued

(4) Violation of the MRDL for chlorine dioxide, as defined in § 141.65(a), when one or more samples taken in the distribution system the day following an exceedance of the MRDL at the entrance of the distribution system exceed the MRDL, or when the water system does not take the required samples in the distribution system, as specified in § 141.133(c)(2)(i);
(5) Violation of the turbidity MCL under § 141.13(b), where the primacy agency determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(6) Violation of the Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR) or Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit (as identified in appendix A), where the primacy agency determines after consultation that a Tier 1 notice is required or where consultation does not take place within 24 hours after the system learns of the violation;
(7) Occurrence of a waterborne disease outbreak, as defined in § 141.2, or other waterborne emergency (such as a failure or significant interruption in key water treatment processes, a natural disaster that disrupts the water supply or distribution system, or a chemical spill or unexpected loading of possible pathogens into the source water that significantly increases the potential for drinking water contamination);
(8) Detection of *E. coli*, enterococci, or coliphage in source water samples as specified in § 141.402(a) and § 141.402(b);
(9) Other violations or situations with significant potential to have serious adverse effects on human health as a result of short-term exposure, as determined by the primacy agency either in its regulations or on a case-by-case basis.

(b) *When is the Tier 1 public notice to be provided?* What additional steps are required? Public water systems must:

(1) Provide a public notice as soon as practical but no later than 24 hours after the system learns of the violation;

(2) Initiate consultation with the primacy agency as soon as practical, but no later than 24 hours after the public water system learns of the violation or situation, to determine additional public notice requirements; and

(3) Comply with any additional public notification requirements (including any repeat notices or direction on the duration of the posted notices) that are established as a result of the consultation with the primacy agency. Such requirements may include the timing, form, manner, frequency, and content of repeat notices (if any) and other actions designed to reach all persons served.

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

(1) Appropriate broadcast media (such as radio and television);

(2) Posting of the notice in conspicuous locations throughout the area served by the water system;

(3) Hand delivery of the notice to persons served by the water system; or

(4) Another delivery method approved in writing by the primacy agency.

[65 FR 26035, May 4, 2000, as amended at 67 FR 1836, Jan. 14, 2002; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013]

§ 141.203 *Tier 2 Public Notice*—Form, manner, and frequency of notice.

(a) *Which violations or situations require a Tier 2 public notice?* Table 1 of this section lists the violation categories and other situations requiring a Tier 2 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

TABLE 1 TO § 141.203—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 2 PUBLIC NOTICE

(1) All violations of the MCL, MRDL, and treatment technique requirements, except where a Tier 1 notice is required under § 141.202(a) or where the primacy agency determines that a Tier 1 notice is required;
(2) Violations of the monitoring and testing procedure requirements, where the primacy agency determines that a Tier 2 rather than a Tier 3 public notice is required, taking into account potential health impacts and persistence of the violation; and
(3) Failure to comply with the terms and conditions of any variance or exemption in place.
(4) Failure to take corrective action or failure to maintain at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer under § 141.403(a).

(b) *When is the Tier 2 public notice to be provided?* (1) Public water systems must provide the public notice as soon as practical, but no later than 30 days after the system learns of the violation. If the public notice is posted, the notice must remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved. The primacy agency may, in appropriate circumstances, allow additional time for the initial notice of up to three months from the date the system learns of the violation. It is not appropriate for the primacy agency to grant an extension to the 30-day deadline for any unresolved violation or to allow across-the-board extensions by rule or policy for other violations or situations requiring a Tier 2 public notice. Extensions granted by the primacy agency must be in writing.

(2) The public water system must repeat the notice every three months as long as the violation or situation persists, unless the primacy agency determines that appropriate circumstances warrant a different repeat notice frequency. In no circumstance may the repeat notice be given less frequently than once per year. It is not appropriate for the primacy agency to allow less frequent repeat notice for an MCL or treatment technique violation under the Total Coliform Rule or subpart Y of this part or a treatment technique violation under the Surface Water Treatment Rule or Interim Enhanced Surface Water Treatment Rule. It is also not appropriate for the primacy agency to allow through its rules or policies across-the-board reductions in the repeat notice frequency for other ongoing violations requiring a Tier 2 repeat notice. Primacy agency determinations allowing repeat notices to be given less frequently than once every three months must be in writing.

(3) For the turbidity violations specified in this paragraph, public water systems must consult with the primacy agency as soon as practical but no later than 24 hours after the public water system learns of the violation, to determine whether a Tier 1 public notice under §141.202(a) is required to protect public health. When consultation does not take place within the 24-hour period, the water system must distribute a Tier 1 notice of the violation within the next 24 hours (*i.e.*, no later than 48 hours after the system learns of the violation), following the requirements under §141.202(b) and (c). Consultation with the primacy agency is required for:

(i) Violation of the turbidity MCL under §141.13(b); or

(ii) Violation of the SWTR, IESWTR or LT1ESWTR treatment technique requirement resulting from a single exceedance of the maximum allowable turbidity limit.

(c) *What is the form and manner of the Tier 2 public notice?* Public water systems must provide the initial public notice and any repeat notices in a form and manner that is reasonably calculated to reach persons served in the required time period. The form and manner of the public notice may vary based on the specific situation and type of water system, but it must at a minimum meet the following requirements:

(1) Unless directed otherwise by the primacy agency in writing, community water systems must provide notice by:

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (c)(1)(i) of this section. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places served by the system or on the Internet; or delivery to community organizations.

(2) Unless directed otherwise by the primacy agency in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system if they would not normally be reached by the notice required in paragraph (c)(2)(i) of this section. Such persons may include those served who may not see a posted notice because the posted notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

[65 FR 26035, May 4, 2000, as amended at 67 FR 1836, Jan. 14, 2002; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013]

§ 141.204 *Tier 3 Public Notice*—Form, manner, and frequency of notice.

(a) *Which violations or situations require a Tier 3 public notice?* Table 1 of this section lists the violation categories and other situations requiring a Tier 3 public notice. Appendix A to this subpart identifies the tier assignment for each specific violation or situation.

TABLE 1 TO § 141.204—VIOLATION CATEGORIES AND OTHER SITUATIONS REQUIRING A TIER 3 PUBLIC NOTICE

(1) Monitoring violations under 40 CFR part 141, except where a Tier 1 notice is required under § 141.202(a) or where the primacy agency determines that a Tier 2 notice is required;
(2) Failure to comply with a testing procedure established in 40 CFR part 141, except where a Tier 1 notice is required under § 141.202(a)) or where the primacy agency determines that a Tier 2 notice is required;
(3) Operation under a variance granted under Section 1415 or an exemption granted under Section 1416 of the Safe Drinking Water Act;
(4) Availability of unregulated contaminant monitoring results, as required under § 141.207;
(5) Exceedance of the fluoride secondary maximum contaminant level (SMCL), as required under § 141.208; and
(6) Reporting and Recordkeeping violations under subpart Y of 40 CFR part 141.

(b) *When is the Tier 3 public notice to be provided?* (1) Public water systems must provide the public notice not later than one year after the public water system learns of the violation or situation or begins operating under a variance or exemption. Following the initial notice, the public water system must repeat the notice annually for as long as the violation, variance, exemption, or other situation persists. If the public notice is posted, the notice must remain in place for as long as the violation, variance, exemption, or other situation persists, but in no case less than seven days (even if the violation or situation is resolved).

(2) Instead of individual Tier 3 public notices, a public water system may use an annual report detailing all violations and situations that occurred during the previous twelve months, as long as the timing requirements of paragraph (b)(1) of this section are met.

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

(1) Unless directed otherwise by the primacy agency in writing, community water systems must provide notice by:

(i) Mail or other direct delivery to each customer receiving a bill and to other service connections to which water is delivered by the public water system; and

(ii) Any other method reasonably calculated to reach other persons regularly served by the system, if they would not normally be reached by the notice required in paragraph (c)(1)(i) of this section. Such persons may include those who do not pay water bills or do not have service connection addresses (e.g., house renters, apartment dwellers, university students, nursing home patients, prison inmates, etc.). Other methods may include: Publication in a local newspaper; delivery of multiple copies for distribution by customers that provide their drinking water to others (e.g., apartment building owners or large private employers); posting in public places or on the Internet; or delivery to community organizations.

(2) Unless directed otherwise by the primacy agency in writing, non-community water systems must provide notice by:

(i) Posting the notice in conspicuous locations throughout the distribution system frequented by persons served by the system, or by mail or direct delivery to each customer and service connection (where known); and

(ii) Any other method reasonably calculated to reach other persons served by the system, if they would not normally be reached by the notice required in paragraph (c)(2)(i) of this section. Such persons may include those who may not see a posted notice because the notice is not in a location they routinely pass by. Other methods may include: Publication in a local newspaper or newsletter distributed to customers; use of E-mail to notify employees or students; or, delivery of multiple copies in central locations (e.g., community centers).

(d) *In what situations may the Consumer Confidence Report be used to meet the Tier 3 public notice requirements?* For community water systems, the Consumer Confidence Report (CCR) required under Subpart O of this part may be used as a vehicle for the initial Tier 3 public notice and all required repeat notices, as long as:

(1) The CCR is provided to persons served no later than 12 months after the system learns of the violation or situation as required under §141.204(b);

(2) The Tier 3 notice contained in the CCR follows the content requirements under §141.205; and

(3) The CCR is distributed following the delivery requirements under §141.204(c).

[65 FR 26035, May 4, 2000; 65 FR 38629, June 21, 2000, as amended at 78 FR 10350, Feb. 13, 2013]

§ 141.205 Content of the public notice.

(a) *What elements must be included in the public notice for violations of National Primary Drinking Water Regulations (NPDWR) or other situations requiring a public notice?* When a public water system violates a NPDWR or has a situation requiring public notification, each public notice must include the following elements:

(1) A description of the violation or situation, including the contaminant(s) of concern, and (as applicable) the contaminant level(s);

(2) When the violation or situation occurred;

(3) Any potential adverse health effects from the violation or situation, including the standard language under paragraph (d)(1) or (d)(2) of this section, whichever is applicable;

(4) The population at risk, including subpopulations particularly vulnerable if exposed to the contaminant in their drinking water;

(5) Whether alternative water supplies should be used;

(6) What actions consumers should take, including when they should seek medical help, if known;

(7) What the system is doing to correct the violation or situation;

(8) When the water system expects to return to compliance or resolve the situation;

(9) The name, business address, and phone number of the water system

owner, operator, or designee of the public water system as a source of additional information concerning the notice; and

(10) A statement to encourage the notice recipient to distribute the public notice to other persons served, using the standard language under paragraph (d)(3) of this section, where applicable.

(b) *What elements must be included in the public notice for public water systems operating under a variance or exemption?* (1) If a public water system has been granted a variance or an exemption, the public notice must contain:

(i) An explanation of the reasons for the variance or exemption;

(ii) The date on which the variance or exemption was issued;

(iii) A brief status report on the steps the system is taking to install treatment, find alternative sources of water, or otherwise comply with the terms and schedules of the variance or exemption; and

(iv) A notice of any opportunity for public input in the review of the variance or exemption.

(2) If a public water system violates the conditions of a variance or exemption, the public notice must contain the ten elements listed in paragraph (a) of this section.

(c) *How is the public notice to be presented?* (1) Each public notice required by this section:

(i) Must be displayed in a conspicuous way when printed or posted;

(ii) Must not contain overly technical language or very small print;

(iii) Must not be formatted in a way that defeats the purpose of the notice;

(iv) Must not contain language which nullifies the purpose of the notice.

(2) Each public notice required by this section must comply with multilingual requirements, as follows:

(i) For public water systems serving a large proportion of non-English speaking consumers, as determined by the primacy agency, the public notice must contain information in the appropriate language(s) regarding the importance of the notice or contain a telephone number or address where persons served may contact the water system to obtain a translated copy of the notice or to request assistance in the appropriate language.

(ii) In cases where the primacy agency has not determined what constitutes a large proportion of non-English speaking consumers, the public water system must include in the public notice the same information as in paragraph (c)(2)(i) of this section, where appropriate to reach a large proportion of non-English speaking persons served by the water system.

(d) *What standard language must public water systems include in their public notice?* Public water systems are required to include the following standard language in their public notice:

(1) Standard health effects language for MCL or MRDL violations, treatment technique violations, and violations of the condition of a variance or exemption. Public water systems must include in each public notice the health effects language specified in appendix B to this subpart corresponding to each MCL, MRDL, and treatment technique violation listed in appendix A to this subpart, and for each violation of a condition of a variance or exemption.

(2) Standard language for monitoring and testing procedure violations. Public water systems must include the following language in their notice, including the language necessary to fill in the blanks, for all monitoring and testing procedure violations listed in appendix A to this subpart:

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

(3) Standard language to encourage the distribution of the public notice to all persons served. Public water systems must include in their notice the following language (where applicable):

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

§ 141.206 Notice to new billing units or new customers.

(a) *What is the requirement for community water systems?* Community water systems must give a copy of the most recent public notice for any continuing violation, the existence of a variance or exemption, or other ongoing situations requiring a public notice to all new billing units or new customers prior to or at the time service begins.

(b) *What is the requirement for non-community water systems?* Non-community water systems must continuously post the public notice in conspicuous locations in order to inform new consumers of any continuing violation, variance or exemption, or other situation requiring a public notice for as long as the violation, variance, exemption, or other situation persists.

§ 141.207 Special notice of the availability of unregulated contaminant monitoring results.

(a) *When is the special notice to be given?* The owner or operator of a community water system or non-transient, non-community water system required to monitor under § 141.40 must notify persons served by the system of the availability of the results of such sampling no later than 12 months after the monitoring results are known.

(b) *What is the form and manner of the special notice?* The form and manner of the public notice must follow the requirements for a Tier 3 public notice prescribed in §§ 141.204(c), (d)(1), and (d)(3). The notice must also identify a person and provide the telephone number to contact for information on the monitoring results.

§ 141.208 Special notice for exceedance of the SMCL for fluoride.

(a) *When is the special notice to be given?* Community water systems that exceed the fluoride secondary maximum contaminant level (SMCL) of 2 mg/l as specified in § 143.3 (determined by the last single sample taken in accordance with § 141.23), but do not exceed the maximum contaminant level (MCL) of 4 mg/l for fluoride (as specified in § 141.62), must provide the public notice in paragraph (c) of this section to persons served. Public notice must be provided as soon as practical but no later than 12 months from the day the water system learns of the exceedance. A copy of the notice must also be sent to all new billing units and new customers at the time service begins and to the State public health officer. The public water system must repeat the notice at least annually for as long as the SMCL is exceeded. If the public notice is posted, the notice must remain in place for as long as the SMCL is exceeded, but in no case less than seven days (even if the exceedance is eliminated). On a case-by-case basis, the primacy agency may require an initial notice sooner than 12 months and repeat notices more frequently than annually.

(b) *What is the form and manner of the special notice?* The form and manner of the public notice (including repeat notices) must follow the requirements for a Tier 3 public notice in § 141.204(c) and (d)(1) and (d)(3).

(c) *What mandatory language must be contained in the special notice?* The notice must contain the following language, including the language necessary to fill in the blanks:

> This is an alert about your drinking water and a cosmetic dental problem that might affect children under nine years of age. At low levels, fluoride can help prevent cavities, but children drinking water containing more than 2 milligrams per liter (mg/l) of fluoride may develop cosmetic discoloration of their permanent teeth (dental fluorosis). The drinking water provided by your community water system [*name*] has a fluoride concentration of [*insert value*] mg/l.
>
> Dental fluorosis, in its moderate or severe forms, may result in a brown staining and/or pitting of the permanent teeth. This problem occurs only in developing teeth, before they erupt from the gums. Children under nine should be provided with alternative sources of drinking water or water that has been treated to remove the fluoride to avoid the possibility of staining and pitting of their permanent teeth. You may also want to contact your dentist about proper use by young children of fluoride-containing products. Older children and adults may safely drink the water.
>
> Drinking water containing more than 4 mg/L of fluoride (the U.S. Environmental Protection Agency's drinking water standard) can increase your risk of developing bone disease. Your drinking water does not contain more than 4 mg/l of fluoride, but we're required to notify you when we discover that the fluoride levels in your drinking water exceed 2 mg/l because of this cosmetic dental problem.

For more information, please call [name of water system contact] of [name of community water system] at [phone number]. Some home water treatment units are also available to remove fluoride from drinking water. To learn more about available home water treatment units, you may call NSF International at 1–877–8–NSF–HELP.''

§ 141.209 Special notice for nitrate exceedances above MCL by non-community water systems (NCWS), where granted permission by the primacy agency under § 141.11(d).

(a) *When is the special notice to be given?* The owner or operator of a non-community water system granted permission by the primacy agency under § 141.11(d) to exceed the nitrate MCL must provide notice to persons served according to the requirements for a Tier 1 notice under § 141.202(a) and (b).

(b) *What is the form and manner of the special notice?* Non-community water systems granted permission by the primacy agency to exceed the nitrate MCL under § 141.11(d) must provide continuous posting of the fact that nitrate levels exceed 10 mg/l and the potential health effects of exposure, according to the requirements for Tier 1 notice delivery under § 141.202(c) and the content requirements under § 141.205.

§ 141.210 Notice by primacy agency on behalf of the public water system.

(a) *May the primacy agency give the notice on behalf of the public water system?* The primacy agency may give the notice required by this subpart on behalf of the owner and operator of the public water system if the primacy agency complies with the requirements of this subpart.

(b) *What is the responsibility of the public water system when notice is given by the primacy agency?* The owner or operator of the public water system remains responsible for ensuring that the requirements of this subpart are met.

§ 141.211 Special notice for repeated failure to conduct monitoring of the source water for *Cryptosporidium* and for failure to determine bin classification or mean *Cryptosporidium* level.

(a) *When is the special notice for repeated failure to monitor to be given?* The owner or operator of a community or non-community water system that is required to monitor source water under § 141.701 must notify persons served by the water system that monitoring has not been completed as specified no later than 30 days after the system has failed to collect any 3 months of monitoring as specified in § 141.701(c). The notice must be repeated as specified in § 141.203(b).

(b) *When is the special notice for failure to determine bin classification or mean Cryptosporidium level to be given?* The owner or operator of a community or non-community water system that is required to determine a bin classification under § 141.710, or to determine mean *Cryptosporidium* level under § 141.712, must notify persons served by the water system that the determination has not been made as required no later than 30 days after the system has failed report the determination as specified in § 141.710(e) or § 141.712(a), respectively. The notice must be repeated as specified in § 141.203(b). The notice is not required if the system is complying with a State-approved schedule to address the violation.

(c) *What is the form and manner of the special notice?* The form and manner of the public notice must follow the requirements for a Tier 2 public notice prescribed in § 141.203(c). The public notice must be presented as required in § 141.205(c).

(d) *What mandatory language must be contained in the special notice?* The notice must contain the following language, including the language necessary to fill in the blanks.

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

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

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

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

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

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

[71 FR 768, Jan. 5, 2006]

APPENDIX A TO SUBPART Q OF PART 141—NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE[1]

Contaminant	MCL/MRDL/TT violations[2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
I. Violations of National Primary Drinking Water Regulations (NPDWR):[3].				
A. Microbiological Contaminants.				
1.a Total coliform bacteria †	2	141.63(a)	3	141.21(a)–(e).
1.b Total coliform (TT violations resulting from failure to perform assessments or corrective actions, monitoring violations, and reporting violations) ‡	2	141.860(b)(1)	3	141.860(c)(1). 141.860(d)(1).
1.c Seasonal system failure to follow State-approved start-up plan prior to serving water to the public or failure to provide certification to State ‡	2	141.860(b)(2)	3	141.860(d)(3).
2.a Fecal coliform/*E. coli*†	1	141.63(b)	[4]1,3	141.21(e)
2.b *E. coli* (MCL, monitoring, and reporting violations) ‡	1	141.860 (a)	3	141.860(c)(2) 141.860(d)(1). 141.860(d)(2).
2.c *E. coli* (TT violations resulting from failure to perform level 2 Assessments or corrective action) ‡	2	141.860(b)(1)		
3. Turbidity MCL	2	141.13(a)	3	141.22
4. Turbidity MCL (average of 2 days' samples >5 NTU)	[5]2, 1	141.13(b)	3	141.22
5. Turbidity (for TT violations resulting from a single exceedance of maximum allowable turbidity level)	[6]2, 1	141.71(a)(2), 141.71(c)(2)(i), 141.73(a)(2), 141.73 (b)(2), 141.73 (c)(2), 141.73(d), 141.173(a)(2), 141.173(b), 141.551(b)	3	141.74(a)(1), 141.74(b)(2), 141.74(c)(1), 141.174, 141.560(a)–(c), 141.561.
6. Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. allowable turbidity level (TT)	2	141.70–141.73	3	141.74
7. Interim Enhanced Surface Water Treatment Rule violations, other than violations resulting from single exceedance of max. turbidity level (TT)	[7]2	141.170–141.173, 141.500–141.553	3	141.172, 141.174, 141.530–141.544, 141.560–141.564.
8. Filter Backwash Recycling Rule violations	2	141.76(c)	3	141.76(b), (d)
9. Long Term 1 Enhanced Surface Water Treatment Rule violations	2	141.500–141.553	3	141.530–141.544, 141.560–141.564.
10. LT2ESWTR violations	2	141.710–141.720	[22]2, 3	141.701–141.705 and 141.708–141.709.
11. Ground Water Rule violations	2	141.404	3	141.402(h), 141.403(d).
B. Inorganic Chemicals (IOCs)				
1. Antimony	2	141.62(b)	3	141.23(a), (c)

2. Arsenic	2	[8] 141.62(b)	3	[11] 141.23(a), (c)
3. Asbestos (fibers >10 μm)	2	141.62(b)	3	141.23(a)–(b)
4. Barium	2	141.62(b)	3	141.23(a), (c)
5. Beryllium	2	141.62(b)	3	141.23(a), (c)
6. Cadmium	2	141.62(b)	3	141.23(a), (c)
7. Chromium (total)	2	141.62(b)	3	141.23(a), (c)
8. Cyanide	2	141.62(b)	3	141.23(a), (c)
9. Fluoride	2	141.62(b)	3	141.23(a), (c)
10. Mercury (inorganic)	2	141.62(b)	3	141.23(a), (c)
11. Nitrate	1	141.62(b)	[12] 1, 3	141.23(a), (d), 141.23(f)(2)
12. Nitrite	1	141.62(b)	[12] 1, 3	141.23(a), (e), 141.23(f)(2)
13. Total Nitrate and Nitrite	1	141.62(b)	3	141.23(a)
14. Selenium	2	141.62(b)	3	141.23(a), (c)
15. Thallium	2	141.62(b)	3	141.23(a), (c)
C. Lead and Copper Rule (Action Level for lead is 0.015 mg/L, for copper is 1.3 mg/L)				
1. Lead and Copper Rule (TT)	2	141.80–141.85	3	141.86–141.89
D. Synthetic Organic Chemicals (SOCs)				
1. 2,4–D	2	141.61(c)	3	141.24(h)
2. 2,4,5–TP (Silvex)	2	141.61(c)	3	141.24(h)
3. Alachlor	2	141.61(c)	3	141.24(h)
4. Atrazine	2	141.61(c)	3	141.24(h)
5. Benzo(a)pyrene (PAHs)	2	141.61(c)	3	141.24(h)
6. Carbofuran	2	141.61(c)	3	141.24(h)
7. Chlordane	2	141.61(c)	3	141.24(h)
8. Dalapon	2	141.61(c)	3	141.24(h)
9. Di (2-ethylhexyl) adipate	2	141.61(c)	3	141.24(h)
10. Di (2-ethylhexyl) phthalate	2	141.61(c)	3	141.24(h)
11. Dibromochloropropane	2	141.61(c)	3	141.24(h)
12. Dinoseb	2	141.61(c)	3	141.24(h)
13. Dioxin (2,3,7,8-TCDD)	2	141.61(c)	3	141.24(h)
14. Diquat	2	141.61(c)	3	141.24(h)
15. Endothall	2	141.61(c)	3	141.24(h)
16. Endrin	2	141.61(c)	3	141.24(h)
17. Ethylene dibromide	2	141.61(c)	3	141.24(h)
18. Glyphosate	2	141.61(c)	3	141.24(h)
19. Heptachlor	2	141.61(c)	3	141.24(h)
20. Heptachlor epoxide	2	141.61(c)	3	141.24(h)
21. Hexachlorobenzene	2	141.61(c)	3	141.24(h)
22. Hexachlorocyclo-pentadiene	2	141.61(c)	3	141.24(h)
23. Lindane	2	141.61(c)	3	141.24(h)
24. Methoxychlor	2	141.61(c)	3	141.24(h)
25. Oxamyl (Vydate)	2	141.61(c)	3	141.24(h)
26. Pentachlorophenol	2	141.61(c)	3	141.24(h)
27. Picloram	2	141.61(c)	3	141.24(h)
28. Polychlorinated biphenyls (PCBs)	2	141.61(c)	3	141.24(h)
29. Simazine	2	141.61(c)	3	141.24(h)
30. Toxaphene	2	141.61(c)	3	141.24(h)
E. Volatile Organic Chemicals (VOCs)				
1. Benzene	2	141.61(a)	3	141.24(f)

Contaminant	MCL/MRDL/TT violations[2]		Monitoring & testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
2. Carbon tetrachloride	2	141.61(a)	3	141.24(f)
3. Chlorobenzene (monochlorobenzene)	2	141.61(a)	3	141.24(f)
4. o-Dichlorobenzene	2	141.61(a)	3	141.24(f)
5. p-Dichlorobenzene	2	141.61(a)	3	141.24(f)
6. 1,2-Dichloroethane	2	141.61(a)	3	141.24(f)
7. 1,1-Dichloroethylene	2	141.61(a)	3	141.24(f)
8. cis-1,2-Dichloroethylene	2	141.61(a)	3	141.24(f)
9. trans-1,2-Dichloroethylene	2	141.61(a)	3	141.24(f)
10. Dichloromethane	2	141.61(a)	3	141.24(f)
11. 1,2-Dichloropropane	2	141.61(a)	3	141.24(f)
12. Ethylbenzene	2	141.61(a)	3	141.24(f)
13. Styrene	2	141.61(a)	3	141.24(f)
14. Tetrachloroethylene	2	141.61(a)	3	141.24(f)
15. Toluene	2	141.61(a)	3	141.24(f)
16. 1,2,4-Trichlorobenzene	2	141.61(a)	3	141.24(f)
17. 1,1,1-Trichloroethane	2	141.61(a)	3	141.24(f)
18. 1,1,2-Trichloroethane	2	141.61(a)	3	141.24(f)
19. Trichloroethylene	2	141.61(a)	3	141.24(f)
20. Vinyl chloride	2	141.61(a)	3	141.24(f)
21. Xylenes (total)	2	141.61(a)	3	141.24(f)
F. Radioactive Contaminants				
1. Beta/photon emitters	2	141.66(d)	3	141.25(a) 141.26(b)
2. Alpha emitters	2	141.66(c)	3	141.25(a) 141.26(a)
3. Combined radium (226 and 228)	2	141.66(b)	3	141.25(a) 141.26(a)
4. Uranium	[9] 2	141.66(e)	[10] 3	141.25(a) 141.26(a)
G. Disinfection Byproducts (DBPs), Byproduct Precursors, Disinfectant Residuals. Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs).[13]				
1. Total trihalomethanes (TTHMs)	2	[14] 141.64(b)	3	141.132(a)–(b), 141.600–141.605, 141.620–141.629
2. Haloacetic Acids (HAA5)	2	141.64(b)	3	141.132(a)–(b), 141.600–141.605, 141.620–141.629
3. Bromate	2	141.64(a)	3	141.132(a)–(b)
4. Chlorite	2	141.64(a)	3	141.132(a)–(b)
5. Chlorine (MRDL)	2	141.65(a)	3	141.132(a), (c)
6. Chloramine (MRDL)	2	141.65(a)	3	141.132(a), (c)

7. Chlorine dioxide (MRDL), where any 2 consecutive daily samples at entrance to distribution system only are above MRDL	2	141.65(a), 141.133(c)(3)	2 [15], 3	141.132(a), (c), 141.133(c)(2)
8. Chlorine dioxide (MRDL), where sample(s) in distribution system the next day are also above MRDL	[16] 1	141.65(a), 141.133(c)(3)	1	141.132(a), (c), 141.133(c)(2)
9. Control of DBP precursors—TOC (TT)	2	141.135(a)–(b)	3	141.132(a), (d)
10. Bench marking and disinfection profiling	N/A	N/A	3	141.172 141.530–141.544.
11. Development of monitoring plan	N/A	N/A	3	141.132(f)
H. Other Treatment Techniques				
1. Acrylamide (TT)	2	141.111	N/A	N/A
2. Epichlorohydrin (TT)	2	141.111	N/A	N/A
II. Unregulated Contaminant Monitoring: [17]				
A. Unregulated contaminants	N/A	N/A	3	141.40
B. Nickel	N/A	N/A	3	141.23(c), (k)
III. Public Notification for Variances and Exemptions:				
A. Operation under a variance or exemption	3	[18] 1415, 1416,	N/A	N/A
B. Violation of conditions of a variance or exemption	2	1415, 1416, [19] 142.307	N/A	N/A
IV. Other Situations Requiring Public Notification:				
A. Fluoride secondary maximum contaminant level (SMCL) exceedance	3	143.3	N/A	N/A
B. Exceedance of nitrate MCL for non-community systems, as allowed by primacy agency	1	141.11(d)	N/A	N/A
C. Availability of unregulated contaminant monitoring data	3	141.40	N/A	N/A
D. Waterborne disease outbreak	1	141.2, 141.71(c)(2)(ii)	N/A	N/A
E. Other waterborne emergency [20]	1	N/A	N/A	N/A
F. Source Water Sample Positive for GWR Fecal indicators: E. coli, enterococci, or coliphage	1	141.402(g)	N/A	N/A
G. Other situations as determined by primacy agency	[21] 1, 2, 3	N/A	N/A	N/A

APPENDIX A—ENDNOTES

† Until March 31, 2016.

‡ Beginning April 1, 2016.

1. Violations and other situations not listed in this table (e.g., failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the primacy agency. Primacy agencies may, at their option, also require a more stringent public notice tier (e.g., Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under §141.202(a) and §141.203(a).

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

3. The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.

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

5. Systems that violate the turbidity MCL of 5 NTU based on an average of measurements over two consecutive days must consult with the primacy agency within 24 hours after learning of the violation. Based on this consultation, the primacy agency may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the primacy agency in the 24-hour period, the violation is automatically elevated to Tier 1.

6. Systems with treatment technique violations involving a single exceedance of a maximum turbidity limit under the Surface Water Treatment Rule (SWTR), the Interim Enhanced Surface Water Treatment Rule (IESWTR), or the Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) are required to consult with the primacy agency within 24 hours after learning of the violation. Based on this consultation, the primacy agency may subsequently decide to elevate the violation to Tier 1. If a system is unable to make contact with the primacy agency in the 24-hour period, the violation is automatically elevated to Tier 1.

7. Most of the requirements of the Interim Enhanced Surface Water Treatment Rule (63 *FR* 69477) (§§141.170–141.171, 141.173–141.174) become effective January 1, 2002 for Subpart H systems (surface water systems and ground water systems under the direct influence of surface water) serving at least 10,000 persons. However, §141.172 has some requirements that become effective as early as April 16, 1999. The Surface Water Treatment Rule remains in effect for systems serving at least 10,000 persons even after 2002; the Interim Enhanced Surface Water Treatment Rule adds additional requirements and does not in many cases supercede the SWTR.

8. The arsenic MCL citations are effective January 23, 2006. Until then, the citations are §141.11(b) and §141.23(n).

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

10. The uranium Tier 3 violation citations are effective December 8, 2000 for all community water systems.

11. The arsenic Tier 3 violation MCL citations are effective January 23, 2006. Until then, the citations are §141.23(a), (l).

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

13. Subpart H community and non-transient non-community systems serving ≥10,000 must comply with new DBP MCLs, disinfectant MRDLs, and related monitoring requirements beginning January 1, 2002. All other community and non-transient non-community systems must meet the MCLs and MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving 10,000 or more persons and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. Subpart H transient non-community systems serving fewer than 10,000 persons and using only ground water not under the direct influence of surface water and using chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

14. §§141.64(b)(1) 141.132(a)–(b) apply until §§141.620–141.630 take effect under the schedule in §141.620(c).

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

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

17. Some water systems must monitor for certain unregulated contaminants listed in §141.40.

18. This citation refers to §§1415 and 1416 of the Safe Drinking Water Act. §§1415 and 1416 require that "a schedule prescribed. . . for a public water system granted a variance [or exemption] shall require compliance by the system. . ."

19. In addition to §§1415 and 1416 of the Safe Drinking Water Act, 40 CFR 142.307 specifies the items and schedule milestones that must be included in a variance for small systems.

20. Other waterborne emergencies require a Tier 1 public notice under §141.202(a) for situations that do not meet the definition of a waterborne disease outbreak given in 40 CFR 141.2 but that still have the potential to have serious adverse effects on health as a result of short-term exposure. These could include outbreaks not related to treatment deficiencies, as well as situations that have the potential to cause outbreaks, such as failures or significant interruption in water treatment processes, natural disasters that disrupt the water supply or distribution system, chemical spills, or unexpected loading of possible pathogens into the source water.

21. Primacy agencies may place other situations in any tier they believe appropriate, based on threat to public health.

22. Failure to collect three or more samples for *Cryptosporidium* analysis is a Tier 2 violation requiring special notice as specified in §141.211. All other monitoring and testing procedure violations are Tier 3.

[65 FR 26035, May 4, 2000, as amended at 65 FR 76750, Dec. 7, 2000; 66 FR 7065, Jan. 22, 2001; 66 FR 31104, June 8, 2001; 67 FR 1836, Jan. 14, 2002; 69 FR 38856, June 29, 2004; 71 FR 483, Jan. 4, 2006; 71 FR 768, Jan. 5, 2006; 71 FR 65652, Nov. 8, 2006; 78 FR 10350, Feb. 13, 2013; 79 FR 10669, Feb. 26, 2014]

APPENDIX B TO SUBPART Q OF PART 141—STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR) A. Microbiological Contaminants			
1a. Total coliform †	Zero	See footnote[3]	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially-harmful, bacteria may be present. Coliforms were found in more samples than allowed and this was a warning of potential problems.
1b. Fecal coliform/*E. coli* †	Zero	Zero	Fecal coliforms and *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
1c. Fecal indicators (GWR):	Zero	TT	Fecal indicators are microbes whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.
i. E. coli	None	TT	
ii. enterococci	None	TT	
iii. coliphage			
1d. Ground Water Rule (GWR) TT violations	None	TT	Inadequately treated or inadequately protected water may contain disease-causing organisms. These organisms can cause symptoms such as diarrhea, nausea, cramps, and associated headaches.
1e. Subpart Y Coliform Assessment and/or Corrective Action Violations ‡.	N/A	TT	Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogens may be present or that a potential pathway exists through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessments to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.] We failed to conduct the required assessment. We failed to correct all identified sanitary defects that were found during the assessment(s).
1f. Subpart Y *E.coli* Assessment and/or Corrective Action Violations ‡.	N/A	TT	*E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems. We violated the standard for *E. coli,* indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct a detailed assessment to identify problems and to correct any problems that are found. [THE SYSTEM MUST USE THE FOLLOWING APPLICABLE SENTENCES.] We failed to conduct the required assessment. We failed to correct all identified sanitary defects that were found during the assessment that we conducted.

1g. *E. coli* ‡	Zero	In compliance unless one of the following conditions occurs: (1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample. (2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample. (3) The system fails to take all required repeat samples following an *E. coli*-positive routine sample. (4) The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.	*E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Human pathogens in these wastes can cause short-term effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a greater health risk for infants, young children, the elderly, and people with severely compromised immune systems.
1h. Subpart Y Seasonal System TT Violations ‡	N/A	TT	When this violation includes the failure to monitor for total coliforms or *E. coli* prior to serving water to the public, the mandatory language found at 141.205(d)(2) must be used. When this violation includes failure to complete other actions, the appropriate elements found in 141.205(a) to describe the violation must be used.
2a. Turbidity (MCL) [4]	None	1 NTU [5]/5 NTU	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2b. Turbidity (SWTR TT) [6]	None	TT [7]	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.
2c. Turbidity (IESWTR TT and LT1ESWTR TT) [8]	None	TT	Turbidity has no health effects. However, turbidity can interfere with disinfection and provide a medium for microbial growth. Turbidity may indicate the presence of disease-causing organisms. These organisms include bacteria, viruses, and parasites that can cause symptoms such as nausea, cramps, diarrhea and associated headaches.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
B. Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR), Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR) and the Filter Backwash Recycling Rule (FBRR) violations			
3. Giardia lamblia (SWTR/IESWTR/LT1ESWTR)	Zero	TT[10]	Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.
4. Viruses (SWTR/IESWTR/LT1ESWTR).			
5. Heterotrophic plate count (HPC) bacteria[9] (SWTR/IESWTR/LT1ESWTR).			
6. Legionella (SWTR/IESWTR/LT1ESWTR).			
7. Cryptosporidium (IESWTR/FBRR/LT1ESWTR).			
C. Inorganic Chemicals (IOCs)			
8. Antimony	0.006	0.006	Some people who drink water containing antimony well in excess of the MCL over many years could experience increases in blood cholesterol and decreases in blood sugar.
9. Arsenic[11]	0	0.010	Some people who drink water containing arsenic in excess of the MCL over many years could experience skin damage or problems with their circulatory system, and may have an increased risk of getting cancer.
10. Asbestos (10 µm)	7 MFL[12]	7 MFL	Some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps.
11. Barium	2	2	Some people who drink water containing barium in excess of the MCL over many years could experience an increase in their blood pressure.
12. Beryllium	0.004	0.004	Some people who drink water containing beryllium well in excess of the MCL over many years could develop intestinal lesions.
13. Cadmium	0.005	0.005	Some people who drink water containing cadmium in excess of the MCL over many years could experience kidney damage.
14. Chromium (total)	0.1	0.1	Some people who use water containing chromium well in excess of the MCL over many years could experience allergic dermatitis.
15. Cyanide	0.2	0.2	Some people who drink water containing cyanide well in excess of the MCL over many years could experience nerve damage or problems with their thyroid.
16. Fluoride	4.0	4.0	Some people who drink water containing fluoride in excess of the MCL over many years could get bone disease, including pain and tenderness of the bones. Fluoride in drinking water at half the MCL or more may cause mottling of children's teeth, usually in children less than nine years old. Mottling, also known as dental fluorosis, may include brown staining and/or pitting of the teeth, and occurs only in developing teeth before they erupt from the gums.
17. Mercury (inorganic)	0.002	0.002	Some people who drink water containing inorganic mercury well in excess of the MCL over many years could experience kidney damage.
18. Nitrate	10	10	Infants below the age of six months who drink water containing nitrate in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
19. Nitrite	1	1	Infants below the age of six months who drink water containing nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.
20. Total Nitrate and Nitrite	10	10	Infants below the age of six months who drink water containing nitrate and nitrite in excess of the MCL could become seriously ill and, if untreated, may die. Symptoms include shortness of breath and blue baby syndrome.

21. Selenium	0.05	0.05	Selenium is an essential nutrient. However, some people who drink water containing selenium in excess of the MCL over many years could experience hair or fingernail losses, numbness in fingers or toes, or problems with their circulation.
22. Thallium	0.0005	0.002	Some people who drink water containing thallium in excess of the MCL over many years could experience hair loss, changes in their blood, or problems with their kidneys, intestines, or liver.
D. Lead and Copper Rule			
23. Lead	Zero	TT[13]	Infants and children who drink water containing lead in excess of the action level could experience delays in their physical or mental development. Children could show slight deficits in attention span and learning abilities. Adults who drink this water over many years could develop kidney problems or high blood pressure.
24. Copper	1.3	TT[14]	Copper is an essential nutrient, but some people who drink water containing copper in excess of the action level over a relatively short amount of time could experience gastrointestinal distress. Some people who drink water containing copper in excess of the action level over many years could suffer liver or kidney damage. People with Wilson's Disease should consult their personal doctor.
E. Synthetic Organic Chemicals (SOCs)			
25. 2,4–D	0.07	0.07	Some people who drink water containing the weed killer 2,4–D well in excess of the MCL over many years could experience problems with their kidneys, liver, or adrenal glands.
26. 2,4,5–TP (Silvex)	0.05	0.05	Some people who drink water containing silvex in excess of the MCL over many years could experience liver problems.
27. Alachlor	Zero	0.002	Some people who drink water containing alachlor in excess of the MCL over many years could have problems with their eyes, liver, kidneys, or spleen, or experience anemia, and may have an increased risk of getting cancer.
28. Atrazine	0.003	0.003	Some people who drink water containing atrazine well in excess of the MCL over many years could experience problems with their cardiovascular system or reproductive difficulties.
29. Benzo(a)pyrene (PAHs)	Zero	0.0002	Some people who drink water containing benzo(a)pyrene in excess of the MCL over many years may experience reproductive difficulties and may have an increased risk of getting cancer.
30. Carbofuran	0.04	0.04	Some people who drink water containing carbofuran in excess of the MCL over many years could experience problems with their blood, or nervous or reproductive systems.
31. Chlordane	Zero	0.002	Some people who drink water containing chlordane in excess of the MCL over many years could experience problems with their liver or nervous system, and may have an increased risk of getting cancer.
32. Dalapon	0.2	0.2	Some people who drink water containing dalapon well in excess of the MCL over many years could experience minor kidney changes.
33. Di(2-ethylhexyl) adipate	0.4	0.4	Some people who drink water containing di(2-ethylhexyl) adipate well in excess of the MCL over many years could experience toxic effects such as weight loss, liver enlargement or possible reproductive difficulties.
34. Di(2-ethylhexyl) phthalate	Zero	0.006	Some people who drink water containing di(2-ethylhexyl) phthalate well in excess of the MCL over many years may have problems with their liver, or experience reproductive difficulties, and may have an increased risk of getting cancer.
35. Dibromochloropropane (DBCP)	Zero	0.0002	Some people who drink water containing DBCP in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
36. Dinoseb	0.007	0.007	Some people who drink water containing dinoseb well in excess of the MCL over many years could experience reproductive difficulties.

Contaminant	MCLG [1] mg/L	MCL [2] mg/L	Standard health effects language for public notification
37. Dioxin (2,3,7,8-TCDD)	Zero	3×10^{-8}	Some people who drink water containing dioxin in excess of the MCL over many years could experience reproductive difficulties and may have an increased risk of getting cancer.
38. Diquat	0.02	0.02	Some people who drink water containing diquat in excess of the MCL over many years could get cataracts.
39. Endothall	0.1	0.1	Some people who drink water containing endothall in excess of the MCL over many years could experience problems with their stomach or intestines.
40. Endrin	0.002	0.002	Some people who drink water containing endrin in excess of the MCL over many years could experience liver problems.
41. Ethylene dibromide	Zero	0.00005	Some people who drink water containing ethylene dibromide in excess of the MCL over many years could experience problems with their liver, stomach, reproductive system, or kidneys, and may have an increased risk of getting cancer.
42. Glyphosate	0.7	0.7	Some people who drink water containing glyphosate in excess of the MCL over many years could experience problems with their kidneys or reproductive difficulties.
43. Heptachlor	Zero	0.0004	Some people who drink water containing heptachlor in excess of the MCL over many years could experience liver damage and may have an increased risk of getting cancer.
44. Heptachlor epoxide	Zero	0.0002	Some people who drink water containing heptachlor epoxide in excess of the MCL over many years could experience liver damage, and may have an increased risk of getting cancer.
45. Hexachlorobenzene	Zero	0.001	Some people who drink water containing hexachlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys, or adverse reproductive effects, and may have an increased risk of getting cancer.
46. Hexachlorocyclo-pentadiene	0.05	0.05	Some people who drink water containing hexachlorocyclopentadiene well in excess of the MCL over many years could experience problems with their kidneys or stomach.
47. Lindane	0.0002	0.0002	Some people who drink water containing lindane in excess of the MCL over many years could experience problems with their kidneys or liver.
48. Methoxychlor	0.04	0.04	Some people who drink water containing methoxychlor in excess of the MCL over many years could experience reproductive difficulties.
49. Oxamyl (Vydate)	0.2	0.2	Some people who drink water containing oxamyl in excess of the MCL over many years could experience slight nervous system effects.
50. Pentachlorophenol	Zero	0.001	Some people who drink water containing pentachlorophenol in excess of the MCL over many years could experience problems with their liver or kidneys, and may have an increased risk of getting cancer.
51. Picloram	0.5	0.5	Some people who drink water containing picloram in excess of the MCL over many years could experience problems with their liver.
52. Polychlorinated biphenyls (PCBs)	Zero	0.0005	Some people who drink water containing PCBs in excess of the MCL over many years could experience changes in their skin, problems with their thymus gland, immune deficiencies, or reproductive or nervous system difficulties, and may have an increased risk of getting cancer.
53. Simazine	0.004	0.004	Some people who drink water containing simazine in excess of the MCL over many years could experience problems with their blood.
54. Toxaphene	Zero	0.003	Some people who drink water containing toxaphene in excess of the MCL over many years could have problems with their kidneys, liver, or thyroid, and may have an increased risk of getting cancer.
F. Volatile Organic Chemicals (VOCs)			
55. Benzene	Zero	0.005	Some people who drink water containing benzene in excess of the MCL over many years could experience anemia or a decrease in blood platelets, and may have an increased risk of getting cancer.

56. Carbon tetrachloride	Zero	0.005	Some people who drink water containing carbon tetrachloride in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
57. Chlorobenzene (monochloro- benzene)	0.1	0.1	Some people who drink water containing chlorobenzene in excess of the MCL over many years could experience problems with their liver or kidneys.
58. *o*-Dichlorobenzene	0.6	0.6	Some people who drink water containing o-dichlorobenzene well in excess of the MCL over many years could experience problems with their liver, kidneys, or circulatory systems.
59. *p*-Dichlorobenzene	0.075	0.075	Some people who drink water containing p-dichlorobenzene in excess of the MCL over many years could experience anemia, damage to their liver, kidneys, or spleen, or changes in their blood.
60. 1,2-Dichloroethane	Zero	0.005	Some people who drink water containing 1,2-dichloroethane in excess of the MCL over many years may have an increased risk of getting cancer.
61. 1,1-Dichloroethylene	0.007	0.007	Some people who drink water containing 1,1-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
62. *cis*-1,2-Dichloroethylene	0.07	0.07	Some people who drink water containing cis-1,2-dichloroethylene in excess of the MCL over many years could experience problems with their liver.
63. *trans*-1,2-Dichloroethylene	0.1	0.1	Some people who drink water containing trans-1,2-dichloroethylene well in excess of the MCL over many years could experience problems with their liver.
64. Dichloromethane	Zero	0.005	Some people who drink water containing dichloromethane in excess of the MCL over many years could have liver problems and may have an increased risk of getting cancer.
65. 1,2-Dichloropropane	Zero	0.005	Some people who drink water containing 1,2-dichloropropane in excess of the MCL over many years may have an increased risk of getting cancer.
66. Ethylbenzene	0.7	0.7	Some people who drink water containing ethylbenzene well in excess of the MCL over many years could experience problems with their liver or kidneys.
67. Styrene	0.1	0.1	Some people who drink water containing styrene well in excess of the MCL over many years could have problems with their liver, kidneys, or circulatory system.
68. Tetrachloroethylene	Zero	0.005	Some people who drink water containing tetrachloroethylene in excess of the MCL over many years could have problems with their liver, and may have an increased risk of getting cancer.
69. Toluene	1	1	Some people who drink water containing toluene well in excess of the MCL over many years could have problems with their nervous system, kidneys, or liver.
70. 1,2,4-Trichlorobenzene	0.07	0.07	Some people who drink water containing 1,2,4-trichlorobenzene well in excess of the MCL over many years could experience changes in their adrenal glands.
71. 1,1,1-Trichloroethane	0.2	0.2	Some people who drink water containing 1,1,1-trichloroethane in excess of the MCL over many years could experience problems with their liver, nervous system, or circulatory system.
72. 1,1,2-Trichloroethane	0.003	0.005	Some people who drink water containing 1,1,2-trichloroethane well in excess of the MCL over many years could have problems with their liver, kidneys, or immune systems.
73. Trichloroethylene	Zero	0.005	Some people who drink water containing trichloroethylene in excess of the MCL over many years could experience problems with their liver and may have an increased risk of getting cancer.
74. Vinyl chloride	Zero	0.002	Some people who drink water containing vinyl chloride in excess of the MCL over many years may have an increased risk of getting cancer.
75. Xylenes (total)	10	10	Some people who drink water containing xylenes in excess of the MCL over many years could experience damage to their nervous system.
G. Radioactive Contaminants			
76. Beta/photon emitters	Zero	4 mrem/yr [15]	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
77. Alpha emitters	Zero	17 pCi/L[17]	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
78. Combined radium (226 & 228)	Zero	5 pCi/L	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
79. Uranium[16]	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
H. Disinfection Byproducts (DBPs), Byproduct Precursors, and Disinfectant Residuals: Where disinfection is used in the treatment of drinking water, disinfectants combine with organic and inorganic matter present in water to form chemicals called disinfection byproducts (DBPs). EPA sets standards for controlling the levels of disinfectants and DBPs in drinking water, including trihalomethanes (THMs) and haloacetic acids (HAAs)[18]			
80. Total trihalomethanes (TTHMs)	N/A	0.080[19] [20]	Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.
81. Haloacetic Acids (HAA)	N/A	0.060[21]	Some people who drink water containing haloacetic acids in excess of the MCL over many years may have an increased risk of getting cancer.
82. Bromate	Zero	0.010	Some people who drink water containing bromate in excess of the MCL over many years may have an increased risk of getting cancer.
83. Chlorite	0.08	1.0	Some infants and young children who drink water containing chlorite in excess of the MCL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorite in excess of the MCL. Some people may experience anemia.
84. Chlorine	4 (MRDLG)[22]	4.0 (MRDL)[23]	Some people who use water containing chlorine well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chlorine well in excess of the MRDL could experience stomach discomfort.
85. Chloramines	4 (MRDLG)	4.0 (MRDL)	Some people who use water containing chloramines well in excess of the MRDL could experience irritating effects to their eyes and nose. Some people who drink water containing chloramines well in excess of the MRDL could experience stomach discomfort or anemia.
86a. Chlorine dioxide, where any 2 consecutive daily samples taken at the entrance to the distribution system are above the MRDL.	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only:* The chlorine dioxide violations reported today are the result of exceedances at the treatment facility only, not within the distribution system which delivers water to consumers. Continued compliance with chlorine dioxide levels within the distribution system minimizes the potential risk of these violations to consumers.
86b. Chlorine dioxide, where one or more distribution system samples are above the MRDL.	0.8 (MRDLG)	0.8 (MRDL)	Some infants and young children who drink water containing chlorine dioxide in excess of the MRDL could experience nervous system effects. Similar effects may occur in fetuses of pregnant women who drink water containing chlorine dioxide in excess of the MRDL. Some people may experience anemia. *Add for public notification only:* The chlorine dioxide violations reported today include exceedances of the EPA standard within the distribution system which delivers water to consumers. Violations of the chlorine dioxide standard within the distribution system may harm human health based on short-term exposures. Certain groups, including fetuses, infants, and young children, may be especially susceptible to nervous system effects from excessive chlorine dioxide exposure.

87. Control of DBP precursors (TOC)	None	TT	Total organic carbon (TOC) has no health effects. However, total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (THMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer.
I. Other Treatment Techniques			
88. Acrylamide	Zero	TT	Some people who drink water containing high levels of acrylamide over a long period of time could have problems with their nervous system or blood, and may have an increased risk of getting cancer.
89. Epichlorohydrin	Zero	TT	Some people who drink water containing high levels of epichlorohydrin over a long period of time could experience stomach problems, and may have an increased risk of getting cancer.

APPENDIX B—ENDNOTES

† Until March 31, 2016.

‡ Beginning April 1, 2016.

1. MCLG—Maximum contaminant level goal

2. MCL—Maximum contaminant level

3. For water systems analyzing at least 40 samples per month, no more than 5.0 percent of the monthly samples may be positive for total coliforms. For systems analyzing fewer than 40 samples per month, no more than one sample per month may be positive for total coliforms.

4. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, and the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule. The MCL for the monthly turbidity average is 1 NTU; the MCL for the 2-day average is 5 NTU for systems that are required to filter but have not yet installed filtration (40 CFR 141.13).

5. NTU—Nephelometric turbidity unit

6. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, and the 1989 Surface Water Treatment Rule, the 1998 Interim Enhanced Surface Water Treatment Rule and the 2001 Long Term 1 Enhanced Surface Water Treatment Rule. Systems subject to the Surface Water Treatment Rule (both filtered and unfiltered) may not exceed 5 NTU. In addition, in filtered systems, 95 percent of samples each month must not exceed 0.5 NTU in systems using conventional or direct filtration and must not exceed 1 NTU in systems using slow sand or diatomaceous earth filtration or other filtration technologies approved by the primacy agency.

7. TT—Treatment technique

8. There are various regulations that set turbidity standards for different types of systems, including 40 CFR 141.13, the 1989 Surface Water Treatment Rule (SWTR), the 1998 Interim Enhanced Surface Water Treatment Rule (IESWTR) and the 2002 Long Term 1 Enhanced Surface Water Treatment Rule (LT1ESWTR). For systems subject to the IESWTR (systems serving at least 10,000 people, using surface water or ground water under the direct influence of surface water), that use conventional filtration or direct filtration, after January 1, 2002, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the IESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the primacy agency. For systems subject to the LT1ESWTR (systems serving fewer than 10,000 people, using surface water or ground water under the direct influence of surface water) that use conventional filtration or direct filtration, after January 1, 2005, the turbidity level of a system's combined filter effluent may not exceed 0.3 NTU in at least 95 percent of monthly measurements, and the turbidity level of a system's combined filter effluent must not exceed 1 NTU at any time. Systems subject to the LT1ESWTR using technologies other than conventional, direct, slow sand, or diatomaceous earth filtration must meet turbidity limits set by the primacy agency.

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

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

11. These arsenic values are effective January 23, 2006. Until then, the MCL is 0.05 mg/L and there is no MCLG.

12. Millions fibers per liter.

13. Action Level = 0.015 mg/L

14. Action Level = 1.3 mg/L

15. Millirems per years

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

17. Picocuries per liter

18. Surface water systems and ground water systems under the direct influence of surface water are regulated under subpart H of 40 CFR 141. Subpart H community and non-transient non-community systems serving ≥10,000 must comply with subpart L DBP MCLs and disinfectant maximum residual disinfectant levels (MRDLs) beginning January 1, 2002. All other community and non-transient non-community systems must comply with subpart L DBP MCLs and disinfectant MRDLs beginning January 1, 2004. Subpart H transient non-community systems serving ≥10,000 that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2002. All other transient non-community systems that use chlorine dioxide as a disinfectant or oxidant must comply with the chlorine dioxide MRDL beginning January 1, 2004.

19. Community and non-transient non-community systems must comply with subpart V TTHM and HAA5 MCLs of 0.080 mg/L and 0.060 mg/L, respectively (with compliance calculated as a locational running annual average) on the schedule in § 141.620.

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

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

22. MRDLG—Maximum residual disinfectant level goal.

23. MRDL—Maximum residual disinfectant level.

[65 FR 26043, May 4, 2000; 65 FR 38629, June 21, 2000; 65 FR 40521, 40522, June 30, 2000, as amended at 65 FR 76751, Dec. 7, 2000; 66 FR 7065, Jan. 22, 2001; 66 FR 31104, June 8, 2001; 67 FR 1838, Jan. 14, 2002; 67 FR 70857, Nov. 27, 2002; 68 FR 14507, Mar. 25, 2003; 69 FR 38856, June 29, 2004; 71 FR 483, Jan. 4, 2006; 71 FR 65653, Nov. 8, 2006; 78 FR 10351, Feb. 13, 2013]

APPENDIX C TO SUBPART Q OF PART 141—LIST OF ACRONYMS USED IN PUBLIC NOTIFICATION REGULATION

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

[65 FR 26035, May 4, 2000, as amended at 71 FR 65653, Nov. 8, 2006]

Subpart R [Reserved]

Subpart S—Ground Water Rule

SOURCE: 71 FR 65653, Nov. 8, 2006, unless otherwise noted.

§ 141.400 General requirements and applicability.

(a) *Scope of this subpart.* The requirements of this subpart S constitute National Primary Drinking Water Regulations.

(b) *Applicability.* This subpart applies to all public water systems that use ground water except that it does not apply to public water systems that combine all of their ground water with surface water or with ground water under the direct influence of surface water prior to treatment under subpart H. For the purposes of this subpart, ''ground water system'' is defined as any public water system meeting this applicability statement, including consecutive systems receiving finished ground water.

(c) *General requirements.* Systems subject to this subpart must comply with the following requirements:

(1) Sanitary survey information requirements for all ground water systems as described in § 141.401.

(2) Microbial source water monitoring requirements for ground water systems that do not treat all of their ground water to at least 99.99 percent (4-log) treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer as described in § 141.402.

(3) Treatment technique requirements, described in § 141.403, that apply to ground water systems that have fecally contaminated source waters, as determined by source water monitoring conducted under § 141.402, or that have significant deficiencies that are identified by the State or that are identified by EPA under SDWA section 1445. A ground water system with fecally contaminated source water or with significant deficiencies subject to the treatment technique requirements of this subpart must implement one or more of the following corrective action options: correct all significant deficiencies; provide an alternate source of water; eliminate the source of contamination; or provide treatment that

reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer.

(4) Ground water systems that provide at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer are required to conduct compliance monitoring to demonstrate treatment effectiveness, as described in § 141.403(b).

(5) If requested by the State, ground water systems must provide the State with any existing information that will enable the State to perform a hydrogeologic sensitivity assessment. For the purposes of this subpart, ''hydrogeologic sensitivity assessment'' is a determination of whether ground water systems obtain water from hydrogeologically sensitive settings.

(d) *Compliance date.* Ground water systems must comply, unless otherwise noted, with the requirements of this subpart beginning December 1, 2009.

§ 141.401 Sanitary surveys for ground water systems.

(a) Ground water systems must provide the State, at the State's request, any existing information that will enable the State to conduct a sanitary survey.

(b) For the purposes of this subpart, a ''sanitary survey,'' as conducted by the State, includes but is not limited to, an onsite review of the water source(s) (identifying sources of contamination by using results of source water assessments or other relevant information where available), facilities, equipment, operation, maintenance, and monitoring compliance of a public water system to evaluate the adequacy of the system, its sources and operations and the distribution of safe drinking water.

(c) The sanitary survey must include an evaluation of the applicable components listed in paragraphs (c)(1) through (8) of this section:

(1) Source,

(2) Treatment,

(3) Distribution system,

(4) Finished water storage,

(5) Pumps, pump facilities, and controls,

(6) Monitoring, reporting, and data verification,

(7) System management and operation, and

(8) Operator compliance with State requirements.

§ 141.402 Ground water source microbial monitoring and analytical methods.

(a) *Triggered source water monitoring*—

(1) *General requirements.* A ground water system must conduct triggered source water monitoring if the conditions identified in paragraphs (a)(1)(i) and either (a)(1)(ii) or (a)(1)(iii) of this section exist.

(i) The system does not provide at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for each ground water source; and either

(ii) The system is notified that a sample collected under § 141.21(a) is total coliform-positive and the sample is not invalidated under § 141.21(c) until March 31, 2016, or

(iii) The system is notified that a sample collected under §§ 141.854 through 141.857 is total coliform-positive and the sample is not invalidated under § 141.853(c) beginning April 1, 2016.

(2) *Sampling requirements.* A ground water system must collect, within 24 hours of notification of the total coliform-positive sample, at least one ground water source sample from each ground water source in use at the time the total coliform-positive sample was collected under § 141.21(a) until March 31, 2016, or collected under §§ 141.854 through 141.857 beginning April 1, 2016, except as provided in paragraph (a)(2)(ii) of this section.

(i) The State may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the ground water source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the State must specify how much time the system has to collect the sample.

(ii) If approved by the State, systems with more than one ground water source may meet the requirements of this paragraph (a)(2) by sampling a representative ground water source or sources. If directed by the State, systems must submit for State approval a triggered source water monitoring plan that identifies one or more ground water sources that are representative of each monitoring site in the system's sample siting plan under § 141.21(a) until March 31, 2016, or under § 141.853 beginning April 1, 2016, and that the system intends to use for representative sampling under this paragraph.

(iii) Until March 31, 2016, a ground water system serving 1,000 or fewer people may use a repeat sample collected from a ground water source to meet both the requirements of § 141.21(b) and to satisfy the monitoring requirements of paragraph (a)(2) of this section for that ground water source only if the State approves the use of *E. coli* as a fecal indicator for source water monitoring under this paragraph (a). If the repeat sample collected from the ground water source is *E. coli*-positive, the system must comply with paragraph (a)(3) of this section.

(iv) Beginning April 1, 2016, a ground water system serving 1,000 or fewer people may use a repeat sample collected from a ground water source to meet both the requirements of subpart Y and to satisfy the monitoring requirements of paragraph (a)(2) of this section for that ground water source only if the State approves the use of *E. coli* as a fecal indicator for source water monitoring under this paragraph (a) and approves the use of a single sample for meeting both the triggered source water monitoring requirements in this paragraph (a) and the repeat monitoring requirements in § 141.858. If the repeat sample collected from the ground water source is *E. coli*- positive, the system must comply with paragraph (a)(3) of this section.

(3) *Additional requirements.* If the State does not require corrective action under § 141.403(a)(2) for a fecal indicator-positive source water sample collected under paragraph (a)(2) of this section that is not invalidated under paragraph (d) of this section, the system must collect five additional source water samples from the same source within 24 hours of being notified of the fecal indicator-positive sample.

(4) *Consecutive and wholesale systems.* (i) In addition to the other requirements of this paragraph (a), a consecutive ground water system that has a total coliform-positive sample collected under § 141.21(a) until March 31, 2016, or under §§ 141.854 through 141.857 beginning April 1, 2016, must notify the wholesale system(s) within 24 hours of being notified of the total coliform-positive sample.

(ii) In addition to the other requirements of this paragraph (a), a wholesale ground water system must comply with paragraphs (a)(4)(ii)(A) and (a)(4)(ii)(B) of this section.

(A) A wholesale ground water system that receives notice from a consecutive system it serves that a sample collected under § 141.21(a) until March 31, 2016, or collected under §§ 141.854 through 141.857 beginning April 1, 2016, is total coliform-positive must, within 24 hours of being notified, collect a sample from its ground water source(s) under paragraph (a)(2) of this section and analyze it for a fecal indicator under paragraph (c) of this section.

(B) If the sample collected under paragraph (a)(4)(ii)(A) of this section is fecal indicator-positive, the wholesale ground water system must notify all consecutive systems served by that ground water source of the fecal indicator source water positive within 24 hours of being notified of the ground water source sample monitoring result and must meet the requirements of paragraph (a)(3) of this section.

(5) *Exceptions to the triggered source water monitoring requirements.* A ground water system is not required to comply with the source water monitoring requirements of paragraph (a) of this section if either of the following conditions exists:

(i) The State determines, and documents in writing, that the total coliform-positive sample collected under § 141.21(a) until March 31, 2016, or under §§ 141.854 through 141.857 beginning April 1, 2016, is caused by a distribution system deficiency; or

(ii) The total coliform-positive sample collected under § 141.21(a) until March 31, 2016, or under §§ 141.854 through 141.857 beginning April 1, 2016, is collected at a location that meets State criteria for distribution system conditions that will cause total coliform-positive samples.

(b) *Assessment source water monitoring.* If directed by the State, ground water systems must conduct assessment source water monitoring that meets State-determined requirements for such monitoring. A ground water system conducting assessment source water monitoring may use a triggered source water sample collected under paragraph (a)(2) of this section to meet the requirements of paragraph (b) of this section. State-determined assessment source water monitoring requirements may include:

(1) Collection of a total of 12 ground water source samples that represent each month the system provides ground water to the public,

(2) Collection of samples from each well unless the system obtains written State approval to conduct monitoring at one or more wells within the ground water system that are representative of multiple wells used by that system and that draw water from the same hydrogeologic setting,

(3) Collection of a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used,

(4) Analysis of all ground water source samples using one of the analytical methods listed in the in paragraph (c)(2) of this section for the presence of *E. coli*, enterococci, or coliphage,

(5) Collection of ground water source samples at a location prior to any treatment of the ground water source unless the State approves a sampling location after treatment, and

(6) Collection of ground water source samples at the well itself unless the system's configuration does not allow for sampling at the well itself and the State approves an alternate sampling location that is representative of the water quality of that well.

(c) *Analytical methods.* (1) A ground water system subject to the source water monitoring requirements of paragraph (a) of this section must collect a standard sample volume of at least 100 mL for fecal indicator analysis regardless of the fecal indicator or analytical method used.

(2) A ground water system must analyze all ground water source samples collected under paragraph (a) of this section using one of the analytical methods listed in the following table in paragraph (c)(2) of this section or one of the alternative methods listed in appendix A to subpart C of this part for the presence of *E. coli*, enterococci, or coliphage:

ANALYTICAL METHODS FOR SOURCE WATER MONITORING

Fecal indicator[1]	Methodology	Method citation
E. coli	Colilert[3]	9223 B.[2]
	Colisure[3]	9223 B.[2]
	Membrane Filter Method with MI Agar	EPA Method 1604.[4]
	m-ColiBlue24 Test[5].	
	E*Colite Test[6].	
	EC–MUG[7]	9221 F.[2]
	NA–MUG[7]	9222 G.[2]
Enterococci	Multiple-Tube Technique	9230B.[2]
	Membrane Filter Technique	9230C.[2]
	Membrane Filter Technique	EPA Method 1600.[8]
	Enterolert[9].	
Coliphage	Two-Step Enrichment Presence-Absence Procedure.	EPA Method 1601.[10]
	Single Agar Layer Procedure	EPA Method 1602.[11]

Analyses must be conducted in accordance with the documents listed below. The Director of the Federal Register approves the incorporation by reference of the documents listed in footnotes 2–11 in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of the documents may be obtained from the sources listed below. Copies may be inspected at EPA's Drinking Water Docket, EPA West, 1301 Constitution Avenue, NW., EPA West, Room B102, Washington DC 20460 (Telephone: 202–566–2426); or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html.*

[1] The time from sample collection to initiation of analysis may not exceed 30 hours. The ground water system is encouraged but is not required to hold samples below 10 °C during transit.

[2] Methods are described in Standard Methods for the Examination of Water and Wastewater 20th edition (1998) and copies may be obtained from the American Public Health Association, 1015 Fifteenth Street, NW., Washington, DC 20005–2605.

[3] Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092.

[4] EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium); September 2002, EPA 821–R–02–024. Method is available at *http://www.epa.gov/nerlcwww/1604sp02.pdf* or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

[5] A description of the m-ColiBlue24 Test, "Total Coliforms and *E. coli* Membrane Filtration Method with m-ColiBlue24® Broth," Method No. 10029 Revision 2, August 17, 1999, is available from Hach Company, 100 Dayton Ave., Ames, IA 50010 or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

[6] A description of the E*Colite Test, "Charm E*Colite Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water, January 9, 1998, is available from Charm Sciences, Inc., 659 Andover St., Lawrence, MA 01843–1032 or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

[7] EC–MUG (Method 9221F) or NA–MUG (Method 9222G) can be used for *E. coli* testing step as described in § 141.21(f)(6)(i) or (ii) after use of Standard Methods 9221 B, 9221 D, 9222 B, or 9222 C.

[8] EPA Method 1600: Enterococci in Water by Membrane Filtration Using membrane-Enterococcus Indoxyl–β–D–Glucoside Agar (mEI) EPA 821–R–02–022 (September 2002) is an approved variation of Standard Method 9230C. The method is available at *http://www.epa.gov/nerlcwww/1600sp02.pdf* or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460. The holding time and temperature for ground water samples are specified in footnote 1 above, rather than as specified in Section 8 of EPA Method 1600.

[9] Medium is available through IDEXX Laboratories, Inc., One IDEXX Drive, Westbrook, Maine 04092. Preparation and use of the medium is set forth in the article "Evaluation of Enterolert for Enumeration of Enterococci in Recreational Waters," by Budnick, G.E., Howard, R.T., and Mayo, D.R., 1996, Applied and Environmental Microbiology, 62:3881–3884.

[10] EPA Method 1601: Male-specific (F +) and Somatic Coliphage in Water by Two-step Enrichment Procedure; April 2001, EPA 821–R–01–030. Method is available at *http://www.epa.gov/nerlcwww/1601ap01.pdf* or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

[11] EPA Method 1602: Male-specific (F +) and Somatic Coliphage in Water by Single Agar Layer (SAL) Procedure; April 2001, EPA 821–R–01–029. Method is available at *http://www.epa.gov/nerlcwww/1602ap01.pdf* or from EPA's Water Resource Center (RC–4100T), 1200 Pennsylvania Avenue, NW., Washington, DC 20460.

(d) *Invalidation of a fecal indicator-positive ground water source sample.* (1) A ground water system may obtain State invalidation of a fecal indicator-positive ground water source sample collected under paragraph (a) of this section only under the conditions specified in paragraphs (d)(1)(i) and (ii) of this section.

(i) The system provides the State with written notice from the laboratory that improper sample analysis occurred; or

(ii) The State determines and documents in writing that there is substantial evidence that a fecal indicator-positive ground water source sample is not related to source water quality.

(2) If the State invalidates a fecal indicator-positive ground water source sample, the ground water system must collect another source water sample under paragraph (a) of this section within 24 hours of being notified by the State of its invalidation decision and have it analyzed for the same fecal indicator using the analytical methods in paragraph (c) of this section. The State may extend the 24-hour time limit on a case-by-case basis if the system cannot collect the source water sample within 24 hours due to circumstances beyond its control. In the case of an extension, the State must specify how much time the system has to collect the sample.

(e) *Sampling location.* (1) Any ground water source sample required under paragraph (a) of this section must be collected at a location prior to any treatment of the ground water source unless the State approves a sampling location after treatment.

(2) If the system's configuration does not allow for sampling at the well itself, the system may collect a sample at a State-approved location to meet the requirements of paragraph (a) of this section if the sample is representative of the water quality of that well.

(f) *New sources.* If directed by the State, a ground water system that places a new ground water source into service after November 30, 2009, must conduct assessment source water monitoring under paragraph (b) of this section. If directed by the State, the system must begin monitoring before the ground water source is used to provide water to the public.

(g) *Public notification.* A ground water system with a ground water source sample collected under paragraph (a) or (b) of this section that is fecal indicator-positive and that is not invalidated under paragraph (d) of this section, including consecutive systems served by the ground water source, must conduct public notification under § 141.202.

(h) *Monitoring violations.* Failure to meet the requirements of paragraphs (a)–(f) of this section is a monitoring violation and requires the ground water system to provide public notification under § 141.204.

[71 FR 65653, Nov. 8, 2006; 71 FR 67427, Nov. 21, 2006, as amended at 74 FR 30958, June 29, 2009; 78 FR 10353, Feb. 13, 2013]

§ 141.403 Treatment technique requirements for ground water systems.

(a) *Ground water systems with significant deficiencies or source water fecal contamination.* (1) The treatment technique requirements of this section must be met by ground water systems when a significant deficiency is identified or when a ground water source sample collected under § 141.402(a)(3) is fecal indicator-positive.

(2) If directed by the State, a ground water system with a ground water source sample collected under § 141.402(a)(2), § 141.402(a)(4), or § 141.402(b) that is fecal indicator-positive must comply with the treatment technique requirements of this section.

(3) When a significant deficiency is identified at a Subpart H public water system that uses both ground water and surface water or ground water under the direct influence of surface water, the system must comply with provisions of this paragraph except in cases where the State determines that the significant deficiency is in a portion of the distribution system that is served solely by surface water or ground water under the direct influence of surface water.

(4) Unless the State directs the ground water system to implement a specific corrective action, the ground water system must consult with the State regarding the appropriate corrective action within 30 days of receiving written notice from the State of a significant deficiency, written notice from a laboratory that a ground water source sample collected under § 141.402(a)(3) was found to be fecal indicator-positive, or direction from the State that a fecal indicator'positive collected under § 141.402(a)(2), § 141.402(a)(4), or § 141.402(b) requires corrective action. For the purposes of this subpart, significant deficiencies include, but are not limited to, defects in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that the State determines to be causing, or have potential for causing, the introduction of contamination into the water delivered to consumers.

(5) Within 120 days (or earlier if directed by the State) of receiving written notification from the State of a significant deficiency, written notice from a laboratory that a ground water source sample collected under § 141.402(a)(3) was found to be fecal indicator-positive, or direction from the State that a fecal indicator-positive sample collected under § 141.402(a)(2), § 141.402(a)(4), or § 141.402(b) requires corrective action, the ground water system must either:

(i) Have completed corrective action in accordance with applicable State plan review processes or other State guidance or direction, if any, including State-specified interim measures; or

(ii) Be in compliance with a State-approved corrective action plan and schedule subject to the conditions specified in paragraphs (a)(5)(ii)(A) and (a)(5)(ii)(B) of this section.

(A) Any subsequent modifications to a State-approved corrective action plan and schedule must also be approved by the State.

(B) If the State specifies interim measures for protection of the public health pending State approval of the corrective action plan and schedule or pending completion of the corrective action plan, the system must comply with these interim measures as well as with any schedule specified by the State.

(6) *Corrective action alternatives.* Ground water systems that meet the conditions of paragraph (a)(1) or (a)(2) of this section must implement one or more of the following corrective action alternatives:

(i) Correct all significant deficiencies;

(ii) Provide an alternate source of water;

(iii) Eliminate the source of contamination; or

(iv) Provide treatment that reliably achieves at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(7) *Special notice to the public of significant deficiencies or source water fecal contamination.* (i) In addition to the applicable public notification requirements of § 141.202, a community ground water system that receives notice from

the State of a significant deficiency or notification of a fecal indicator-positive ground water source sample that is not invalidated by the State under §141.402(d) must inform the public served by the water system under §141.153(h)(6) of the fecal indicator-positive source sample or of any significant deficiency that has not been corrected. The system must continue to inform the public annually until the significant deficiency is corrected or the fecal contamination in the ground water source is determined by the State to be corrected under paragraph (a)(5) of this section.

(ii) In addition to the applicable public notification requirements of §141.202, a non-community ground water system that receives notice from the State of a significant deficiency must inform the public served by the water system in a manner approved by the State of any significant deficiency that has not been corrected within 12 months of being notified by the State, or earlier if directed by the State. The system must continue to inform the public annually until the significant deficiency is corrected. The information must include:

(A) The nature of the significant deficiency and the date the significant deficiency was identified by the State;

(B) The State-approved plan and schedule for correction of the significant deficiency, including interim measures, progress to date, and any interim measures completed; and

(C) For systems with a large proportion of non-English speaking consumers, as determined by the State, information in the appropriate language(s) regarding the importance of the notice or a telephone number or address where consumers may contact the system to obtain a translated copy of the notice or assistance in the appropriate language.

(iii) If directed by the State, a non-community water system with significant deficiencies that have been corrected must inform its customers of the significant deficiencies, how the deficiencies were corrected, and the dates of correction under paragraph (a)(7)(ii) of this section.

(b) *Compliance monitoring*—(1) *Existing ground water sources.* A ground water system that is not required to meet the source water monitoring requirements of this subpart for any ground water source because it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for any ground water source before December 1, 2009, must notify the State in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the specified ground water source and begin compliance monitoring in accordance with paragraph (b)(3) of this section by December 1, 2009. Notification to the State must include engineering, operational, or other information that the State requests to evaluate the submission. If the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source, the system must conduct ground water source monitoring as required under §141.402.

(2) *New ground water sources.* A ground water system that places a ground water source in service after November 30, 2009, that is not required to meet the source water monitoring requirements of this subpart because the system provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source must comply with the requirements of paragraphs (b)(2)(i), (b)(2)(ii) and (b)(2)(iii) of this section.

(i) The system must notify the State in writing that it provides at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source. Notification to the State must include engineering, operational, or other information that the State requests to evaluate the submission.

(ii) The system must conduct compliance monitoring as required under §141.403(b)(3) of this subpart within 30 days of placing the source in service.

(iii) The system must conduct ground water source monitoring under §141.402 if the system subsequently discontinues 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for the ground water source.

(3) *Monitoring requirements.* A ground water system subject to the requirements of paragraphs (a), (b)(1) or (b)(2) of this section must monitor the effectiveness and reliability of treatment for that ground water source before or at the first customer as follows:

(i) *Chemical disinfection*—(A) *Ground water systems serving greater than 3,300 people.* A ground water system that serves greater than 3,300 people must continuously monitor the residual disinfectant concentration using analytical methods specified in §141.74(a)(2) at a location approved by the State and must record the lowest residual disinfectant concentration each day that water from the ground water source is served to the public. The ground water system must maintain the State-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. If there is a failure in the continuous monitoring equipment, the ground water system must conduct grab sampling every four hours until the continuous monitoring equipment is returned to service. The system must resume continuous residual disinfectant monitoring within 14 days.

(B) *Ground water systems serving 3,300 or fewer people.* A ground water system that serves 3,300 or fewer people must monitor the residual disinfectant concentration using analytical methods specified in §141.74(a)(2) at a location approved by the State and record the residual disinfection concentration each day that water from the ground water source is served to the public. The ground water system must maintain the State-determined residual disinfectant concentration every day the ground water system serves water from the ground water source to the public. The ground water system must take a daily grab sample during the hour of peak flow or at another time specified by the State. If any daily grab sample measurement falls below the State-determined residual disinfectant concentration, the ground water system must take follow-up samples every four hours until the residual disinfectant concentration is restored to the State-determined level. Alternatively, a ground water system that serves 3,300 or fewer people may monitor continuously and meet the requirements of paragraph (b)(3)(i)(A) of this section.

(ii) *Membrane filtration.* A ground water system that uses membrane filtration to meet the requirements of this subpart must monitor the membrane filtration process in accordance with all State-specified monitoring requirements and must operate the membrane filtration in accordance with all State-specified compliance requirements. A ground water system that uses membrane filtration is in compliance with the requirement to achieve at least 4-log removal of viruses when:

(A) The membrane has an absolute molecular weight cut-off (MWCO), or an alternate parameter that describes the exclusion characteristics of the membrane, that can reliably achieve at least 4-log removal of viruses;

(B) The membrane process is operated in accordance with State-specified compliance requirements; and

(C) The integrity of the membrane is intact.

(iii) *Alternative treatment.* A ground water system that uses a State-approved alternative treatment to meet the requirements of this subpart by providing at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer must:

(A) Monitor the alternative treatment in accordance with all State-specified monitoring requirements; and

(B) Operate the alternative treatment in accordance with all compliance requirements that the State determines to be necessary to achieve at least 4-log treatment of viruses.

(c) *Discontinuing treatment.* A ground water system may discontinue 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source if the State determines and documents in writing that 4-log treatment of viruses is no longer necessary for that ground water source. A system that discontinues 4-log treatment of viruses is subject to the source water monitoring and analytical methods requirements of § 141.402 of this subpart.

(d) Failure to meet the monitoring requirements of paragraph (b) of this section is a monitoring violation and requires the ground water system to provide public notification under § 141.204.

§ 141.404 Treatment technique violations for ground water systems.

(a) A ground water system with a significant deficiency is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the State) of receiving written notice from the State of the significant deficiency, the system:

(1) Does not complete corrective action in accordance with any applicable State plan review processes or other State guidance and direction, including State specified interim actions and measures, or

(2) Is not in compliance with a State-approved corrective action plan and schedule.

(b) Unless the State invalidates a fecal indicator-positive ground water source sample under § 141.402(d), a ground water system is in violation of the treatment technique requirement if, within 120 days (or earlier if directed by the State) of meeting the conditions of § 141.403(a)(1) or § 141.403(a)(2), the system:

(1) Does not complete corrective action in accordance with any applicable State plan review processes or other State guidance and direction, including State-specified interim measures, or

(2) Is not in compliance with a State-approved corrective action plan and schedule.

(c) A ground water system subject to the requirements of § 141.403(b)(3) that fails to maintain at least 4-log treatment of viruses (using inactivation, removal, or a State-approved combination of 4-log virus inactivation and removal) before or at the first customer for a ground water source is in violation of the treatment technique requirement if the failure is not corrected within four hours of determining the system is not maintaining at least 4-log treatment of viruses before or at the first customer.

(d) Ground water system must give public notification under § 141.203 for the treatment technique violations specified in paragraphs (a), (b) and (c) of this section.

§ 141.405 Reporting and recordkeeping for ground water systems.

(a) *Reporting.* In addition to the requirements of § 141.31, a ground water system regulated under this subpart must provide the following information to the State:

(1) A ground water system conducting compliance monitoring under § 141.403(b) must notify the State any time the system fails to meet any State-specified requirements including, but not limited to, minimum residual disinfectant concentration, membrane operating criteria or membrane integrity, and alternative treatment operating criteria, if operation in accordance with the criteria or requirements is not restored within four hours. The ground water system must notify the State as soon as possible, but in no case later than the end of the next business day.

(2) After completing any corrective action under § 141.403(a), a ground water system must notify the State within 30 days of completion of the corrective action.

(3) If a ground water system subject to the requirements of § 141.402(a) does not conduct source water monitoring under § 141.402(a)(5)(ii), the system must provide documentation to the State within 30 days of the total coliform positive sample that it met the State criteria.

(b) *Recordkeeping.* In addition to the requirements of § 141.33, a ground water system regulated under this subpart must maintain the following information in its records:

(1) Documentation of corrective actions. Documentation shall be kept for a period of not less than ten years.

(2) Documentation of notice to the public as required under § 141.403(a)(7). Documentation shall be kept for a period of not less than three years.

(3) Records of decisions under § 141.402(a)(5)(ii) and records of invalidation of fecal indicator-positive ground water source samples under § 141.402(d). Documentation shall be kept for a period of not less than five years.

(4) For consecutive systems, documentation of notification to the wholesale system(s) of total coliform-positive samples that are not invalidated under § 141.21(c) until March 31, 2016, or under § 141.853 beginning April 1, 2016. Documentation shall be kept for a period of not less than five years.

(5) For systems, including wholesale systems, that are required to perform compliance monitoring under § 141.403(b):

(i) Records of the State-specified minimum disinfectant residual. Documentation shall be kept for a period of not less than ten years.

(ii) Records of the lowest daily residual disinfectant concentration and records of the date and duration of any failure to maintain the State-prescribed minimum residual disinfectant concentration for a period of more than four hours. Documentation shall be kept for a period of not less than five years.

(iii) Records of State-specified compliance requirements for membrane filtration and of parameters specified by the State for State-approved alternative treatment and records of the date and duration of any failure to meet the membrane operating, membrane integrity, or alternative treatment operating requirements for more than four hours. Documentation shall be kept for a period of not less than five years.

[71 FR 65653, Nov. 8, 2006, as amended at 78 FR 10353, Feb. 13, 2013]

Subpart T—Enhanced Filtration and Disinfection—Systems Serving Fewer Than 10,000 People

SOURCE: 67 FR 1839, Jan. 14, 2002, unless otherwise noted.

GENERAL REQUIREMENTS

§ 141.500 General requirements.

The requirements of this subpart constitute national primary drinking water regulations. These regulations establish requirements for filtration and disinfection that are in addition to criteria under which filtration and disinfection are required under subpart H of this part. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for the following contaminants: *Giardia lamblia*, viruses, heterotrophic plate count bacteria, *Legionella*, *Cryptosporidium* and turbidity. The treatment technique requirements consist of installing and properly operating water treatment processes which reliably achieve:

(a) At least 99 percent (2 log) removal of *Cryptosporidium* between a point where the raw water is not subject to recontamination by surface water runoff and a point downstream before or at the first customer for filtered systems, or *Cryptosporidium* control under the watershed control plan for unfiltered systems; and

(b) Compliance with the profiling and benchmark requirements in §§ 141.530 through 141.544.

§ 141.501 Who is subject to the requirements of subpart T?

You are subject to these requirements if your system:

(a) Is a public water system;

(b) Uses surface water or GWUDI as a source; and

(c) Serves fewer than 10,000 persons.

§ 141.502 When must my system comply with these requirements?

You must comply with these requirements in this subpart beginning January 1, 2005, except where otherwise noted.

[69 FR 38856, June 29, 2004]

§ 141.503 What does subpart T require?

There are seven requirements of this subpart, and you must comply with all requirements that are applicable to your system. These requirements are:

(a) You must cover any finished water reservoir that you began to construct on or after March 15, 2002 as described in §§ 141.510 and 141.511;

(b) If your system is an unfiltered system, you must comply with the updated watershed control requirements described in §§ 141.520–141.522;

(c) If your system is a community or non-transient non-community water systems you must develop a disinfection profile as described in §§ 141.530–141.536;

(d) If your system is considering making a significant change to its disinfection practices, you must develop a disinfection benchmark and consult with the State for approval of the change as described in §§ 141.540–141.544;

(e) If your system is a filtered system, you must comply with the combined filter effluent requirements as described in §§ 141.550–141.553;

(f) If your system is a filtered system that uses conventional or direct filtration, you must comply with the individual filter turbidity requirements as described in §§ 141.560–141.564; and

(g) You must comply with the applicable reporting and recordkeeping requirements as described in §§ 141.570 and 141.571.

FINISHED WATER RESERVOIRS

§ 141.510 Is my system subject to the new finished water reservoir requirements?

All subpart H systems which serve fewer than 10,000 are subject to this requirement.

§ 141.511 What is required of new finished water reservoirs?

If your system begins construction of a finished water reservoir on or after March 15, 2002 the reservoir must be covered. Finished water reservoirs for which your system began construction prior to March 15, 2002 are not subject to this requirement.

ADDITIONAL WATERSHED CONTROL REQUIREMENTS FOR UNFILTERED SYSTEMS

§ 141.520 Is my system subject to the updated watershed control requirements?

If you are a subpart H system serving fewer than 10,000 persons which does not provide filtration, you must continue to comply with all of the filtration avoidance criteria in § 141.71, as well as the additional watershed control requirements in § 141.521.

§ 141.521 What updated watershed control requirements must my unfiltered system implement to continue to avoid filtration?

Your system must take any additional steps necessary to minimize the potential for contamination by *Cryptosporidium* oocysts in the source water. Your system's watershed control program must, for *Cryptosporidium*:

(a) Identify watershed characteristics and activities which may have an adverse effect on source water quality; and

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

§ 141.522 How does the State determine whether my system's watershed control requirements are adequate?

During an onsite inspection conducted under the provisions of § 141.71(b)(3), the State must determine whether your watershed control program is adequate to limit potential contamination by *Cryptosporidium* oocysts. The adequacy of the program must be based on the comprehensiveness of the watershed review; the effectiveness of your program to monitor and control detrimental activities occurring in the watershed; and the extent to which your system has maximized land ownership and/or controlled land use within the watershed.

DISINFECTION PROFILE

§ 141.530 What is a disinfection profile and who must develop one?

A disinfection profile is a graphical representation of your system's level of *Giardia lamblia* or virus inactivation measured during the course of a year. If you are a subpart H community or non-transient non-community water system which serves fewer than 10,000 persons, your system must develop a disinfection profile unless your State determines that your system's profile is unnecessary. Your State may approve the use of a more representative data set for disinfection profiling than the data set required under §§ 141.532–141.536.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§ 141.531 What criteria must a State use to determine that a profile is unnecessary?

States may only determine that a system's profile is unnecessary if a system's TTHM and HAA5 levels are below 0.064 mg/L and 0.048 mg/L, respectively. To determine these levels, TTHM and HAA5 samples must be collected after January 1, 1998, during the month with the warmest water temperature, and at the point of maximum residence time in your distribution system. Your State may approve a more representative TTHM and HAA5 data set to determine these levels.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§ 141.532 How does my system develop a disinfection profile and when must it begin?

A disinfection profile consists of three steps:

(a) First, your system must collect data for several parameters from the plant as discussed in § 141.533 over the course of 12 months. If your system serves between 500 and 9,999 persons you must begin to collect data no later than July 1, 2003. If your system serves fewer than 500 persons you must begin to collect data no later than January 1, 2004.

(b) Second, your system must use this data to calculate weekly log inactivation as discussed in §§ 141.534 and 141.535; and

(c) Third, your system must use these weekly log inactivations to develop a disinfection profile as specified in § 141.536.

§ 141.533 What data must my system collect to calculate a disinfection profile?

Your system must monitor the following parameters to determine the total log inactivation using the analytical methods in § 141.74 (a), once per week on the same calendar day, over 12 consecutive months:

(a) The temperature of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

(b) If your system uses chlorine, the pH of the disinfected water at each residual disinfectant concentration sampling point during peak hourly flow;

(c) The disinfectant contact time(s) (''T'') during peak hourly flow; and

(d) The residual disinfectant concentration(s) (''C'') of the water before or at the first customer and prior to each additional point of disinfection during peak hourly flow.

§ 141.534 How does my system use this data to calculate an inactivation ratio?

Use the tables in § 141.74(b)(3)(v) to determine the appropriate CT99.9 value. Calculate the total inactivation ratio as follows, and multiply the value by 3.0 to determine log inactivation of *Giardia lamblia:*

If your system * * *	Your system must determine * * *
(a) Uses only one point of disinfectant application.	(1) One inactivation ratio (CTcalc/CT$_{99.9}$) before or at the first customer during peak hourly flow or (2) Successive CTcalc/CT$_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. Under this alternative, your system must calculate the total inactivation ratio by determining (CTcalc/CT$_{99.9}$) for each sequence and then adding the (CTcalc/CT$_{99.9}$) values together to determine (ΣCTcalc/CT$_{99.9}$).
(b) Uses more than one point of disinfectant application before the first customer.	The (CTcalc/CT$_{99.9}$) value of each disinfection segment immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow using the procedure specified in paragraph (a)(2) of this section.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§ 141.535 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?

If your system uses chloramines, ozone, or chlorine dioxide for primary disinfection, you must also calculate the logs of inactivation for viruses and develop an additional disinfection profile for viruses using methods approved by the State.

§ 141.536 My system has developed an inactivation ratio; what must we do now?

Each log inactivation serves as a data point in your disinfection profile. Your system will have obtained 52 measurements (one for every week of the year). This will allow your system and the State the opportunity to evaluate how microbial inactivation varied over the course of the year by looking at all 52 measurements (your Disinfection Profile). Your system must retain the Disinfection Profile data in graphic form, such as a spreadsheet, which must be available for review by the State as part of a sanitary survey. Your system must use this data to calculate a benchmark if you are considering changes to disinfection practices.

DISINFECTION BENCHMARK

§ 141.540 Who has to develop a disinfection benchmark?

If you are a subpart H system required to develop a disinfection profile under §§ 141.530 through 141.536, your system must develop a Disinfection Benchmark if you decide to make a significant change to your disinfection practice. Your system must consult with the State for approval before you can implement a significant disinfection practice change.

§ 141.541 What are significant changes to disinfection practice?

Significant changes to disinfection practice include:

(a) Changes to the point of disinfection;

(b) Changes to the disinfectant(s) used in the treatment plant;

(c) Changes to the disinfection process; or

(d) Any other modification identified by the State.

§ 141.542 What must my system do if we are considering a significant change to disinfection practices?

If your system is considering a significant change to its disinfection practice, your system must calculate a disinfection benchmark(s) as described in §§ 141.543 and 141.544 and provide the benchmark(s) to your State. Your system may only make a significant disinfection practice change after consulting with the State for approval. Your system must submit the following information to the State as part of the consultation and approval process:

(a) A description of the proposed change;

(b) The disinfection profile for *Giardia lamblia* (and, if necessary, viruses) and disinfection benchmark;

(c) An analysis of how the proposed change will affect the current levels of disinfection; and

(d) Any additional information requested by the State.

§ 141.543 How is the disinfection benchmark calculated?

If your system is making a significant change to its disinfection practice, it must calculate a disinfection benchmark using the procedure specified in the following table.

To calculate a disinfection benchmark your system must perform the following steps
Step 1: Using the data your system collected to develop the Disinfection Profile, determine the average *Giardia lamblia* inactivation for each calendar month by dividing the sum of all *Giardia lamblia* inactivations for that month by the number of values calculated for that month.
Step 2: Determine the lowest monthly average value out of the twelve values. This value becomes the disinfection benchmark.

§ 141.544 What if my system uses chloramines, ozone, or chlorine dioxide for primary disinfection?

If your system uses chloramines, ozone or chlorine dioxide for primary disinfection your system must calculate the disinfection benchmark from the data your system collected for viruses to develop the disinfection profile in addition to the *Giardia lamblia* disinfection benchmark calculated under § 141.543. This viral benchmark must be calculated in the same manner used to calculate the *Giardia lamblia* disinfection benchmark in § 141.543.

COMBINED FILTER EFFLUENT REQUIREMENTS

§ 141.550 Is my system required to meet subpart T combined filter effluent turbidity limits?

All subpart H systems which serve populations fewer than 10,000, are required to filter, and utilize filtration other than slow sand filtration or diatomaceous earth filtration must meet the combined filter effluent turbidity requirements of §§ 141.551–141.553 . If your system uses slow sand or diatomaceous earth filtration you are not required to meet the combined filter effluent turbidity limits of subpart T, but you must continue to meet the combined filter effluent turbidity limits in § 141.73.

§ 141.551 What strengthened combined filter effluent turbidity limits must my system meet?

Your system must meet two strengthened combined filter effluent turbidity limits.

(a) The first combined filter effluent turbidity limit is a ‘‘95th percentile’’ turbidity limit that your system must meet in at least 95 percent of the turbidity measurements taken each month. Measurements must continue to be taken as described in § 141.74(a) and (c). Monthly reporting must be completed according to § 141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your 95th percentile turbidity value is * * *
(1) Conventional Filtration or Direct Filtration.	0.3 NTU.
(2) All other “Alternative” Filtration	A value determined by the State (not to exceed 1 NTU) based on the demonstration described in § 141.552.

(b) The second combined filter effluent turbidity limit is a ‘‘maximum’’ turbidity limit which your system may at no time exceed during the month. Measurements must continue to be taken as described in § 141.74(a) and (c). Monthly reporting must be completed according to § 141.570. The following table describes the required limits for specific filtration technologies.

If your system consists of * * *	Your maximum turbidity value is * * *
(1) Conventional Filtration or Direct Filtration.	1 NTU.
(2) All other “Alternative Filtration”	A value determined by the State (not to exceed 5 NTU) based on the demonstration as described in § 141.552.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§ 141.552 My system consists of “alternative filtration” and is required to conduct a demonstration—what is required of my system and how does the State establish my turbidity limits?

(a) If your system consists of alternative filtration(filtration other than slow sand filtration, diatomaceous earth filtration, conventional filtration, or direct filtration) you are required to conduct a demonstration (see tables in § 141.551). Your system must demonstrate to the State, using pilot plant studies or other means, that your system’s filtration, in combination with disinfection treatment, consistently achieves:

(1) 99 percent removal of *Cryptosporidium* oocysts;

(2) 99.9 percent removal and/or inactivation of *Giardia lamblia* cysts; and

(3) 99.99 percent removal and/or inactivation of viruses.

(b) [Reserved]

§ 141.553 My system practices lime softening—is there any special provision regarding my combined filter effluent?

If your system practices lime softening, you may acidify representative combined filter effluent turbidity samples prior to analysis using a protocol approved by the State.

INDIVIDUAL FILTER TURBIDITY REQUIREMENTS

§ 141.560 Is my system subject to individual filter turbidity requirements?

If your system is a subpart H system serving fewer than 10,000 people and utilizing conventional filtration or direct filtration, you must conduct continuous monitoring of turbidity for each individual filter at your system. The following requirements apply to continuous turbidity monitoring:

(a) Monitoring must be conducted using an approved method in § 141.74(a);

(b) Calibration of turbidimeters must be conducted using procedures specified by the manufacturer;

(c) Results of turbidity monitoring must be recorded at least every 15 minutes;

(d) Monthly reporting must be completed according to § 141.570; and

(e) Records must be maintained according to § 141.571.

§ 141.561 What happens if my system's turbidity monitoring equipment fails?

If there is a failure in the continuous turbidity monitoring equipment, your system must conduct grab sampling every four hours in lieu of continuous monitoring until the turbidimeter is back on-line. Your system has 14 days to resume continuous monitoring before a violation is incurred.

§ 141.562 My system only has two or fewer filters—is there any special provision regarding individual filter turbidity monitoring?

Yes, if your system only consists of two or fewer filters, you may conduct continuous monitoring of combined filter effluent turbidity in lieu of individual filter effluent turbidity monitoring. Continuous monitoring must meet the same requirements set forth in § 141.560(a) through (d) and § 141.561.

§ 141.563 What follow-up action is my system required to take based on continuous turbidity monitoring?

Follow-up action is required according to the following tables:

If * * *	Your system must * * *
(a) The turbidity of an individual filter (or the turbidity of combined filter effluent (CFE) for systems with 2 filters that monitor CFE in lieu of individual filters) exceeds 1.0 NTU in two consecutive recordings 15 minutes apart.	Report to the State by the 10th of the following month and include the filter number(s), corresponding date(s), turbidity value(s) which exceeded 1.0 NTU, and the cause (if known) for the exceedance(s).

If a system was required to report to the State * * *	Your system must * * *
(b) For three months in a row and turbidity exceeded 1.0 NTU in two consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters).	Conduct a self-assessment of the filter(s) within 14 days of the day the filter exceeded 1.0 NTU in two consecutive measurements for the third straight month unless a CPE as specified in paragraph (c) of this section was required. Systems with 2 filters that monitor CFE in lieu of individual filters must conduct a self assessment on both filters. The self-assessment must consist of at least the following components: assessment of filter performance; development of a filter profile; identification and prioritization of factors limiting filter performance; assessment of the applicability of corrections; and preparation of a filter self-assessment report.
(c) For two months in a row and turbidity exceeded 2.0 NTU in 2 consecutive recordings 15 minutes apart at the same filter (or CFE for systems with 2 filters that monitor CFE in lieu of individual filters).	Arrange to have a comprehensive performance evaluation (CPE) conducted by the State or a third party approved by the State not later than 60 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month. If a CPE has been completed by the State or a third party approved by the State within the 12 prior months or the system and State are jointly participating in an ongoing Comprehensive Technical Assistance (CTA) project at the system, a new CPE is not required. If conducted, a CPE must be completed and submitted to the State no later than 120 days following the day the filter exceeded 2.0 NTU in two consecutive measurements for the second straight month.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38856, June 29, 2004]

§ 141.564 My system practices lime softening—is there any special provision regarding my individual filter turbidity monitoring?

If your system utilizes lime softening, you may apply to the State for alternative turbidity exceedance levels for the levels specified in the table in § 141.563. You must be able to demonstrate to the State that higher turbidity levels are due to lime carryover only, and not due to degraded filter performance.

REPORTING AND RECORDKEEPING REQUIREMENTS

§ 141.570 What does subpart T require that my system report to the State?

This subpart T requires your system to report several items to the State. The following table describes the items which must be reported and the frequency of reporting. Your system is required to report the information described in the following table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of information to report	Frequency
(a) Combined Filter Effluent Requirements. (§§ 141.550–141.553)	(1) The total number of filtered water turbidity measurements taken during the month.	By the 10th of the following month.
	(2) The number and percentage of filtered water turbidity measurements taken during the month which are less than or equal to your system's required 95th percentile limit.	By the 10th of the following month.
	(3) The date and value of any turbidity measurements taken during the month which exceed the maximum turbidity value for your filtration system.	By the 10th of the following month.
(b) Individual Turbidity Requirements. (§§ 141.560–141.564)	(1) That your system conducted individual filter turbidity monitoring during the month.	By the 10th of the following month.
	(2) The filter number(s), corresponding date(s), and the turbidity value(s) which exceeded 1.0 NTU during the month, and the cause (if known) for the exceedance(s), but only if 2 consecutive measurements exceeded 1.0 NTU.	By the 10th of the following month.
	(3) If a self-assessment is required, the date that it was triggered and the date that it was completed.	By the 10th of the following month (or 14 days after the self-assessment was triggered only if the self-assessment was triggered during the last four days of the month)
	(4) If a CPE is required, that the CPE is required and the date that it was triggered.	By the 10th of the following month.
	(5) Copy of completed CPE report	Within 120 days after the CPE was triggered.
(c) Disinfection Profiling ...... (§§ 141.530–141.536)	(1) Results of optional monitoring which show TTHM levels <0.064 mg/l and HAA5 levels <0.048 mg/l (Only if your system wishes to forgo profiling) or that your system has begun disinfection profiling.	(i) For systems serving 500–9,999 by July 1, 2003; (ii) For systems serving fewer than 500 by January 1, 2004.
(d) Disinfection Benchmarking. (§§ 141.540–141.544)	(1) A description of the proposed change in disinfection, your system's disinfection profile for Giardia lamblia (and, if necessary, viruses) and disinfection benchmark, and an analysis of how the proposed change will affect the current levels of disinfection.	Anytime your system is considering a significant change to its disinfection practice.

[67 FR 1839, Jan. 14, 2002, as amended at 69 FR 38857, June 29, 2004]

§ 141.571 What records does subpart T require my system to keep?

Your system must keep several types of records based on the requirements of subpart T, in addition to recordkeeping requirements under § 141.75. The following table describes the necessary records, the length of time these records must be kept, and for which requirement the records pertain. Your system is required to maintain records described in this table, if it is subject to the specific requirement shown in the first column.

Corresponding requirement	Description of necessary records	Duration of time records must be kept
(a) Individual Filter Turbidity Requirements (§§ 141.560–141.564)	Results of individual filter monitoring	At least 3 years.
(b) Disinfection Profiling (§§ 141.530–141.536)	Results of Profile (including raw data and analysis)	Indefinitely.
(c) Disinfection Benchmarking (§§ 141.540–141.544)	Benchmark (including raw data and analysis)	Indefinitely.

Subpart U—Initial Distribution System Evaluations

SOURCE: 71 FR 483, Jan. 4, 2006, unless otherwise noted.

§ 141.600 General requirements.

(a) The requirements of subpart U of this part constitute national primary drinking water regulations. The regulations in this subpart establish monitoring and other requirements for identifying subpart V compliance monitoring locations for determining compliance with maximum contaminant levels for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5). You must use an Initial Distribution System Evaluation (IDSE) to determine locations with representative high TTHM and HAA5 concentrations throughout your distribution system. IDSEs are used in conjunction with, but separate from, subpart L compliance monitoring, to identify and select subpart V compliance monitoring locations.

(b) *Applicability*. You are subject to these requirements if your system is a community water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light; or if your system is a nontransient noncommunity water system that serves at least 10,000 people and uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.

(c) *Schedule*. (1) You must comply with the requirements of this subpart on the schedule in the table in this paragraph (c)(1).

If you serve this population	You must submit your standard monitoring plan or system specific study plan [1] or 40/30 certification [2] to the State by or receive very small system waiver from State	You must complete your standard monitoring or system specific study by	You must submit your IDSE report to the State by [3]
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system			
(i) ≥100,000	October 1, 2006	September 30, 2008	January 1, 2009.
(ii) 50,000–99,999	April 1, 2007	March 31, 2009	July 1, 2009.
(iii) 10,000–49,999.	October 1, 2007	September 30, 2009	January 1, 2010.
(iv) <10,000 (CWS Only).	April 1, 2008	March 31, 2010	July 1, 2010.
Other systems that are part of a combined distribution system			
(v) Wholesale system or consecutive system.	—at the same time as the system with the earliest compliance date in the combined distribution system.	—at the same time as the system with the earliest compliance date in the combined distribution system.	—at the same time as the system with the earliest compliance date in the combined distribution system.

[1] If, within 12 months after the date identified in this column, the State does not approve your plan or notify you that it has not yet completed its review, you may consider the plan that you submitted as approved. You must implement that plan and you must complete standard monitoring or a system specific study no later than the date identified in the third column.

[2] You must submit your 40/30 certification under § 141.603 by the date indicated.

[3] If, within three months after the date identified in this column (nine months after the date identified in this column if you must comply on the schedule in paragraph (c)(1)(iii) of this section), the State does not approve your IDSE report or notify you that it has not yet completed its review, you may consider the report that you submitted as approved and you must implement the recommended subpart V monitoring as required.

(2) For the purpose of the schedule in paragraph (c)(1) of this section, the State may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The State may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) You must conduct standard monitoring that meets the requirements in §141.601, or a system specific study that meets the requirements in §141.602, or certify to the State that you meet 40/30 certification criteria under §141.603, or qualify for a very small system waiver under §141.604.

(1) You must have taken the full complement of routine TTHM and HAA5 compliance samples required of a system with your population and source water under subpart L of this part (or you must have taken the full complement of reduced TTHM and HAA5 compliance samples required of a system with your population and source water under subpart L if you meet reduced monitoring criteria under subpart L of this part) during the period specified in §141.603(a) to meet the 40/30 certification criteria in §141.603. You must have taken TTHM and HAA5 samples under §§141.131 and 141.132 to be eligible for the very small system waiver in §141.604.

(2) If you have not taken the required samples, you must conduct standard monitoring that meets the requirements in §141.601, or a system specific study that meets the requirements in §141.602.

(e) You must use only the analytical methods specified in §141.131, or otherwise approved by EPA for monitoring under this subpart, to demonstrate compliance with the requirements of this subpart.

(f) IDSE results will not be used for the purpose of determining compliance with MCLs in §141.64.

§ 141.601 Standard monitoring.

(a) *Standard monitoring plan.* Your standard monitoring plan must comply with paragraphs (a)(1) through (a)(4) of this section. You must prepare and submit your standard monitoring plan to the State according to the schedule in §141.600(c).

(1) Your standard monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating locations and dates of all projected standard monitoring, and all projected subpart L compliance monitoring.

(2) Your standard monitoring plan must include justification of standard monitoring location selection and a summary of data you relied on to justify standard monitoring location selection.

(3) Your standard monitoring plan must specify the population served and system type (subpart H or ground water).

(4) You must retain a complete copy of your standard monitoring plan submitted under this paragraph (a), including any State modification of your standard monitoring plan, for as long as you are required to retain your IDSE report under paragraph (c)(4) of this section.

(b) *Standard monitoring.* (1) You must monitor as indicated in the table in this paragraph (b)(1). You must collect dual sample sets at each monitoring location. One sample in the dual sample set must be analyzed for TTHM. The other sample in the dual sample set must be analyzed for HAA5. You must conduct one monitoring period during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature. You must review available compliance, study, or operational data to determine the peak historical month for TTHM or HAA5 levels or warmest water temperature.

Source water type	Population size category	Monitoring periods and frequency of sampling	Distribution system monitoring locations[1]				
			Total per monitoring period	Near entry points	Average residence time	High TTHM locations	High HAA5 locations
Subpart H							
	<500 consecutive systems.	one (during peak historical month)[2].	2	1		1	
	<500 non-consecutive systems.		2			1	1
	500–3,300 consecutive systems.	four (every 90 days)	2	1		1	
	500–3,300 non-consecutive systems.		2			1	1
	3,301–9,999		4		1	2	1
	10,000–49,999	six (every 60 days)	8	1	2	3	2
	50,000–249,999		16	3	4	5	4
	250,000–999,999		24	4	6	8	6
	1,000,000–4,999,999		32	6	8	10	8
	≥5,000,000		40	8	10	12	10
Ground Water							
	<500 consecutive systems.	one (during peak historical month)[2].	2	1		1	
	<500 non-consecutive systems.		2			1	1
	500–9,999	four (every 90 days)	2			1	1
	10,000–99,999		6	1	1	2	2
	100,000–499,999		8	1	1	3	3
	≥500,000		12	2	2	4	4

[1] A dual sample set (*i.e.*, a TTHM and an HAA5 sample) must be taken at each monitoring location during each monitoring period.

[2] The peak historical month is the month with the highest TTHM or HAA5 levels or the warmest water temperature.

(2) You must take samples at locations other than the existing subpart L monitoring locations. Monitoring locations must be distributed throughout the distribution system.

(3) If the number of entry points to the distribution system is fewer than the specified number of entry point monitoring locations, excess entry point samples must be replaced equally at high TTHM and HAA5 locations. If there is an odd extra location number, you must take a sample at a high TTHM location. If the number of entry points to the distribution system is more than the specified number of entry point monitoring locations, you must take samples at entry points to the distribution system having the highest annual water flows.

(4) Your monitoring under this paragraph (b) may not be reduced under the provisions of § 141.29 and the State may not reduce your monitoring using the provisions of § 142.16(m).

(c) *IDSE report.* Your IDSE report must include the elements required in paragraphs (c)(1) through (c)(4) of this section. You must submit your IDSE report to the State according to the schedule in § 141.600(c).

(1) Your IDSE report must include all TTHM and HAA5 analytical results from subpart L compliance monitoring and all standard monitoring conducted during the period of the IDSE as individual analytical results and LRAAs presented in a tabular or spreadsheet format acceptable to the State. If changed from your standard monitoring plan submitted under paragraph (a) of this section, your report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).

(2) Your IDSE report must include an explanation of any deviations from your approved standard monitoring plan.

(3) You must recommend and justify subpart V compliance monitoring locations and timing based on the protocol in § 141.605.

(4) You must retain a complete copy of your IDSE report submitted under this section for 10 years after the date that you submitted your report. If the

State modifies the subpart V monitoring requirements that you recommended in your IDSE report or if the State approves alternative monitoring locations, you must keep a copy of the State's notification on file for 10 years after the date of the State's notification. You must make the IDSE report and any State notification available for review by the State or the public.

§ 141.602 System specific studies.

(a) *System specific study plan.* Your system specific study plan must be based on either existing monitoring results as required under paragraph (a)(1) of this section or modeling as required under paragraph (a)(2) of this section. You must prepare and submit your system specific study plan to the State according to the schedule in § 141.600(c).

(1) *Existing monitoring results.* You may comply by submitting monitoring results collected before you are required to begin monitoring under § 141.600(c). The monitoring results and analysis must meet the criteria in paragraphs (a)(1)(i) and (a)(1)(ii) of this section.

(i) *Minimum requirements.* (A) TTHM and HAA5 results must be based on samples collected and analyzed in accordance with § 141.131. Samples must be collected no earlier than five years prior to the study plan submission date.

(B) The monitoring locations and frequency must meet the conditions identified in this paragraph (a)(1)(i)(B). Each location must be sampled once during the peak historical month for TTHM levels or HAA5 levels or the month of warmest water temperature for every 12 months of data submitted for that location. Monitoring results must include all subpart L compliance monitoring results plus additional monitoring results as necessary to meet minimum sample requirements.

System Type	Population size category	Number of monitoring locations	Number of samples	
			TTHM	HAA5
Subpart H:				
	<500	3	3	3
	500–3,300	3	9	9
	3,301–9,999	6	36	36
	10,000–49,999	12	72	72
	50,000–249,999	24	144	144
	250,000–999,999	36	216	216
	1,000,000–4,999,999	48	288	288
	≥5,000,000	60	360	360
Ground Water:				
	<500	3	3	3
	500–9,999	3	9	9
	10,000–99,999	12	48	48
	100,000–499,999	18	72	72
	≥500,000	24	96	96

(ii) *Reporting monitoring results.* You must report the information in this paragraph (a)(1)(ii).

(A) You must report previously collected monitoring results and certify that the reported monitoring results include all compliance and non-compliance results generated during the time period beginning with the first reported result and ending with the most recent subpart L results.

(B) You must certify that the samples were representative of the entire distribution system and that treatment, and distribution system have not changed significantly since the samples were collected.

(C) Your study monitoring plan must include a schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed or planned system specific study monitoring.

(D) Your system specific study plan must specify the population served and system type (subpart H or ground water).

(E) You must retain a complete copy of your system specific study plan submitted under this paragraph (a)(1), including any State modification of your system specific study plan, for as long as you are required to retain your IDSE report under paragraph (b)(5) of this section.

(F) If you submit previously collected data that fully meet the number of samples required under paragraph (a)(1)(i)(B) of this section and the State rejects some of the data, you must either conduct additional monitoring to replace rejected data on a schedule the State approves or conduct standard monitoring under §141.601.

(2) *Modeling*. You may comply through analysis of an extended period simulation hydraulic model. The extended period simulation hydraulic model and analysis must meet the criteria in this paragraph (a)(2).

(i) *Minimum requirements*. (A) The model must simulate 24 hour variation in demand and show a consistently repeating 24 hour pattern of residence time.

(B) The model must represent the criteria listed in paragraphs (a)(2)(i)(B)(1) through (9) of this section.

(1) 75% of pipe volume;

(2) 50% of pipe length;

(3) All pressure zones;

(4) All 12-inch diameter and larger pipes;

(5) All 8-inch and larger pipes that connect pressure zones, influence zones from different sources, storage facilities, major demand areas, pumps, and control valves, or are known or expected to be significant conveyors of water;

(6) All 6-inch and larger pipes that connect remote areas of a distribution system to the main portion of the system;

(7) All storage facilities with standard operations represented in the model; and

(8) All active pump stations with controls represented in the model; and

(9) All active control valves.

(C) The model must be calibrated, or have calibration plans, for the current configuration of the distribution system during the period of high TTHM formation potential. All storage facilities must be evaluated as part of the calibration process. All required calibration must be completed no later than 12 months after plan submission.

(ii) *Reporting modeling*. Your system specific study plan must include the information in this paragraph (a)(2)(ii).

(A) Tabular or spreadsheet data demonstrating that the model meets requirements in paragraph (a)(2)(i)(B) of this section.

(B) A description of all calibration activities undertaken, and if calibration is complete, a graph of predicted tank levels versus measured tank levels for the storage facility with the highest residence time in each pressure zone, and a time series graph of the residence time at the longest residence time storage facility in the distribution system showing the predictions for the entire simulation period (*i.e.*, from time zero until the time it takes to for the model to reach a consistently repeating pattern of residence time).

(C) Model output showing preliminary 24 hour average residence time predictions throughout the distribution system.

(D) Timing and number of samples representative of the distribution system planned for at least one monitoring period of TTHM and HAA5 dual sample monitoring at a number of locations no less than would be required for the system under standard monitoring in §141.601 during the historical month of high TTHM. These samples must be taken at locations other than existing subpart L compliance monitoring locations.

(E) Description of how all requirements will be completed no later than 12 months after you submit your system specific study plan.

(F) Schematic of your distribution system (including distribution system entry points and their sources, and storage facilities), with notes indicating the locations and dates of all completed system specific study monitoring (if calibration is complete) and all subpart L compliance monitoring.

(G) Population served and system type (subpart H or ground water).

(H) You must retain a complete copy of your system specific study plan submitted under this paragraph (a)(2), including any State modification of your system specific study plan, for as long as you are required to retain your IDSE report under paragraph (b)(7) of this section.

(iii) If you submit a model that does not fully meet the requirements under paragraph (a)(2) of this section, you must correct the deficiencies and respond to State inquiries concerning the model. If you fail to correct deficiencies or respond to inquiries to the State's satisfaction, you must conduct standard monitoring under §141.601.

(b) *IDSE report.* Your IDSE report must include the elements required in paragraphs (b)(1) through (b)(6) of this section. You must submit your IDSE report according to the schedule in §141.600(c).

(1) Your IDSE report must include all TTHM and HAA5 analytical results from subpart L compliance monitoring and all system specific study monitoring conducted during the period of the system specific study presented in a tabular or spreadsheet format acceptable to the State. If changed from your system specific study plan submitted under paragraph (a) of this section, your IDSE report must also include a schematic of your distribution system, the population served, and system type (subpart H or ground water).

(2) If you used the modeling provision under paragraph (a)(2) of this section, you must include final information for the elements described in paragraph (a)(2)(ii) of this section, and a 24-hour time series graph of residence time for each subpart V compliance monitoring location selected.

(3) You must recommend and justify subpart V compliance monitoring locations and timing based on the protocol in §141.605.

(4) Your IDSE report must include an explanation of any deviations from your approved system specific study plan.

(5) Your IDSE report must include the basis (analytical and modeling results) and justification you used to select the recommended subpart V monitoring locations.

(6) You may submit your IDSE report in lieu of your system specific study plan on the schedule identified in §141.600(c) for submission of the system specific study plan if you believe that you have the necessary information by the time that the system specific study plan is due. If you elect this approach, your IDSE report must also include all information required under paragraph (a) of this section.

(7) You must retain a complete copy of your IDSE report submitted under this section for 10 years after the date that you submitted your IDSE report. If the State modifies the subpart V monitoring requirements that you recommended in your IDSE report or if the State approves alternative monitoring locations, you must keep a copy of the State's notification on file for 10 years after the date of the State's notification. You must make the IDSE report and any State notification available for review by the State or the public.

§ 141.603 40/30 certification.

(a) *Eligibility.* You are eligible for 40/30 certification if you had no TTHM or HAA5 monitoring violations under subpart L of this part and no individual sample exceeded 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 during an eight consecutive calendar quarter period beginning no earlier than the date specified in this paragraph (a).

If your 40/30 certification is due	Then your eligibility for 40/30 certification is based on eight consecutive calendar quarters of subpart L compliance monitoring results beginning no earlier than [1]
(1) October 1, 2006	January 2004.
(2) April 1, 2007	January 2004.
(3) October 1, 2007	January 2005.
(4) April 1, 2008	January 2005.

[1] Unless you are on reduced monitoring under subpart L of this part and were not required to monitor during the specified period. If you did not monitor during the specified period, you must base your eligibility on compliance samples taken during the 12 months preceding the specified period.

(b) *40/30 certification.* (1) You must certify to your State that every individual compliance sample taken under subpart L of this part during the periods specified in paragraph (a) of this section were ≤0.040 mg/L for TTHM and ≤0.030 mg/L for HAA5, and that you have not had any TTHM or HAA5 monitoring violations during the period specified in paragraph (a) of this section.

(2) The State may require you to submit compliance monitoring results, distribution system schematics, and/or recommended subpart V compliance monitoring locations in addition to your certification. If you fail to submit the requested information, the State may require standard monitoring under §141.601 or a system specific study under §141.602.

(3) The State may still require standard monitoring under §141.601 or a system specific study under §141.602 even if you meet the criteria in paragraph (a) of this section.

(4) You must retain a complete copy of your certification submitted under this section for 10 years after the date that you submitted your certification. You must make the certification, all data upon which the certification is based, and any State notification available for review by the State or the public.

§ 141.604 Very small system waivers.

(a) If you serve fewer than 500 people and you have taken TTHM and HAA5 samples under subpart L of this part, you are not required to comply with this subpart unless the State notifies you that you must conduct standard monitoring under §141.601 or a system specific study under §141.602.

(b) If you have not taken TTHM and HAA5 samples under subpart L of this part or if the State notifies you that you must comply with this subpart, you must conduct standard monitoring under §141.601 or a system specific study under §141.602.

§ 141.605 Subpart V compliance monitoring location recommendations.

(a) Your IDSE report must include your recommendations and justification for where and during what month(s) TTHM and HAA5 monitoring for subpart V of this part should be conducted. You must base your recommendations on the criteria in paragraphs (b) through (e) of this section.

(b) You must select the number of monitoring locations specified in the table in this paragraph (b). You will use these recommended locations as subpart V routine compliance monitoring locations, unless State requires different or additional locations. You should distribute locations throughout the distribution system to the extent possible.

Source water type	Population size category	Monitoring frequency [1]	Distribution system monitoring location			
			Total per monitoring period [2]	Highest TTHM locations	Highest HAA5 locations	Existing subpart L compliance locations
Subpart H:						
	<500	per year	2	1	1	
	500–3,300	per quarter	2	1	1	
	3,301–9,999	per quarter	2	1	1	
	10,000–49,999	per quarter	4	2	1	1
	50,000–249,999	per quarter	8	3	3	2
	250,000–999,999	per quarter	12	5	4	3
	1,000,000–4,999,999	per quarter	16	6	6	4
	≥5,000,000	per quarter	20	8	7	5
Ground water:						
	<500	per year	2	1	1	
	500–9,999	per year	2	1	1	
	10,000–99,999	per quarter	4	2	1	1
	100,000–499,999	per quarter	6	3	2	1
	≥500,000	per quarter	8	3	3	2

[1] All systems must monitor during month of highest DBP concentrations.

[2] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500–3,300. Ground water systems serving 500–9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and subpart H systems serving 500–3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

(c) You must recommend subpart V compliance monitoring locations based on standard monitoring results, system specific study results, and subpart L compliance monitoring results. You must follow the protocol in paragraphs (c)(1) through (c)(8) of this section. If required to monitor at more than eight locations, you must repeat the protocol as necessary. If you do not have existing subpart L compliance monitoring results or if you do not have enough existing subpart L compliance monitoring results, you must repeat the protocol, skipping the provisions of paragraphs (c)(3) and (c)(7) of this section as necessary, until you have identified the required total number of monitoring locations.

(1) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.

(2) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.

(3) Existing subpart L average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.

(4) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.

(5) Location with the highest TTHM LRAA not previously selected as a subpart V monitoring location.

(6) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.

(7) Existing subpart L average residence time compliance monitoring location (maximum residence time compliance monitoring location for ground water systems) with the highest TTHM LRAA not previously selected as a subpart V monitoring location.

(8) Location with the highest HAA5 LRAA not previously selected as a subpart V monitoring location.

(d) You may recommend locations other than those specified in paragraph (c) of this section if you include a rationale for selecting other locations. If the State approves the alternate locations, you must monitor at these locations to determine compliance under subpart V of this part.

(e) Your recommended schedule must include subpart V monitoring during the peak historical month for TTHM and HAA5 concentration, unless the State approves another month. Once you have identified the peak historical month, and if you are required to conduct routine monitoring at least quarterly, you must schedule subpart V compliance monitoring at a regular frequency of every 90 days or fewer.

[71 FR 483, Jan. 4, 2006, as amended at 74 FR 30958, June 29, 2009]

Subpart V—Stage 2 Disinfection Byproducts Requirements

SOURCE: 71 FR 488, Jan. 4, 2006, unless otherwise noted.

§ 141.620 General requirements.

(a) *General.* The requirements of subpart V of this part constitute national primary drinking water regulations. The regulations in this subpart establish monitoring and other requirements for achieving compliance with maximum contaminant levels based on locational running annual averages (LRAA) for total trihalomethanes (TTHM) and haloacetic acids (five)(HAA5), and for achieving compliance with maximum residual disinfectant residuals for chlorine and chloramine for certain consecutive systems.

(b) *Applicability.* You are subject to these requirements if your system is a community water system or a nontransient noncommunity water system that uses a primary or residual disinfectant other than ultraviolet light or delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light.

(c) *Schedule.* You must comply with the requirements in this subpart on the schedule in the following table based on your system type.

If you are this type of system	You must comply with subpart V monitoring by:[1]
Systems that are not part of a combined distribution system and systems that serve the largest population in the combined distribution system	
(1) System serving ≥100,000	April 1, 2012.
(2) System serving 50,000–99,999	October 1, 2012.
(3) System serving 10,000–49,999	October 1, 2013.
(4) System serving <10,000	October 1, 2013 if no *Cryptosporidium* monitoring is required under § 141.701(a)(4) or October 1, 2014 if *Cryptosporidium* monitoring is required under § 141.701(a)(4) or (a)(6)
Other systems that are part of a combined distribution system	
(5) Consecutive system or wholesale system	—at the same time as the system with the earliest compliance date in the combined distribution system.

[1] The State may grant up to an additional 24 months for compliance with MCLs and operational evaluation levels if you require capital improvements to comply with an MCL.

(6) Your monitoring frequency is specified in § 141.621(a)(2).

(i) If you are required to conduct quarterly monitoring, you must begin monitoring in the first full calendar quarter that includes the compliance date in the table in this paragraph (c).

(ii) If you are required to conduct monitoring at a frequency that is less than quarterly, you must begin monitoring in the calendar month recommended in the IDSE report prepared under § 141.601 or § 141.602 or the calendar month identified in the subpart V monitoring plan developed under § 141.622 no later than 12 months after the compliance date in this table.

(7) If you are required to conduct quarterly monitoring, you must make compliance calculations at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter (or earlier if the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters). If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date.

(8) For the purpose of the schedule in this paragraph (c), the State may determine that the combined distribution system does not include certain consecutive systems based on factors such as receiving water from a wholesale system only on an emergency basis or receiving only a small percentage and small volume of water from a wholesale system. The State may also determine that the combined distribution system does not include certain wholesale systems based on factors such as delivering water to a consecutive system only on an emergency basis or delivering only a small percentage and small volume of water to a consecutive system.

(d) *Monitoring and compliance*—(1) *Systems required to monitor quarterly*. To comply with subpart V MCLs in § 141.64(b)(2), you must calculate LRAAs for TTHM and HAA5 using monitoring results collected under this subpart and determine that each LRAA does not exceed the MCL. If you fail to complete four consecutive quarters of monitoring, you must calculate compliance with the MCL based on the average of the available data from the most recent four quarters. If you take more than one sample per quarter at a monitoring location, you must average all samples taken in the quarter at that location to determine a quarterly average to be used in the LRAA calculation.

(2) *Systems required to monitor yearly or less frequently*. To determine compliance with subpart V MCLs in § 141.64(b)(2), you must determine that each sample taken is less than the MCL. If any sample exceeds the MCL, you must comply with the requirements of § 141.625. If no sample exceeds the MCL, the sample result for each monitoring location is considered the LRAA for that monitoring location.

(e) *Violation*. You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

[71 FR 488, Jan. 4, 2006; 71 FR 4645, Jan. 27, 2006]

§ 141.621 Routine monitoring.

(a) *Monitoring.* (1) If you submitted an IDSE report, you must begin monitoring at the locations and months you have recommended in your IDSE report submitted under § 141.605 following the schedule in § 141.620(c), unless the State requires other locations or additional locations after its review. If you submitted a 40/30 certification under § 141.603 or you qualified for a very small system waiver under § 141.604 or you are a nontransient noncommunity water system serving <10,000, you must monitor at the location(s) and dates identified in your monitoring plan in § 141.132(f), updated as required by § 141.622.

(2) You must monitor at no fewer than the number of locations identified in this paragraph (a)(2).

Source water type	Population size category	Monitoring Frequency[1]	Distribution system monitoring location total per monitoring period[2]
Subpart H:			
	<500	per year	2
	500–3,300	per quarter	2
	3,301–9,999	per quarter	2
	10,000–49,999	per quarter	4
	50,000–249,999	per quarter	8
	250,000–999,999	per quarter	12
	1,000,000–4,999,999	per quarter	16
	≥5,000,000	per quarter	20
Ground Water:			
	<500	per year	2
	500–9,999	per year	2
	10,000–99,999	per quarter	4
	100,000–499,999	per quarter	6
	≥500,000	per quarter	8

[1] All systems must monitor during month of highest DBP concentrations.

[2] Systems on quarterly monitoring must take dual sample sets every 90 days at each monitoring location, except for subpart H systems serving 500–3,300. Ground water systems serving 500–9,999 on annual monitoring must take dual sample sets at each monitoring location. All other systems on annual monitoring and subpart H systems serving 500–3,300 are required to take individual TTHM and HAA5 samples (instead of a dual sample set) at the locations with the highest TTHM and HAA5 concentrations, respectively. For systems serving fewer than 500 people, only one location with a dual sample set per monitoring period is needed if the highest TTHM and HAA5 concentrations occur at the same location and month.

(3) If you are an undisinfected system that begins using a disinfectant other than UV light after the dates in subpart U of this part for complying with the Initial Distribution System Evaluation requirements, you must consult with the State to identify compliance monitoring locations for this subpart. You must then develop a monitoring plan under § 141.622 that includes those monitoring locations.

(b) *Analytical methods.* You must use an approved method listed in § 141.131 for TTHM and HAA5 analyses in this subpart. Analyses must be conducted by laboratories that have received certification by EPA or the State as specified in § 141.131.

[71 FR 488, Jan. 4, 2006, as amended at 74 FR 30958, June 29, 2009]

§ 141.622 Subpart V monitoring plan.

(a)(1) You must develop and implement a monitoring plan to be kept on file for State and public review. The monitoring plan must contain the elements in paragraphs (a)(1)(i) through (a)(1)(iv) of this section and be complete no later than the date you conduct your initial monitoring under this subpart.

(i) Monitoring locations;

(ii) Monitoring dates;

(iii) Compliance calculation procedures; and

(iv) Monitoring plans for any other systems in the combined distribution system if the State has reduced monitoring requirements under the State authority in § 142.16(m).

(2) If you were not required to submit an IDSE report under either § 141.601 or

§ 141.602, and you do not have sufficient subpart L monitoring locations to identify the required number of subpart V compliance monitoring locations indicated in § 141.605(b), you must identify additional locations by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of compliance monitoring locations have been identified. You must also provide the rationale for identifying the locations as having high levels of TTHM or HAA5. If you have more subpart L monitoring locations than required for subpart V compliance monitoring in § 141.605(b), you must identify which locations you will use for subpart V compliance monitoring by alternating selection of locations representing high TTHM levels and high HAA5 levels until the required number of subpart V compliance monitoring locations have been identified.

(b) If you are a subpart H system serving >3,300 people, you must submit a copy of your monitoring plan to the State prior to the date you conduct your initial monitoring under this subpart, unless your IDSE report submitted under subpart U of this part contains all the information required by this section.

(c) You may revise your monitoring plan to reflect changes in treatment, distribution system operations and layout (including new service areas), or other factors that may affect TTHM or HAA5 formation, or for State-approved reasons, after consultation with the State regarding the need for changes and the appropriateness of changes. If you change monitoring locations, you must replace existing compliance monitoring locations with the lowest LRAA with new locations that reflect the current distribution system locations with expected high TTHM or HAA5 levels. The State may also require modifications in your monitoring plan. If you are a subpart H system serving >3,300 people, you must submit a copy of your modified monitoring plan to the State prior to the date you are required to comply with the revised monitoring plan.

§ 141.623 Reduced monitoring.

(a) You may reduce monitoring to the level specified in the table in this paragraph (a) any time the LRAA is ≤0.040 mg/L for TTHM and ≤0.030 mg/L for HAA5 at all monitoring locations. You may only use data collected under the provisions of this subpart or subpart L of this part to qualify for reduced monitoring. In addition, the source water annual average TOC level, before any treatment, must be ≤4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either § 141.132(b)(1)(iii) or § 141.132(d).

Source water type	Population size category	Monitoring frequency [1]	Distribution system monitoring location per monitoring period
Subpart H:			
	<500		monitoring may not be reduced.
	500–3,300	per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	3,301–9,999	per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	10,000–49,999	per quarter	2 dual sample sets at the locations with the highest TTHM and highest HAA5 LRAAs.
	50,000–249,999	per quarter	4 dual sample sets—at the locations with the two highest TTHM and two highest HAA5 LRAAs.
	250,000–999,999	per quarter	6 dual sample sets—at the locations with the three highest TTHM and three highest HAA5 LRAAs.

Source water type	Population size category	Monitoring frequency [1]	Distribution system monitoring location per monitoring period
	1,000,000–4,999,999	per quarter	8 dual sample sets—at the locations with the four highest TTHM and four highest HAA5 LRAAs.
	≥5,000,000	per quarter	10 dual sample sets—at the locations with the five highest TTHM and five highest HAA5 LRAAs.
Ground Water:			
	<500	every third year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	500–9,999	per year	1 TTHM and 1 HAA5 sample: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement; 1 dual sample set per year if the highest TTHM and HAA5 measurements occurred at the same location and quarter.
	10,000–99,999	per year	2 dual sample sets: one at the location and during the quarter with the highest TTHM single measurement, one at the location and during the quarter with the highest HAA5 single measurement.
	100,000–499,999	per quarter	2 dual sample sets; at the locations with the highest TTHM and highest HAA5 LRAAs.
	≥500,000	per quarter	4 dual sample sets at the locations with the two highest TTHM and two highest HAA5 LRAAs.

[1] Systems on quarterly monitoring must take dual sample sets every 90 days.

(b) You may remain on reduced monitoring as long as the TTHM LRAA ≤0.040 mg/L and the HAA5 LRAA ≤0.030 mg/L at each monitoring location (for systems with quarterly reduced monitoring) or each TTHM sample ≤0.060 mg/L and each HAA5 sample ≤0.045 mg/L (for systems with annual or less frequent monitoring). In addition, the source water annual average TOC level, before any treatment, must be ≤4.0 mg/L at each treatment plant treating surface water or ground water under the direct influence of surface water, based on monitoring conducted under either § 141.132(b)(1)(iii) or § 141.132(d).

(c) If the LRAA based on quarterly monitoring at any monitoring location exceeds either 0.040 mg/L for TTHM or 0.030 mg/L for HAA5 or if the annual (or less frequent) sample at any location exceeds either 0.060 mg/L for TTHM or 0.045 mg/L for HAA5, or if the source water annual average TOC level, before any treatment, >4.0 mg/L at any treatment plant treating surface water or ground water under the direct influence of surface water, you must resume routine monitoring under § 141.621 or begin increased monitoring if § 141.625 applies.

(d) The State may return your system to routine monitoring at the State's discretion.

§ 141.624 Additional requirements for consecutive systems.

If you are a consecutive system that does not add a disinfectant but delivers water that has been treated with a primary or residual disinfectant other than ultraviolet light, you must comply with analytical and monitoring requirements for chlorine and chloramines in § 141.131 (c) and § 141.132(c)(1) and the compliance requirements in § 141.133(c)(1) beginning April 1, 2009, unless required earlier by the State, and report monitoring results under § 141.134(c).

§ 141.625 Conditions requiring increased monitoring.

(a) If you are required to monitor at a particular location annually or less frequently than annually under § 141.621

or § 141.623, you must increase monitoring to dual sample sets once per quarter (taken every 90 days) at all locations if a TTHM sample is >0.080 mg/L or a HAA5 sample is >0.060 mg/L at any location.

(b) You are in violation of the MCL when the LRAA exceeds the subpart V MCLs in § 141.64(b)(2), calculated based on four consecutive quarters of monitoring (or the LRAA calculated based on fewer than four quarters of data if the MCL would be exceeded regardless of the monitoring results of subsequent quarters). You are in violation of the monitoring requirements for each quarter that a monitoring result would be used in calculating an LRAA if you fail to monitor.

(c) You may return to routine monitoring once you have conducted increased monitoring for at least four consecutive quarters and the LRAA for every monitoring location is ≤0.060 mg/L for TTHM and ≤0.045 mg/L for HAA5.

§ 141.626 Operational evaluation levels.

(a) You have exceeded the operational evaluation level at any monitoring location where the sum of the two previous quarters' TTHM results plus twice the current quarter's TTHM result, divided by 4 to determine an average, exceeds 0.080 mg/L, or where the sum of the two previous quarters' HAA5 results plus twice the current quarter's HAA5 result, divided by 4 to determine an average, exceeds 0.060 mg/L.

(b)(1) If you exceed the operational evaluation level, you must conduct an operational evaluation and submit a written report of the evaluation to the State no later than 90 days after being notified of the analytical result that causes you to exceed the operational evaluation level. The written report must be made available to the public upon request.

(2) Your operational evaluation must include an examination of system treatment and distribution operational practices, including storage tank operations, excess storage capacity, distribution system flushing, changes in sources or source water quality, and treatment changes or problems that may contribute to TTHM and HAA5 formation and what steps could be considered to minimize future exceedences.

(i) You may request and the State may allow you to limit the scope of your evaluation if you are able to identify the cause of the operational evaluation level exceedance.

(ii) Your request to limit the scope of the evaluation does not extend the schedule in paragraph (b)(1) of this section for submitting the written report. The State must approve this limited scope of evaluation in writing and you must keep that approval with the completed report.

§ 141.627 Requirements for remaining on reduced TTHM and HAA5 monitoring based on subpart L results.

You may remain on reduced monitoring after the dates identified in § 141.620(c) for compliance with this subpart only if you qualify for a 40/30 certification under § 141.603 or have received a very small system waiver under § 141.604, plus you meet the reduced monitoring criteria in § 141.623(a), and you do not change or add monitoring locations from those used for compliance monitoring under subpart L of this part. If your monitoring locations under this subpart differ from your monitoring locations under subpart L of this part, you may not remain on reduced monitoring after the dates identified in § 141.620(c) for compliance with this subpart.

§ 141.628 Requirements for remaining on increased TTHM and HAA5 monitoring based on subpart L results.

If you were on increased monitoring under § 141.132(b)(1), you must remain on increased monitoring until you qualify for a return to routine monitoring under § 141.625(c). You must conduct increased monitoring under § 141.625 at the monitoring locations in the monitoring plan developed under § 141.622 beginning at the date identified in § 141.620(c) for compliance with this subpart and remain on increased monitoring until you qualify for a return to routine monitoring under § 141.625(c).

§ 141.629 Reporting and recordkeeping requirements.

(a) *Reporting.* (1) You must report the following information for each monitoring location to the State within 10 days of the end of any quarter in which monitoring is required:

(i) Number of samples taken during the last quarter.

(ii) Date and results of each sample taken during the last quarter.

(iii) Arithmetic average of quarterly results for the last four quarters for each monitoring location (LRAA), beginning at the end of the fourth calendar quarter that follows the compliance date and at the end of each subsequent quarter. If the LRAA calculated based on fewer than four quarters of data would cause the MCL to be exceeded regardless of the monitoring results of subsequent quarters, you must report this information to the State as part of the first report due following the compliance date or anytime thereafter that this determination is made. If you are required to conduct monitoring at a frequency that is less than quarterly, you must make compliance calculations beginning with the first compliance sample taken after the compliance date, unless you are required to conduct increased monitoring under §141.625.

(iv) Whether, based on §141.64(b)(2) and this subpart, the MCL was violated at any monitoring location.

(v) Any operational evaluation levels that were exceeded during the quarter and, if so, the location and date, and the calculated TTHM and HAA5 levels.

(2) If you are a subpart H system seeking to qualify for or remain on reduced TTHM/HAA5 monitoring, you must report the following source water TOC information for each treatment plant that treats surface water or ground water under the direct influence of surface water to the State within 10 days of the end of any quarter in which monitoring is required:

(i) The number of source water TOC samples taken each month during last quarter.

(ii) The date and result of each sample taken during last quarter.

(iii) The quarterly average of monthly samples taken during last quarter or the result of the quarterly sample.

(iv) The running annual average (RAA) of quarterly averages from the past four quarters.

(v) Whether the RAA exceeded 4.0 mg/L.

(3) The State may choose to perform calculations and determine whether the MCL was exceeded or the system is eligible for reduced monitoring in lieu of having the system report that information

(b) *Recordkeeping.* You must retain any subpart V monitoring plans and your subpart V monitoring results as required by §141.33.

Subpart W—Enhanced Treatment for *Cryptosporidium*

SOURCE: 71 FR 769, Jan. 5, 2006, unless otherwise noted.

GENERAL REQUIREMENTS

§ 141.700 General requirements.

(a) The requirements of this subpart W are national primary drinking water regulations. The regulations in this subpart establish or extend treatment technique requirements in lieu of maximum contaminant levels for *Cryptosporidium*. These requirements are in addition to requirements for filtration and disinfection in subparts H, P, and T of this part.

(b) *Applicability.* The requirements of this subpart apply to all subpart H systems, which are public water systems supplied by a surface water source and public water systems supplied by a ground water source under the direct influence of surface water.

(1) Wholesale systems, as defined in §141.2, must comply with the requirements of this subpart based on the population of the largest system in the combined distribution system.

(2) The requirements of this subpart for filtered systems apply to systems required by National Primary Drinking Water Regulations to provide filtration treatment, whether or not the system is currently operating a filtration system.

(3) The requirements of this subpart for unfiltered systems apply only to unfiltered systems that timely met and

continue to meet the filtration avoidance criteria in subparts H, P, and T of this part, as applicable.

(c) *Requirements.* Systems subject to this subpart must comply with the following requirements:

(1) Systems must conduct an initial and a second round of source water monitoring for each plant that treats a surface water or GWUDI source. This monitoring may include sampling for *Cryptosporidium, E. coli,* and turbidity as described in §§ 141.701 through 141.706, to determine what level, if any, of additional *Cryptosporidium* treatment they must provide.

(2) Systems that plan to make a significant change to their disinfection practice must develop disinfection profiles and calculate disinfection benchmarks, as described in §§ 141.708 through 141.709.

(3) Filtered systems must determine their *Cryptosporidium* treatment bin classification as described in § 141.710 and provide additional treatment for *Cryptosporidium,* if required, as described in § 141.711. All unfiltered systems must provide treatment for *Cryptosporidium* as described in § 141.712. Filtered and unfiltered systems must implement *Cryptosporidium* treatment according to the schedule in § 141.713.

(4) Systems with uncovered finished water storage facilities must comply with the requirements to cover the facility or treat the discharge from the facility as described in § 141.714.

(5) Systems required to provide additional treatment for *Cryptosporidium* must implement microbial toolbox options that are designed and operated as described in §§ 141.715 through 141.720.

(6) Systems must comply with the applicable recordkeeping and reporting requirements described in §§ 141.721 through 141.722.

(7) Systems must address significant deficiencies identified in sanitary surveys performed by EPA as described in § 141.723.

SOURCE WATER MONITORING REQUIREMENTS

§ 141.701 Source water monitoring.

(a) *Initial round of source water monitoring.* Systems must conduct the following monitoring on the schedule in paragraph (c) of this section unless they meet the monitoring exemption criteria in paragraph (d) of this section.

(1) Filtered systems serving at least 10,000 people must sample their source water for *Cryptosporidium, E. coli,* and turbidity at least monthly for 24 months.

(2) Unfiltered systems serving at least 10,000 people must sample their source water for *Cryptosporidium* at least monthly for 24 months.

(3)(i) Filtered systems serving fewer than 10,000 people must sample their source water for *E. coli* at least once every two weeks for 12 months.

(ii) A filtered system serving fewer than 10,000 people may avoid *E. coli* monitoring if the system notifies the State that it will monitor for *Cryptosporidium* as described in paragraph (a)(4) of this section. The system must notify the State no later than 3 months prior to the date the system is otherwise required to start *E. coli* monitoring under § 141.701(c).

(4) Filtered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months if they meet one of the following, based on monitoring conducted under paragraph (a)(3) of this section:

(i) For systems using lake/reservoir sources, the annual mean *E. coli* concentration is greater than 10 *E. coli*/100 mL.

(ii) For systems using flowing stream sources, the annual mean *E. coli* concentration is greater than 50 *E. coli*/100 mL.

(iii) The system does not conduct *E. coli* monitoring as described in paragraph (a)(3) of this section.

(iv) Systems using ground water under the direct influence of surface water (GWUDI) must comply with the requirements of paragraph (a)(4) of this section based on the *E. coli* level that applies to the nearest surface water body. If no surface water body is nearby, the system must comply based on the requirements that apply to systems using lake/reservoir sources.

(5) For filtered systems serving fewer than 10,000 people, the State may approve monitoring for an indicator

other than *E. coli* under paragraph (a)(3) of this section. The State also may approve an alternative to the *E. coli* concentration in paragraph (a)(4)(i), (ii) or (iv) of this section to trigger *Cryptosporidium* monitoring. This approval by the State must be provided to the system in writing and must include the basis for the State's determination that the alternative indicator and/or trigger level will provide a more accurate identification of whether a system will exceed the Bin 1 *Cryptosporidium* level in § 141.710.

(6) Unfiltered systems serving fewer than 10,000 people must sample their source water for *Cryptosporidium* at least twice per month for 12 months or at least monthly for 24 months.

(7) Systems may sample more frequently than required under this section if the sampling frequency is evenly spaced throughout the monitoring period.

(b) *Second round of source water monitoring.* Systems must conduct a second round of source water monitoring that meets the requirements for monitoring parameters, frequency, and duration described in paragraph (a) of this section, unless they meet the monitoring exemption criteria in paragraph (d) of this section. Systems must conduct this monitoring on the schedule in paragraph (c) of this section.

(c) *Monitoring schedule.* Systems must begin the monitoring required in paragraphs (a) and (b) of this section no later than the month beginning with the date listed in this table:

SOURCE WATER MONITORING STARTING DATES TABLE

Systems that serve . . .	Must begin the first round of source water monitoring no later than the month beginning . . .	And must begin the second round of source water monitoring no later than the month beginning . . .
(1) At least 100,000 people	(i) October 1, 2006	(ii) April 1, 2015.
(2) From 50,000 to 99,999 people	(i) April 1, 2007	(ii) October 1, 2015.
(3) From 10,000 to 49,999 people	(i) April 1, 2008	(ii) October 1, 2016.
(4) Fewer than 10,000 and monitor for *E. coli*[a].	(i) October 1, 2008	(ii) October 1, 2017.
(5) Fewer than 10,000 and monitor for *Cryptosporidium*[b].	(i) April 1, 2010	(ii) April 1, 2019.

[a] Applies only to filtered systems.

[b] Applies to filtered systems that meet the conditions of paragraph (a)(4) of this section and unfiltered systems.

(d) *Monitoring avoidance.* (1) Filtered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 5.5-log of treatment for *Cryptosporidium*, equivalent to meeting the treatment requirements of Bin 4 in § 141.711.

(2) Unfiltered systems are not required to conduct source water monitoring under this subpart if the system will provide a total of at least 3-log *Cryptosporidium* inactivation, equivalent to meeting the treatment requirements for unfiltered systems with a mean *Cryptosporidium* concentration of greater than 0.01 oocysts/L in § 141.712.

(3) If a system chooses to provide the level of treatment in paragraph (d)(1) or (2) of this section, as applicable, rather than start source water monitoring, the system must notify the State in writing no later than the date the system is otherwise required to submit a sampling schedule for monitoring under § 141.702. Alternatively, a system may choose to stop sampling at any point after it has initiated monitoring if it notifies the State in writing that it will provide this level of treatment. Systems must install and operate technologies to provide this level of treatment by the applicable treatment compliance date in § 141.713.

(e) *Plants operating only part of the year.* Systems with subpart H plants that operate for only part of the year must conduct source water monitoring in accordance with this subpart, but with the following modifications:

(1) Systems must sample their source water only during the months that the plant operates unless the State specifies another monitoring period based on plant operating practices.

(2) Systems with plants that operate less than six months per year and that

monitor for *Cryptosporidium* must collect at least six *Cryptosporidium* samples per year during each of two years of monitoring. Samples must be evenly spaced throughout the period the plant operates.

(f)(1) *New sources.* A system that begins using a new source of surface water or GWUDI after the system is required to begin monitoring under paragraph (c) of this section must monitor the new source on a schedule the State approves. Source water monitoring must meet the requirements of this subpart. The system must also meet the bin classification and *Cryptosporidium* treatment requirements of §§ 141.710 and 141.711 or § 141.712, as applicable, for the new source on a schedule the State approves.

(2) The requirements of § 141.701(f) apply to subpart H systems that begin operation after the monitoring start date applicable to the system's size under paragraph (c) of this section.

(3) The system must begin a second round of source water monitoring no later than 6 years following initial bin classification under § 141.710 or determination of the mean *Cryptosporidium* level under § 141.712, as applicable.

(g) Failure to collect any source water sample required under this section in accordance with the sampling schedule, sampling location, analytical method, approved laboratory, and reporting requirements of §§ 141.702 through 141.706 is a monitoring violation.

(h) *Grandfathering monitoring data.* Systems may use (grandfather) monitoring data collected prior to the applicable monitoring start date in paragraph (c) of this section to meet the initial source water monitoring requirements in paragraph (a) of this section. Grandfathered data may substitute for an equivalent number of months at the end of the monitoring period. All data submitted under this paragraph must meet the requirements in § 141.707.

§ 141.702 Sampling schedules.

(a) Systems required to conduct source water monitoring under § 141.701 must submit a sampling schedule that specifies the calendar dates when the system will collect each required sample.

(1) Systems must submit sampling schedules no later than 3 months prior to the applicable date listed in § 141.701(c) for each round of required monitoring.

(2)(i) Systems serving at least 10,000 people must submit their sampling schedule for the initial round of source water monitoring under § 141.701(a) to EPA electronically at *https://intranet.epa.gov/lt2/.*

(ii) If a system is unable to submit the sampling schedule electronically, the system may use an alternative approach for submitting the sampling schedule that EPA approves.

(3) Systems serving fewer than 10,000 people must submit their sampling schedules for the initial round of source water monitoring § 141.701(a) to the State.

(4) Systems must submit sampling schedules for the second round of source water monitoring § 141.701(b) to the State.

(5) If EPA or the State does not respond to a system regarding its sampling schedule, the system must sample at the reported schedule.

(b) Systems must collect samples within two days before or two days after the dates indicated in their sampling schedule (*i.e.*, within a five-day period around the schedule date) unless one of the conditions of paragraph (b)(1) or (2) of this section applies.

(1) If an extreme condition or situation exists that may pose danger to the sample collector, or that cannot be avoided and causes the system to be unable to sample in the scheduled five-day period, the system must sample as close to the scheduled date as is feasible unless the State approves an alternative sampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.

(2)(i) If a system is unable to report a valid analytical result for a scheduled sampling date due to equipment failure, loss of or damage to the sample, failure to comply with the analytical method requirements, including the quality control requirements in § 141.704, or the failure of an approved laboratory to analyze the sample, then the system must collect a replacement sample.

(ii) The system must collect the replacement sample not later than 21 days after receiving information that an analytical result cannot be reported for the scheduled date unless the system demonstrates that collecting a replacement sample within this time frame is not feasible or the State approves an alternative resampling date. The system must submit an explanation for the delayed sampling date to the State concurrent with the shipment of the sample to the laboratory.

(c) Systems that fail to meet the criteria of paragraph (b) of this section for any source water sample required under § 141.701 must revise their sampling schedules to add dates for collecting all missed samples. Systems must submit the revised schedule to the State for approval prior to when the system begins collecting the missed samples.

§ 141.703 Sampling locations.

(a) Systems required to conduct source water monitoring under § 141.701 must collect samples for each plant that treats a surface water or GWUDI source. Where multiple plants draw water from the same influent, such as the same pipe or intake, the State may approve one set of monitoring results to be used to satisfy the requirements of § 141.701 for all plants.

(b)(1) Systems must collect source water samples prior to chemical treatment, such as coagulants, oxidants and disinfectants, unless the system meets the condition of paragraph (b)(2) of this section.

(2) The State may approve a system to collect a source water sample after chemical treatment. To grant this approval, the State must determine that collecting a sample prior to chemical treatment is not feasible for the system and that the chemical treatment is unlikely to have a significant adverse effect on the analysis of the sample.

(c) Systems that recycle filter backwash water must collect source water samples prior to the point of filter backwash water addition.

(d) *Bank filtration.* (1) Systems that receive *Cryptosporidium* treatment credit for bank filtration under § 141.173(b) or § 141.552(a), as applicable, must collect source water samples in the surface water prior to bank filtration.

(2) Systems that use bank filtration as pretreatment to a filtration plant must collect source water samples from the well (*i.e.*, after bank filtration). Use of bank filtration during monitoring must be consistent with routine operational practice. Systems collecting samples after a bank filtration process may not receive treatment credit for the bank filtration under § 141.717(c).

(e) *Multiple sources.* Systems with plants that use multiple water sources, including multiple surface water sources and blended surface water and ground water sources, must collect samples as specified in paragraph (e)(1) or (2) of this section. The use of multiple sources during monitoring must be consistent with routine operational practice.

(1) If a sampling tap is available where the sources are combined prior to treatment, systems must collect samples from the tap.

(2) If a sampling tap where the sources are combined prior to treatment is not available, systems must collect samples at each source near the intake on the same day and must follow either paragraph (e)(2)(i) or (ii) of this section for sample analysis.

(i) Systems may composite samples from each source into one sample prior to analysis. The volume of sample from each source must be weighted according to the proportion of the source in the total plant flow at the time the sample is collected.

(ii) Systems may analyze samples from each source separately and calculate a weighted average of the analysis results for each sampling date. The weighted average must be calculated by multiplying the analysis result for each source by the fraction the source contributed to total plant flow at the time the sample was collected and then summing these values.

(f) *Additional Requirements.* Systems must submit a description of their sampling location(s) to the State at the same time as the sampling schedule required under § 141.702. This description must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including pretreatment, points of chemical treatment, and filter backwash recycle. If the State does not respond to a system regarding sampling location(s), the system must sample at the reported location(s).

§ 141.704 Analytical methods.

(a) *Cryptosporidium.* Systems must analyze for *Cryptosporidium* using *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA–815–R–05–002 or *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA–815–R–05–001, which are incorporated by reference, or alternative methods listed in appendix A to subpart C of this part. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods online from *http://www.epa.gov/safewater/disinfection/lt2* or from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave., NW., Washington, DC 20460 (*Telephone:* 800–426–4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW., Washington, DC (*Telephone:* 202–566–2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

(1) Systems must analyze at least a 10 L sample or a packed pellet volume of at least 2 mL as generated by the methods listed in paragraph (a) of this section. Systems unable to process a 10 L sample must analyze as much sample volume as can be filtered by two filters approved by EPA for the methods listed in paragraph (a) of this section, up to a packed pellet volume of at least 2 mL.

(2)(i) Matrix spike (MS) samples, as required by the methods in paragraph (a) of this section, must be spiked and filtered by a laboratory approved for *Cryptosporidium* analysis under § 141.705.

(ii) If the volume of the MS sample is greater than 10 L, the system may filter all but 10 L of the MS sample in the field, and ship the filtered sample and the remaining 10 L of source water to the laboratory. In this case, the laboratory must spike the remaining 10 L of water and filter it through the filter used to collect the balance of the sample in the field.

(3) Flow cytometer-counted spiking suspensions must be used for MS samples and ongoing precision and recovery (OPR) samples.

(b) *E. coli.* System must use methods for enumeration of E. coli in source water approved in § 136.3(a) of this chapter or alternative methods listed in appendix A to subpart C of this part.

(1) The time from sample collection to initiation of analysis may not exceed 30 hours unless the system meets the condition of paragraph (b)(2) of this section.

(2) The State may approve on a case-by-case basis the holding of an *E. coli* sample for up to 48 hours between sample collection and initiation of analysis if the State determines that analyzing an *E. coli* sample within 30 hours is not feasible. *E. coli* samples held between 30 to 48 hours must be analyzed by the Colilert reagent version of Standard Method 9223B as listed in § 136.3(a) of this title.

(3) Systems must maintain samples between 0 °C and 10 °C during storage and transit to the laboratory.

(c) *Turbidity.* Systems must use methods for turbidity measurement approved in § 141.74(a)(1).

[71 FR 769, Jan. 5, 2006, as amended at 74 FR 30959, June 29, 2009]

§ 141.705 Approved laboratories.

(a) *Cryptosporidium.* Systems must have *Cryptosporidium* samples analyzed by a laboratory that is approved under EPA's Laboratory Quality Assurance Evaluation Program for Analysis of *Cryptosporidium* in Water or a laboratory that has been certified for

Cryptosporidium analysis by an equivalent State laboratory certification program.

(b) *E. coli.* Any laboratory certified by the EPA, the National Environmental Laboratory Accreditation Conference or the State for total coliform or fecal coliform analysis under § 141.74 is approved for *E. coli* analysis under this subpart when the laboratory uses the same technique for *E. coli* that the laboratory uses for § 141.74.

(c) *Turbidity.* Measurements of turbidity must be made by a party approved by the State.

§ 141.706 Reporting source water monitoring results.

(a) Systems must report results from the source water monitoring required under § 141.701 no later than 10 days after the end of the first month following the month when the sample is collected.

(b)(1) All systems serving at least 10,000 people must report the results from the initial source water monitoring required under § 141.701(a) to EPA electronically at *https://intranet.epa.gov/lt2/.*

(2) If a system is unable to report monitoring results electronically, the system may use an alternative approach for reporting monitoring results that EPA approves.

(c) Systems serving fewer than 10,000 people must report results from the initial source water monitoring required under § 141.701(a) to the State.

(d) All systems must report results from the second round of source water monitoring required under § 141.701(b) to the State.

(e) Systems must report the applicable information in paragraphs (e)(1) and (2) of this section for the source water monitoring required under § 141.701.

(1) Systems must report the following data elements for each *Cryptosporidium* analysis:

1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Sample type (field or matrix spike).
5. Sample volume filtered (L), to nearest ¼ L.
6. Was 100% of filtered volume examined.
7. Number of oocysts counted.

(i) For matrix spike samples, systems must also report the sample volume spiked and estimated number of oocysts spiked. These data are not required for field samples.

(ii) For samples in which less than 10 L is filtered or less than 100% of the sample volume is examined, systems must also report the number of filters used and the packed pellet volume.

(iii) For samples in which less than 100% of sample volume is examined, systems must also report the volume of resuspended concentrate and volume of this resuspension processed through immunomagnetic separation.

(2) Systems must report the following data elements for each *E. coli* analysis:

Data element.

1. PWS ID.
2. Facility ID.
3. Sample collection date.
4. Analytical method number.
5. Method type.
6. Source type (flowing stream, lake/reservoir, GWUDI).
7. *E. coli*/100 mL.
8. Turbidity.[1]

[1] Systems serving fewer than 10,000 people that are not required to monitor for turbidity under §141.701 are not required to report turbidity with their *E. coli* results.

§ 141.707 Grandfathering previously collected data.

(a)(1) Systems may comply with the initial source water monitoring requirements of § 141.701(a) by grandfathering sample results collected before the system is required to begin monitoring (*i.e.*, previously collected data). To be grandfathered, the sample results and analysis must meet the criteria in this section and the State must approve.

(2) A filtered system may grandfather *Cryptosporidium* samples to meet the requirements of § 141.701(a) when the system does not have corresponding *E. coli* and turbidity samples. A system that grandfathers *Cryptosporidium* samples without *E. coli* and turbidity samples is not required to collect *E. coli* and turbidity samples when the system completes the requirements for *Cryptosporidium* monitoring under § 141.701(a).

(b) *E. coli sample analysis.* The analysis of *E. coli* samples must meet the analytical method and approved laboratory requirements of §§ 141.704 through 141.705.

(c) *Cryptosporidium sample analysis*. The analysis of *Cryptosporidium* samples must meet the criteria in this paragraph.

(1) Laboratories analyzed *Cryptosporidium* samples using one of the analytical methods in paragraphs (c)(1)(i) through (vi) of this section, which are incorporated by reference. The Director of the Federal Register approves this incorporation by reference in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. You may obtain a copy of these methods on-line from the United States Environmental Protection Agency, Office of Ground Water and Drinking Water, 1201 Constitution Ave, NW, Washington, DC 20460 (Telephone: 800–426–4791). You may inspect a copy at the Water Docket in the EPA Docket Center, 1301 Constitution Ave., NW, Washington, DC, (Telephone: 202–566–2426) or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

(i) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA–815–R–05–002.

(ii) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA*, 2005, United States Environmental Protection Agency, EPA–815–R–05–001.

(iii) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA*, 2001, United States Environmental Protection Agency, EPA–821–R–01–025.

(iv) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA*, 2001, United States Environmental Protection Agency, EPA–821-–R–01–026.

(v) *Method 1623: Cryptosporidium and Giardia in Water by Filtration/IMS/FA*, 1999, United States Environmental Protection Agency, EPA–821–R–99–006.

(vi) *Method 1622: Cryptosporidium in Water by Filtration/IMS/FA*, 1999, United States Environmental Protection Agency, EPA–821–R–99–001.

(2) For each *Cryptosporidium* sample, the laboratory analyzed at least 10 L of sample or at least 2 mL of packed pellet or as much volume as could be filtered by 2 filters that EPA approved for the methods listed in paragraph (c)(1) of this section.

(d) *Sampling location*. The sampling location must meet the conditions in §141.703.

(e) *Sampling frequency*. *Cryptosporidium* samples were collected no less frequently than each calendar month on a regular schedule, beginning no earlier than January 1999. Sample collection intervals may vary for the conditions specified in §141.702(b)(1) and (2) if the system provides documentation of the condition when reporting monitoring results.

(1) The State may approve grandfathering of previously collected data where there are time gaps in the sampling frequency if the system conducts additional monitoring the State specifies to ensure that the data used to comply with the initial source water monitoring requirements of §141.701(a) are seasonally representative and unbiased.

(2) Systems may grandfather previously collected data where the sampling frequency within each month varied. If the *Cryptosporidium* sampling frequency varied, systems must follow the monthly averaging procedure in §141.710(b)(5) or §141.712(a)(3), as applicable, when calculating the bin classification for filtered systems or the mean *Cryptosporidium* concentration for unfiltered systems.

(f) *Reporting monitoring results for grandfathering*. Systems that request to grandfather previously collected monitoring results must report the following information by the applicable dates listed in this paragraph. Systems serving at least 10,000 people must report this information to EPA unless the State approves reporting to the State rather than EPA. Systems serving fewer than 10,000 people must report this information to the State.

(1) Systems must report that they intend to submit previously collected monitoring results for grandfathering. This report must specify the number of previously collected results the system will submit, the dates of the first and last sample, and whether a system will conduct additional source water monitoring to meet the requirements of §141.701(a). Systems must report this information no later than the date the

sampling schedule under § 141.702 is required.

(2) Systems must report previously collected monitoring results for grandfathering, along with the associated documentation listed in paragraphs (f)(2)(i) through (iv) of this section, no later than two months after the applicable date listed in § 141.701(c).

(i) For each sample result, systems must report the applicable data elements in § 141.706.

(ii) Systems must certify that the reported monitoring results include all results the system generated during the time period beginning with the first reported result and ending with the final reported result. This applies to samples that were collected from the sampling location specified for source water monitoring under this subpart, not spiked, and analyzed using the laboratory's routine process for the analytical methods listed in this section.

(iii) Systems must certify that the samples were representative of a plant's source water(s) and the source water(s) have not changed. Systems must report a description of the sampling location(s), which must address the position of the sampling location in relation to the system's water source(s) and treatment processes, including points of chemical addition and filter backwash recycle.

(iv) For *Cryptosporidium* samples, the laboratory or laboratories that analyzed the samples must provide a letter certifying that the quality control criteria specified in the methods listed in paragraph (c)(1) of this section were met for each sample batch associated with the reported results. Alternatively, the laboratory may provide bench sheets and sample examination report forms for each field, matrix spike, IPR, OPR, and method blank sample associated with the reported results.

(g) If the State determines that a previously collected data set submitted for grandfathering was generated during source water conditions that were not normal for the system, such as a drought, the State may disapprove the data. Alternatively, the State may approve the previously collected data if the system reports additional source water monitoring data, as determined by the State, to ensure that the data set used under § 141.710 or § 141.712 represents average source water conditions for the system.

(h) If a system submits previously collected data that fully meet the number of samples required for initial source water monitoring under § 141.701(a) and some of the data are rejected due to not meeting the requirements of this section, systems must conduct additional monitoring to replace rejected data on a schedule the State approves. Systems are not required to begin this additional monitoring until two months after notification that data have been rejected and additional monitoring is necessary.

DISINFECTION PROFILING AND BENCHMARKING REQUIREMENTS

§ 141.708 Requirements when making a significant change in disinfection practice.

(a) Following the completion of initial source water monitoring under § 141.701(a), a system that plans to make a significant change to its disinfection practice, as defined in paragraph (b) of this section, must develop disinfection profiles and calculate disinfection benchmarks for *Giardia lamblia* and viruses as described in § 141.709. Prior to changing the disinfection practice, the system must notify the State and must include in this notice the information in paragraphs (a)(1) through (3) of this section.

(1) A completed disinfection profile and disinfection benchmark for *Giardia lamblia* and viruses as described in § 141.709.

(2) A description of the proposed change in disinfection practice.

(3) An analysis of how the proposed change will affect the current level of disinfection.

(b) Significant changes to disinfection practice are defined as follows:

(1) Changes to the point of disinfection;

(2) Changes to the disinfectant(s) used in the treatment plant;

(3) Changes to the disinfection process; or

(4) Any other modification identified by the State as a significant change to disinfection practice.

§ 141.709 Developing the disinfection profile and benchmark.

(a) Systems required to develop disinfection profiles under § 141.708 must follow the requirements of this section. Systems must monitor at least weekly for a period of 12 consecutive months to determine the total log inactivation for *Giardia lamblia* and viruses. If systems monitor more frequently, the monitoring frequency must be evenly spaced. Systems that operate for fewer than 12 months per year must monitor weekly during the period of operation. Systems must determine log inactivation for *Giardia lamblia* through the entire plant, based on $CT_{99.9}$ values in Tables 1.1 through 1.6, 2.1 and 3.1 of § 141.74(b) as applicable. Systems must determine log inactivation for viruses through the entire treatment plant based on a protocol approved by the State.

(b) Systems with a single point of disinfectant application prior to the entrance to the distribution system must conduct the monitoring in paragraphs (b)(1) through (4) of this section. Systems with more than one point of disinfectant application must conduct the monitoring in paragraphs (b)(1) through (4) of this section for each disinfection segment. Systems must monitor the parameters necessary to determine the total inactivation ratio, using analytical methods in § 141.74(a).

(1) For systems using a disinfectant other than UV, the temperature of the disinfected water must be measured at each residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.

(2) For systems using chlorine, the pH of the disinfected water must be measured at each chlorine residual disinfectant concentration sampling point during peak hourly flow or at an alternative location approved by the State.

(3) The disinfectant contact time(s) (t) must be determined during peak hourly flow.

(4) The residual disinfectant concentration(s) (C) of the water before or at the first customer and prior to each additional point of disinfectant application must be measured during peak hourly flow.

(c) In lieu of conducting new monitoring under paragraph (b) of this section, systems may elect to meet the requirements of paragraphs (c)(1) or (2) of this section.

(1) Systems that have at least one year of existing data that are substantially equivalent to data collected under the provisions of paragraph (b) of this section may use these data to develop disinfection profiles as specified in this section if the system has neither made a significant change to its treatment practice nor changed sources since the data were collected. Systems may develop disinfection profiles using up to three years of existing data.

(2) Systems may use disinfection profile(s) developed under § 141.172 or §§ 141.530 through 141.536 in lieu of developing a new profile if the system has neither made a significant change to its treatment practice nor changed sources since the profile was developed. Systems that have not developed a virus profile under § 141.172 or §§ 141.530 through 141.536 must develop a virus profile using the same monitoring data on which the *Giardia lamblia* profile is based.

(d) Systems must calculate the total inactivation ratio for *Giardia lamblia* as specified in paragraphs (d)(1) through (3) of this section.

(1) Systems using only one point of disinfectant application may determine the total inactivation ratio for the disinfection segment based on either of the methods in paragraph (d)(1)(i) or (ii) of this section.

(i) Determine one inactivation ratio ($CTcalc/CT_{99.9}$) before or at the first customer during peak hourly flow.

(ii) Determine successive $CTcalc/CT_{99.9}$ values, representing sequential inactivation ratios, between the point of disinfectant application and a point before or at the first customer during peak hourly flow. The system must calculate the total inactivation ratio by determining ($CTcalc/CT_{99.9}$) for each sequence and then adding the ($CTcalc/CT_{99.9}$) values together to determine ($\Sigma (CTcalc/CT_{99.9})$).

(2) Systems using more than one point of disinfectant application before the first customer must determine the CT value of each disinfection segment

immediately prior to the next point of disinfectant application, or for the final segment, before or at the first customer, during peak hourly flow. The ($CTcalc/CT_{99.9}$) value of each segment and (Σ ($CTcalc/CT_{99.9}$)) must be calculated using the method in paragraph (d)(1)(ii) of this section.

(3) The system must determine the total logs of inactivation by multiplying the value calculated in paragraph (d)(1) or (d)(2) of this section by 3.0.

(4) Systems must calculate the log of inactivation for viruses using a protocol approved by the State.

(e) Systems must use the procedures specified in paragraphs (e)(1) and (2) of this section to calculate a disinfection benchmark.

(1) For each year of profiling data collected and calculated under paragraphs (a) through (d) of this section, systems must determine the lowest mean monthly level of both *Giardia lamblia* and virus inactivation. Systems must determine the mean *Giardia lamblia* and virus inactivation for each calendar month for each year of profiling data by dividing the sum of daily or weekly *Giardia lamblia* and virus log inactivation by the number of values calculated for that month.

(2) The disinfection benchmark is the lowest monthly mean value (for systems with one year of profiling data) or the mean of the lowest monthly mean values (for systems with more than one year of profiling data) of *Giardia lamblia* and virus log inactivation in each year of profiling data.

TREATMENT TECHNIQUE REQUIREMENTS

§ 141.710 Bin classification for filtered systems.

(a) Following completion of the initial round of source water monitoring required under § 141.701(a), filtered systems must calculate an initial *Cryptosporidium* bin concentration for each plant for which monitoring was required. Calculation of the bin concentration must use the *Cryptosporidium* results reported under § 141.701(a) and must follow the procedures in paragraphs (b)(1) through (5) of this section.

(b)(1) For systems that collect a total of at least 48 samples, the bin concentration is equal to the arithmetic mean of all sample concentrations.

(2) For systems that collect a total of at least 24 samples, but not more than 47 samples, the bin concentration is equal to the highest arithmetic mean of all sample concentrations in any 12 consecutive months during which *Cryptosporidium* samples were collected.

(3) For systems that serve fewer than 10,000 people and monitor for *Cryptosporidium* for only one year (*i.e.*, collect 24 samples in 12 months), the bin concentration is equal to the arithmetic mean of all sample concentrations.

(4) For systems with plants operating only part of the year that monitor fewer than 12 months per year under § 141.701(e), the bin concentration is equal to the highest arithmetic mean of all sample concentrations during any year of *Cryptosporidium* monitoring.

(5) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the applicable calculation for bin classification in paragraphs (b)(1) through (4) of this section.

(c) Filtered systems must determine their initial bin classification from the following table and using the *Cryptosporidium* bin concentration calculated under paragraphs (a)–(b) of this section:

BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS

For systems that are:	With a *Cryptosporidium* bin concentration of . . .[1]	The bin classification is . . .
. . . required to monitor for *Cryptosporidium* under § 141.701.	*Cryptosporidium* <0.075 oocyst/L	Bin 1.
	0.075 oocysts/L ≤*Cryptosporidium* <1.0 oocysts/L.	Bin 2.

BIN CLASSIFICATION TABLE FOR FILTERED SYSTEMS—Continued

For systems that are:	With a *Cryptosporidium* bin concentration of . . .[1]	The bin classification is . . .
	1.0 oocysts/L ≤*Cryptosporidium* <3.0 oocysts/L.	Bin 3.
	Cryptosporidium ≥3.0 oocysts/L	Bin 4.
. . . serving fewer than 10,000 people and NOT required to monitor for *Cryptosporidium* under § 141.701(a)(4).	NA	Bin 1.

[1] Based on calculations in paragraph (a) or (d) of this section, as applicable.

(d) Following completion of the second round of source water monitoring required under § 141.701(b), filtered systems must recalculate their *Cryptosporidium* bin concentration using the *Cryptosporidium* results reported under § 141.701(b) and following the procedures in paragraphs (b)(1) through (4) of this section. Systems must then redetermine their bin classification using this bin concentration and the table in paragraph (c) of this section.

(e)(1) Filtered systems must report their initial bin classification under paragraph (c) of this section to the State for approval no later than 6 months after the system is required to complete initial source water monitoring based on the schedule in § 141.701(c).

(2) Systems must report their bin classification under paragraph (d) of this section to the State for approval no later than 6 months after the system is required to complete the second round of source water monitoring based on the schedule in § 141.701(c).

(3) The bin classification report to the State must include a summary of source water monitoring data and the calculation procedure used to determine bin classification.

(f) Failure to comply with the conditions of paragraph (e) of this section is a violation of the treatment technique requirement.

§ 141.711 Filtered system additional *Cryptosporidium* treatment requirements.

(a) Filtered systems must provide the level of additional treatment for *Cryptosporidium* specified in this paragraph based on their bin classification as determined under § 141.710 and according to the schedule in § 141.713.

If the system bin classification is . . .	And the system uses the following filtration treatment in full compliance with subparts H, P, and T of this part (as applicable), then the additional *Cryptosporidium* treatment requirements are . . .			
	Conventional filtration treatment (including softening)	Direct filtration	Slow sand or diatomaceous earth filtration	Alternative filtration technologies
Bin 1	No additional treatment	No additional treatment	No additional treatment	No additional treatment.
Bin 2	1-log treatment	1.5-log treatment	1-log treatment	(1)
Bin 3	2-log treatment	2.5-log treatment	2-log treatment	(2)
Bin 4	2.5-log treatment	3-log treatment	2.5-log treatment	(3)

[1] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 4.0-log.
[2] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.0-log.
[3] As determined by the State such that the total *Cryptosporidium* removal and inactivation is at least 5.5-log.

(b)(1) Filtered systems must use one or more of the treatment and management options listed in § 141.715, termed the microbial toolbox, to comply with the additional *Cryptosporidium* treatment required in paragraph (a) of this section.

(2) Systems classified in Bin 3 and Bin 4 must achieve at least 1-log of the additional *Cryptosporidium* treatment required under paragraph (a) of this section using either one or a combination of the following: bag filters, bank filtration, cartridge filters, chlorine dioxide, membranes, ozone, or UV, as described in §§ 141.716 through 141.720.

(c) Failure by a system in any month to achieve treatment credit by meeting criteria in §§ 141.716 through 141.720 for microbial toolbox options that is at least equal to the level of treatment required in paragraph (a) of this section is a violation of the treatment technique requirement.

(d) If the State determines during a sanitary survey or an equivalent source water assessment that after a system completed the monitoring conducted under §141.701(a) or §141.701(b), significant changes occurred in the system's watershed that could lead to increased contamination of the source water by *Cryptosporidium*, the system must take actions specified by the State to address the contamination. These actions may include additional source water monitoring and/or implementing microbial toolbox options listed in §141.715.

§ 141.712 Unfiltered system *Cryptosporidium* treatment requirements.

(a) *Determination of mean Cryptosporidium level.* (1) Following completion of the initial source water monitoring required under §141.701(a), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under §141.701(a). Systems must report this value to the State for approval no later than 6 months after the month the system is required to complete initial source water monitoring based on the schedule in §141.701(c).

(2) Following completion of the second round of source water monitoring required under §141.701(b), unfiltered systems must calculate the arithmetic mean of all *Cryptosporidium* sample concentrations reported under §141.701(b). Systems must report this value to the State for approval no later than 6 months after the month the system is required to complete the second round of source water monitoring based on the schedule in §141.701(c).

(3) If the monthly *Cryptosporidium* sampling frequency varies, systems must first calculate a monthly average for each month of monitoring. Systems must then use these monthly average concentrations, rather than individual sample concentrations, in the calculation of the mean *Cryptosporidium* level in paragraphs (a)(1) or (2) of this section.

(4) The report to the State of the mean *Cryptosporidium* levels calculated under paragraphs (a)(1) and (2) of this section must include a summary of the source water monitoring data used for the calculation.

(5) Failure to comply with the conditions of paragraph (a) of this section is a violation of the treatment technique requirement.

(b) *Cryptosporidium inactivation requirements.* Unfiltered systems must provide the level of inactivation for *Cryptosporidium* specified in this paragraph, based on their mean *Cryptosporidium* levels as determined under paragraph (a) of this section and according to the schedule in §141.713.

(1) Unfiltered systems with a mean *Cryptosporidium* level of 0.01 oocysts/L or less must provide at least 2-log *Cryptosporidium* inactivation.

(2) Unfiltered systems with a mean *Cryptosporidium* level of greater than 0.01 oocysts/L must provide at least 3-log *Cryptosporidium* inactivation.

(c) *Inactivation treatment technology requirements.* Unfiltered systems must use chlorine dioxide, ozone, or UV as described in §141.720 to meet the *Cryptosporidium* inactivation requirements of this section.

(1) Systems that use chlorine dioxide or ozone and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section on more than one day in the calendar month are in violation of the treatment technique requirement.

(2) Systems that use UV light and fail to achieve the *Cryptosporidium* inactivation required in paragraph (b) of this section by meeting the criteria in §141.720(d)(3)(ii) are in violation of the treatment technique requirement.

(d) *Use of two disinfectants.* Unfiltered systems must meet the combined *Cryptosporidium* inactivation requirements of this section and *Giardia lamblia* and virus inactivation requirements of §141.72(a) using a minimum of two disinfectants, and each of two disinfectants must separately achieve the total inactivation required for either *Cryptosporidium, Giardia lamblia,* or viruses.

§ 141.713 Schedule for compliance with *Cryptosporidium* treatment requirements.

(a) Following initial bin classification under § 141.710(c), filtered systems must provide the level of treatment for *Cryptosporidium* required under § 141.711 according to the schedule in paragraph (c) of this section.

(b) Following initial determination of the mean *Cryptosporidium* level under § 141.712(a)(1), unfiltered systems must provide the level of treatment for *Cryptosporidium* required under § 141.712 according to the schedule in paragraph (c) of this section.

(c) *Cryptosporidium treatment compliance dates.*

CRYPTOSPORIDIUM TREATMENT COMPLIANCE DATES TABLE

Systems that serve . . .	Must comply with Cryptosporidium treatment requirements no later than . . .[a]
(1) At least 100,000 people ...	(i) April 1, 2012.
(2) From 50,000 to 99,999 people.	(i) October 1, 2012.
(3) From 10,000 to 49,999 people.	(i) October 1, 2013.
(4) Fewer than 10,000 people	(i) October 1, 2014.

[a] States may allow up to an additional two years for complying with the treatment requirement for systems making capital improvements.

(d) If the bin classification for a filtered system changes following the second round of source water monitoring, as determined under § 141.710(d), the system must provide the level of treatment for *Cryptosporidium* required under § 141.711 on a schedule the State approves.

(e) If the mean *Cryptosporidium* level for an unfiltered system changes following the second round of monitoring, as determined under § 141.712(a)(2), and if the system must provide a different level of *Cryptosporidium* treatment under § 141.712 due to this change, the system must meet this treatment requirement on a schedule the State approves.

§ 141.714 Requirements for uncovered finished water storage facilities.

(a) Systems using uncovered finished water storage facilities must comply with the conditions of this section.

(b) Systems must notify the State of the use of each uncovered finished water storage facility no later than April 1, 2008.

(c) Systems must meet the conditions of paragraph (c)(1) or (2) of this section for each uncovered finished water storage facility or be in compliance with a State-approved schedule to meet these conditions no later than April 1, 2009.

(1) Systems must cover any uncovered finished water storage facility.

(2) Systems must treat the discharge from the uncovered finished water storage facility to the distribution system to achieve inactivation and/or removal of at least 4-log virus, 3-log *Giardia lamblia*, and 2-log *Cryptosporidium* using a protocol approved by the State.

(d) Failure to comply with the requirements of this section is a violation of the treatment technique requirement.

REQUIREMENTS FOR MICROBIAL TOOLBOX COMPONENTS

§ 141.715 Microbial toolbox options for meeting *Cryptosporidium* treatment requirements.

(a)(1) Systems receive the treatment credits listed in the table in paragraph (b) of this section by meeting the conditions for microbial toolbox options described in §§ 141.716 through 141.720. Systems apply these treatment credits to meet the treatment requirements in § 141.711 or § 141.712, as applicable.

(2) Unfiltered systems are eligible for treatment credits for the microbial toolbox options described in § 141.720 only.

(b) The following table summarizes options in the microbial toolbox:

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
Source Protection and Management Toolbox Options	
(1) Watershed control program	0.5-log credit for State-approved program comprising required elements, annual program status report to State, and regular watershed survey. Unfiltered systems are not eligible for credit. Specific criteria are in § 141.716(a).

MICROBIAL TOOLBOX SUMMARY TABLE: OPTIONS, TREATMENT CREDITS AND CRITERIA—Continued

Toolbox Option	*Cryptosporidium* treatment credit with design and implementation criteria
(2) Alternative source/intake management	No prescribed credit. Systems may conduct simultaneous monitoring for treatment bin classification at alternative intake locations or under alternative intake management strategies. Specific criteria are in § 141.716(b).
Pre Filtration Toolbox Options	
(3) Presedimentation basin with coagulation.	0.5-log credit during any month that presedimentation basins achieve a monthly mean reduction of 0.5-log or greater in turbidity or alternative State-approved performance criteria. To be eligible, basins must be operated continuously with coagulant addition and all plant flow must pass through basins. Specific criteria are in § 141.717(a).
(4) Two-stage lime softening	0.5-log credit for two-stage softening where chemical addition and hardness precipitation occur in both stages. All plant flow must pass through both stages. Single-stage softening is credited as equivalent to conventional treatment. Specific criteria are in § 141.717(b).
(5) Bank filtration	0.5-log credit for 25-foot setback; 1.0-log credit for 50-foot setback; aquifer must be unconsolidated sand containing at least 10 percent fines; average turbidity in wells must be less than 1 NTU. Systems using wells followed by filtration when conducting source water monitoring must sample the well to determine bin classification and are not eligible for additional credit. Specific criteria are in § 141.717(c).
Treatment Performance Toolbox Options	
(6) Combined filter performance	0.5-log credit for combined filter effluent turbidity less than or equal to 0.15 NTU in at least 95 percent of measurements each month. Specific criteria are in § 141.718(a).
(7) Individual filter performance	0.5-log credit (in addition to 0.5-log combined filter performance credit) if individual filter effluent turbidity is less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter and is never greater than 0.3 NTU in two consecutive measurements in any filter. Specific criteria are in § 141.718(b).
(8) Demonstration of performance	Credit awarded to unit process or treatment train based on a demonstration to the State with a State- approved protocol. Specific criteria are in § 141.718(c).
Additional Filtration Toolbox Options	
(9) Bag or cartridge filters (individual filters)	Up to 2-log credit based on the removal efficiency demonstrated during challenge testing with a 1.0-log factor of safety. Specific criteria are in § 141.719(a).
(10) Bag or cartridge filters (in series)	Up to 2.5-log credit based on the removal efficiency demonstrated during challenge testing with a 0.5-log factor of safety. Specific criteria are in § 141.719(a).
(11) Membrane filtration	Log credit equivalent to removal efficiency demonstrated in challenge test for device if supported by direct integrity testing. Specific criteria are in § 141.719(b).
(12) Second stage filtration	0.5-log credit for second separate granular media filtration stage if treatment train includes coagulation prior to first filter. Specific criteria are in § 141.719(c)
(13) Slow sand filters	2.5-log credit as a secondary filtration step; 3.0-log credit as a primary filtration process. No prior chlorination for either option. Specific criteria are in § 141.719(d).
Inactivation Toolbox Options	
(14) Chlorine dioxide	Log credit based on measured CT in relation to CT table. Specific criteria in § 141.720(b)
(15) Ozone	Log credit based on measured CT in relation to CT table. Specific criteria in § 141.720(b).
(16) UV	Log credit based on validated UV dose in relation to UV dose table; reactor validation testing required to establish UV dose and associated operating conditions. Specific criteria in § 141.720(d).

§ 141.716 Source toolbox components.

(a) *Watershed control program.* Systems receive 0.5-log *Cryptosporidium* treatment credit for implementing a watershed control program that meets the requirements of this section.

(1) Systems that intend to apply for the watershed control program credit must notify the State of this intent no later than two years prior to the treatment compliance date applicable to the system in § 141.713.

(2) Systems must submit to the State a proposed watershed control plan no later than one year before the applicable treatment compliance date in § 141.713. The State must approve the

watershed control plan for the system to receive watershed control program treatment credit. The watershed control plan must include the elements in paragraphs (a)(2)(i) through (iv) of this section.

(i) Identification of an ''area of influence'' outside of which the likelihood of *Cryptosporidium* or fecal contamination affecting the treatment plant intake is not significant. This is the area to be evaluated in future watershed surveys under paragraph (a)(5)(ii) of this section.

(ii) Identification of both potential and actual sources of *Cryptosporidium* contamination and an assessment of the relative impact of these sources on the system's source water quality.

(iii) An analysis of the effectiveness and feasibility of control measures that could reduce *Cryptosporidium* loading from sources of contamination to the system's source water.

(iv) A statement of goals and specific actions the system will undertake to reduce source water *Cryptosporidium* levels. The plan must explain how the actions are expected to contribute to specific goals, identify watershed partners and their roles, identify resource requirements and commitments, and include a schedule for plan implementation with deadlines for completing specific actions identified in the plan.

(3) Systems with existing watershed control programs (*i.e.*, programs in place on January 5, 2006) are eligible to seek this credit. Their watershed control plans must meet the criteria in paragraph (a)(2) of this section and must specify ongoing and future actions that will reduce source water *Cryptosporidium* levels.

(4) If the State does not respond to a system regarding approval of a watershed control plan submitted under this section and the system meets the other requirements of this section, the watershed control program will be considered approved and 0.5 log *Cryptosporidium* treatment credit will be awarded unless and until the State subsequently withdraws such approval.

(5) Systems must complete the actions in paragraphs (a)(5)(i) through (iii) of this section to maintain the 0.5-log credit.

(i) Submit an annual watershed control program status report to the State. The annual watershed control program status report must describe the system's implementation of the approved plan and assess the adequacy of the plan to meet its goals. It must explain how the system is addressing any shortcomings in plan implementation, including those previously identified by the State or as the result of the watershed survey conducted under paragraph (a)(5)(ii) of this section. It must also describe any significant changes that have occurred in the watershed since the last watershed sanitary survey. If a system determines during implementation that making a significant change to its approved watershed control program is necessary, the system must notify the State prior to making any such changes. If any change is likely to reduce the level of source water protection, the system must also list in its notification the actions the system will take to mitigate this effect.

(ii) Undergo a watershed sanitary survey every three years for community water systems and every five years for noncommunity water systems and submit the survey report to the State. The survey must be conducted according to State guidelines and by persons the State approves.

(A) The watershed sanitary survey must meet the following criteria: encompass the region identified in the State-approved watershed control plan as the area of influence; assess the implementation of actions to reduce source water *Cryptosporidium* levels; and identify any significant new sources of *Cryptosporidium.*

(B) If the State determines that significant changes may have occurred in the watershed since the previous watershed sanitary survey, systems must undergo another watershed sanitary survey by a date the State requires, which may be earlier than the regular date in paragraph (a)(5)(ii) of this section.

(iii) The system must make the watershed control plan, annual status reports, and watershed sanitary survey reports available to the public upon request. These documents must be in a plain language style and include criteria by which to evaluate the success of the program in achieving plan goals. The State may approve systems to withhold from the public portions of the annual status report, watershed control plan, and watershed sanitary survey based on water supply security considerations.

(6) If the State determines that a system is not carrying out the approved watershed control plan, the State may withdraw the watershed control program treatment credit.

(b) *Alternative source.* (1) A system may conduct source water monitoring that reflects a different intake location (either in the same source or for an alternate source) or a different procedure for the timing or level of withdrawal from the source (alternative source monitoring). If the State approves, a system may determine its bin classification under § 141.710 based on the alternative source monitoring results.

(2) If systems conduct alternative source monitoring under paragraph (b)(1) of this section, systems must also monitor their current plant intake concurrently as described in § 141.701.

(3) Alternative source monitoring under paragraph (b)(1) of this section must meet the requirements for source monitoring to determine bin classification, as described in §§ 141.701 through 141.706. Systems must report the alternative source monitoring results to the State, along with supporting information documenting the operating conditions under which the samples were collected.

(4) If a system determines its bin classification under § 141.710 using alternative source monitoring results that reflect a different intake location or a different procedure for managing the timing or level of withdrawal from the source, the system must relocate the intake or permanently adopt the withdrawal procedure, as applicable, no later than the applicable treatment compliance date in § 141.713.

§ 141.717 Pre-filtration treatment toolbox components.

(a) *Presedimentation.* Systems receive 0.5-log *Cryptosporidium* treatment credit for a presedimentation basin during any month the process meets the criteria in this paragraph.

(1) The presedimentation basin must be in continuous operation and must treat the entire plant flow taken from a surface water or GWUDI source.

(2) The system must continuously add a coagulant to the presedimentation basin.

(3) The presedimentation basin must achieve the performance criteria in paragraph (3)(i) or (ii) of this section.

(i) Demonstrates at least 0.5-log mean reduction of influent turbidity. This reduction must be determined using daily turbidity measurements in the presedimentation process influent and effluent and must be calculated as follows: $\log_{10}$(monthly mean of daily influent turbidity) $-$ $\log_{10}$(monthly mean of daily effluent turbidity).

(ii) Complies with State-approved performance criteria that demonstrate at least 0.5-log mean removal of micron-sized particulate material through the presedimentation process.

(b) *Two-stage lime softening.* Systems receive an additional 0.5-log *Cryptosporidium* treatment credit for a two-stage lime softening plant if chemical addition and hardness precipitation occur in two separate and sequential softening stages prior to filtration. Both softening stages must treat the entire plant flow taken from a surface water or GWUDI source.

(c) *Bank filtration.* Systems receive *Cryptosporidium* treatment credit for bank filtration that serves as pretreatment to a filtration plant by meeting the criteria in this paragraph. Systems using bank filtration when they begin source water monitoring under § 141.701(a) must collect samples as described in § 141.703(d) and are not eligible for this credit.

(1) Wells with a ground water flow path of at least 25 feet receive 0.5-log treatment credit; wells with a ground water flow path of at least 50 feet receive 1.0-log treatment credit. The ground water flow path must be determined as specified in paragraph (c)(4) of this section.

(2) Only wells in granular aquifers are eligible for treatment credit. Granular aquifers are those comprised

of sand, clay, silt, rock fragments, pebbles or larger particles, and minor cement. A system must characterize the aquifer at the well site to determine aquifer properties. Systems must extract a core from the aquifer and demonstrate that in at least 90 percent of the core length, grains less than 1.0 mm in diameter constitute at least 10 percent of the core material.

(3) Only horizontal and vertical wells are eligible for treatment credit.

(4) For vertical wells, the ground water flow path is the measured distance from the edge of the surface water body under high flow conditions (determined by the 100 year floodplain elevation boundary or by the floodway, as defined in Federal Emergency Management Agency flood hazard maps) to the well screen. For horizontal wells, the ground water flow path is the measured distance from the bed of the river under normal flow conditions to the closest horizontal well lateral screen.

(5) Systems must monitor each wellhead for turbidity at least once every four hours while the bank filtration process is in operation. If monthly average turbidity levels, based on daily maximum values in the well, exceed 1 NTU, the system must report this result to the State and conduct an assessment within 30 days to determine the cause of the high turbidity levels in the well. If the State determines that microbial removal has been compromised, the State may revoke treatment credit until the system implements corrective actions approved by the State to remediate the problem.

(6) Springs and infiltration galleries are not eligible for treatment credit under this section, but are eligible for credit under §141.718(c).

(7) *Bank filtration demonstration of performance*. The State may approve *Cryptosporidium* treatment credit for bank filtration based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than 1.0-log and may be awarded to bank filtration that does not meet the criteria in paragraphs (c)(1)–(5) of this section.

(i) The study must follow a State-approved protocol and must involve the collection of data on the removal of *Cryptosporidium* or a surrogate for *Cryptosporidium* and related hydrogeologic and water quality parameters during the full range of operating conditions.

(ii) The study must include sampling both from the production well(s) and from monitoring wells that are screened and located along the shortest flow path between the surface water source and the production well(s).

§ 141.718 Treatment performance toolbox components.

(a) *Combined filter performance*. Systems using conventional filtration treatment or direct filtration treatment receive an additional 0.5-log *Cryptosporidium* treatment credit during any month the system meets the criteria in this paragraph. Combined filter effluent (CFE) turbidity must be less than or equal to 0.15 NTU in at least 95 percent of the measurements. Turbidity must be measured as described in §141.74(a) and (c).

(b) *Individual filter performance*. Systems using conventional filtration treatment or direct filtration treatment receive 0.5-log *Cryptosporidium* treatment credit, which can be in addition to the 0.5-log credit under paragraph (a) of this section, during any month the system meets the criteria in this paragraph. Compliance with these criteria must be based on individual filter turbidity monitoring as described in §141.174 or §141.560, as applicable.

(1) The filtered water turbidity for each individual filter must be less than or equal to 0.15 NTU in at least 95 percent of the measurements recorded each month.

(2) No individual filter may have a measured turbidity greater than 0.3 NTU in two consecutive measurements taken 15 minutes apart.

(3) Any system that has received treatment credit for individual filter performance and fails to meet the requirements of paragraph (b)(1) or (2) of this section during any month does not receive a treatment technique violation under §141.711(c) if the State determines the following:

(i) The failure was due to unusual and short-term circumstances that could not reasonably be prevented through optimizing treatment plant design, operation, and maintenance.

(ii) The system has experienced no more than two such failures in any calendar year.

(c) *Demonstration of performance.* The State may approve *Cryptosporidium* treatment credit for drinking water treatment processes based on a demonstration of performance study that meets the criteria in this paragraph. This treatment credit may be greater than or less than the prescribed treatment credits in § 141.711 or §§ 141.717 through 141.720 and may be awarded to treatment processes that do not meet the criteria for the prescribed credits.

(1) Systems cannot receive the prescribed treatment credit for any toolbox box option in §§ 141.717 through 141.720 if that toolbox option is included in a demonstration of performance study for which treatment credit is awarded under this paragraph.

(2) The demonstration of performance study must follow a State-approved protocol and must demonstrate the level of *Cryptosporidium* reduction the treatment process will achieve under the full range of expected operating conditions for the system.

(3) Approval by the State must be in writing and may include monitoring and treatment performance criteria that the system must demonstrate and report on an ongoing basis to remain eligible for the treatment credit. The State may designate such criteria where necessary to verify that the conditions under which the demonstration of performance credit was approved are maintained during routine operation.

§ 141.719 Additional filtration toolbox components.

(a) *Bag and cartridge filters.* Systems receive *Cryptosporidium* treatment credit of up to 2.0-log for individual bag or cartridge filters and up to 2.5-log for bag or cartridge filters operated in series by meeting the criteria in paragraphs (a)(1) through (10) of this section. To be eligible for this credit, systems must report the results of challenge testing that meets the requirements of paragraphs (a)(2) through (9) of this section to the State. The filters must treat the entire plant flow taken from a subpart H source.

(1) The *Cryptosporidium* treatment credit awarded to bag or cartridge filters must be based on the removal efficiency demonstrated during challenge testing that is conducted according to the criteria in paragraphs (a)(2) through (a)(9) of this section. A factor of safety equal to 1-log for individual bag or cartridge filters and 0.5-log for bag or cartridge filters in series must be applied to challenge testing results to determine removal credit. Systems may use results from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria specified in paragraphs (a)(2) through (9) of this section.

(2) Challenge testing must be performed on full-scale bag or cartridge filters, and the associated filter housing or pressure vessel, that are identical in material and construction to the filters and housings the system will use for removal of *Cryptosporidium.* Bag or cartridge filters must be challenge tested in the same configuration that the system will use, either as individual filters or as a series configuration of filters.

(3) Challenge testing must be conducted using *Cryptosporidium* or a surrogate that is removed no more efficiently than *Cryptosporidium.* The microorganism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate must be determined using a method capable of discreetly quantifying the specific microorganism or surrogate used in the test; gross measurements such as turbidity may not be used.

(4) The maximum feed water concentration that can be used during a challenge test must be based on the detection limit of the challenge particulate in the filtrate (*i.e.*, filtrate detection limit) and must be calculated using the following equation:

$$\text{Maximum Feed Concentration} = 1 \times 10^4 \times (\text{Filtrate Detection Limit})$$

(5) Challenge testing must be conducted at the maximum design flow rate for the filter as specified by the manufacturer.

(6) Each filter evaluated must be tested for a duration sufficient to reach 100 percent of the terminal pressure

drop, which establishes the maximum pressure drop under which the filter may be used to comply with the requirements of this subpart.

(7) Removal efficiency of a filter must be determined from the results of the challenge test and expressed in terms of log removal values using the following equation:

$$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during challenge testing; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. In applying this equation, the same units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, then the term C_p must be set equal to the detection limit.

(8) Each filter tested must be challenged with the challenge particulate during three periods over the filtration cycle: within two hours of start-up of a new filter; when the pressure drop is between 45 and 55 percent of the terminal pressure drop; and at the end of the cycle after the pressure drop has reached 100 percent of the terminal pressure drop. An LRV must be calculated for each of these challenge periods for each filter tested. The LRV for the filter (LRV_{filter}) must be assigned the value of the minimum LRV observed during the three challenge periods for that filter.

(9) If fewer than 20 filters are tested, the overall removal efficiency for the filter product line must be set equal to the lowest LRV_{filter} among the filters tested. If 20 or more filters are tested, the overall removal efficiency for the filter product line must be set equal to the 10th percentile of the set of LRV_{filter} values for the various filters tested. The percentile is defined by (i/(n + 1)) where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(10) If a previously tested filter is modified in a manner that could change the removal efficiency of the filter product line, challenge testing to demonstrate the removal efficiency of the modified filter must be conducted and submitted to the State.

(b) *Membrane filtration*. (1) Systems receive *Cryptosporidium* treatment credit for membrane filtration that meets the criteria of this paragraph. Membrane cartridge filters that meet the definition of membrane filtration in § 141.2 are eligible for this credit. The level of treatment credit a system receives is equal to the lower of the values determined under paragraph (b)(1)(i) and (ii) of this section.

(i) The removal efficiency demonstrated during challenge testing conducted under the conditions in paragraph (b)(2) of this section.

(ii) The maximum removal efficiency that can be verified through direct integrity testing used with the membrane filtration process under the conditions in paragraph (b)(3) of this section.

(2) *Challenge testing*. The membrane used by the system must undergo challenge testing to evaluate removal efficiency, and the system must report the results of challenge testing to the State. Challenge testing must be conducted according to the criteria in paragraphs (b)(2)(i) through (vii) of this section. Systems may use data from challenge testing conducted prior to January 5, 2006 if the prior testing was consistent with the criteria in paragraphs (b)(2)(i) through (vii) of this section.

(i) Challenge testing must be conducted on either a full-scale membrane module, identical in material and construction to the membrane modules used in the system's treatment facility, or a smaller-scale membrane module, identical in material and similar in construction to the full-scale module. A module is defined as the smallest component of a membrane unit in which a specific membrane surface area is housed in a device with a filtrate outlet structure.

(ii) Challenge testing must be conducted using *Cryptosporidium* oocysts or a surrogate that is removed no more efficiently than *Cryptosporidium* oocysts. The organism or surrogate used during challenge testing is referred to as the challenge particulate. The concentration of the challenge particulate, in both the feed and filtrate water, must be determined using a method capable of discretely quantifying the specific challenge particulate used in the test; gross measurements such as turbidity may not be used.

(iii) The maximum feed water concentration that can be used during a challenge test is based on the detection limit of the challenge particulate in the filtrate and must be determined according to the following equation:

$$\text{Maximum Feed Concentration} = 3.16 \times 10^6 \times (\text{Filtrate Detection Limit})$$

(iv) Challenge testing must be conducted under representative hydraulic conditions at the maximum design flux and maximum design process recovery specified by the manufacturer for the membrane module. Flux is defined as the throughput of a pressure driven membrane process expressed as flow per unit of membrane area. Recovery is defined as the volumetric percent of feed water that is converted to filtrate over the course of an operating cycle uninterrupted by events such as chemical cleaning or a solids removal process (*i.e.*, backwashing).

(v) Removal efficiency of a membrane module must be calculated from the challenge test results and expressed as a log removal value according to the following equation:

$$LRV = LOG_{10}(C_f) - LOG_{10}(C_p)$$

Where:

LRV = log removal value demonstrated during the challenge test; C_f = the feed concentration measured during the challenge test; and C_p = the filtrate concentration measured during the challenge test. Equivalent units must be used for the feed and filtrate concentrations. If the challenge particulate is not detected in the filtrate, the term C_p is set equal to the detection limit for the purpose of calculating the LRV. An LRV must be calculated for each membrane module evaluated during the challenge test.

(vi) The removal efficiency of a membrane filtration process demonstrated during challenge testing must be expressed as a log removal value ($LRV_{C\text{-}Test}$). If fewer than 20 modules are tested, then $LRV_{C\text{-}Test}$ is equal to the lowest of the representative LRVs among the modules tested. If 20 or more modules are tested, then $LRV_{C\text{-}Test}$ is equal to the 10th percentile of the representative LRVs among the modules tested. The percentile is defined by $(i/(n + 1))$ where i is the rank of n individual data points ordered lowest to highest. If necessary, the 10th percentile may be calculated using linear interpolation.

(vii) The challenge test must establish a quality control release value (QCRV) for a non-destructive performance test that demonstrates the *Cryptosporidium* removal capability of the membrane filtration module. This performance test must be applied to each production membrane module used by the system that was not directly challenge tested in order to verify *Cryptosporidium* removal capability. Production modules that do not meet the established QCRV are not eligible for the treatment credit demonstrated during the challenge test.

(viii) If a previously tested membrane is modified in a manner that could change the removal efficiency of the membrane or the applicability of the non-destructive performance test and associated QCRV, additional challenge testing to demonstrate the removal efficiency of, and determine a new QCRV for, the modified membrane must be conducted and submitted to the State.

(3) *Direct integrity testing.* Systems must conduct direct integrity testing in a manner that demonstrates a removal efficiency equal to or greater than the removal credit awarded to the membrane filtration process and meets the requirements described in paragraphs (b)(3)(i) through (vi) of this section. A direct integrity test is defined as a physical test applied to a membrane unit in order to identify and isolate integrity breaches (*i.e.*, one or more leaks that could result in contamination of the filtrate).

(i) The direct integrity test must be independently applied to each membrane unit in service. A membrane unit is defined as a group of membrane modules that share common valving that allows the unit to be isolated from the rest of the system for the purpose of integrity testing or other maintenance.

(ii) The direct integrity method must have a resolution of 3 micrometers or less, where resolution is defined as the size of the smallest integrity breach that contributes to a response from the direct integrity test.

(iii) The direct integrity test must have a sensitivity sufficient to verify the log treatment credit awarded to the membrane filtration process by the State, where sensitivity is defined as the maximum log removal value that can be reliably verified by a direct integrity test. Sensitivity must be determined using the approach in either paragraph (b)(3)(iii)(A) or (B) of this section as applicable to the type of direct integrity test the system uses.

(A) For direct integrity tests that use an applied pressure or vacuum, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = LOG_{10}\ (Q_p\ /(VCF \times Q_{breach}))$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test; Q_p = total design filtrate flow from the membrane unit; Q_{breach} = flow of water from an integrity breach associated with the smallest integrity test response that can be reliably measured, and VCF = volumetric concentration factor. The volumetric concentration factor is the ratio of the suspended solids concentration on the high pressure side of the membrane relative to that in the feed water.

(B) For direct integrity tests that use a particulate or molecular marker, the direct integrity test sensitivity must be calculated according to the following equation:

$$LRV_{DIT} = LOG_{10}(C_f) - LOG_{10}(C_p)$$

Where:

LRV_{DIT} = the sensitivity of the direct integrity test; C_f = the typical feed concentration of the marker used in the test; and C_p = the filtrate concentration of the marker from an integral membrane unit.

(iv) Systems must establish a control limit within the sensitivity limits of the direct integrity test that is indicative of an integral membrane unit capable of meeting the removal credit awarded by the State.

(v) If the result of a direct integrity test exceeds the control limit established under paragraph (b)(3)(iv) of this section, the system must remove the membrane unit from service. Systems must conduct a direct integrity test to verify any repairs, and may return the membrane unit to service only if the direct integrity test is within the established control limit.

(vi) Systems must conduct direct integrity testing on each membrane unit at a frequency of not less than once each day that the membrane unit is in operation. The State may approve less frequent testing, based on demonstrated process reliability, the use of multiple barriers effective for *Cryptosporidium*, or reliable process safeguards.

(4) *Indirect integrity monitoring*. Systems must conduct continuous indirect integrity monitoring on each membrane unit according to the criteria in paragraphs (b)(4)(i) through (v) of this section. Indirect integrity monitoring is defined as monitoring some aspect of filtrate water quality that is indicative of the removal of particulate matter. A system that implements continuous direct integrity testing of membrane units in accordance with the criteria in paragraphs (b)(3)(i) through (v) of this section is not subject to the requirements for continuous indirect integrity monitoring. Systems must submit a monthly report to the State summarizing all continuous indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken in each case.

(i) Unless the State approves an alternative parameter, continuous indirect integrity monitoring must include continuous filtrate turbidity monitoring.

(ii) Continuous monitoring must be conducted at a frequency of no less than once every 15 minutes.

(iii) Continuous monitoring must be separately conducted on each membrane unit.

(iv) If indirect integrity monitoring includes turbidity and if the filtrate turbidity readings are above 0.15 NTU for a period greater than 15 minutes (*i.e.*, two consecutive 15-minute readings above 0.15 NTU), direct integrity testing must immediately be performed on the associated membrane unit as specified in paragraphs (b)(3)(i) through (v) of this section.

(v) If indirect integrity monitoring includes a State-approved alternative parameter and if the alternative parameter exceeds a State-approved control limit for a period greater than 15 minutes, direct integrity testing must immediately be performed on the associated membrane units as specified in paragraphs (b)(3)(i) through (v) of this section.

(c) *Second stage filtration.* Systems receive 0.5-log *Cryptosporidium* treatment credit for a separate second stage of filtration that consists of sand, dual media, GAC, or other fine grain media following granular media filtration if the State approves. To be eligible for this credit, the first stage of filtration must be preceded by a coagulation step and both filtration stages must treat the entire plant flow taken from a surface water or GWUDI source. A cap, such as GAC, on a single stage of filtration is not eligible for this credit. The State must approve the treatment credit based on an assessment of the design characteristics of the filtration process.

(d) *Slow sand filtration (as secondary filter).* Systems are eligible to receive 2.5-log *Cryptosporidium* treatment credit for a slow sand filtration process that follows a separate stage of filtration if both filtration stages treat entire plant flow taken from a surface water or GWUDI source and no disinfectant residual is present in the influent water to the slow sand filtration process. The State must approve the treatment credit based on an assessment of the design characteristics of the filtration process. This paragraph does not apply to treatment credit awarded to slow sand filtration used as a primary filtration process.

[71 FR 769, Jan. 5, 2006; 71 FR 6136, Feb. 6, 2006]

§ 141.720 Inactivation toolbox components.

(a) *Calculation of CT values.* (1) CT is the product of the disinfectant contact time (T, in minutes) and disinfectant concentration (C, in milligrams per liter). Systems with treatment credit for chlorine dioxide or ozone under paragraph (b) or (c) of this section must calculate CT at least once each day, with both C and T measured during peak hourly flow as specified in §§ 141.74(a) through (b).

(2) Systems with several disinfection segments in sequence may calculate CT for each segment, where a disinfection segment is defined as a treatment unit process with a measurable disinfectant residual level and a liquid volume. Under this approach, systems must add the *Cryptosporidium* CT values in each segment to determine the total CT for the treatment plant.

(b) *CT values for chlorine dioxide and ozone.* (1) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding chlorine dioxide CT value for the applicable water temperature, as described in paragraph (a) of this section.

CT VALUES (MG·MIN/L) FOR *Cryptosporidium* INACTIVATION BY CHLORINE DIOXIDE [1]

Log credit	Water Temperature, °C										
	≤0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	159	153	140	128	107	90	69	45	29	19	12
(ii) 0.5	319	305	279	256	214	180	138	89	58	38	24
(iii) 1.0	637	610	558	511	429	360	277	179	116	75	49
(iv) 1.5	956	915	838	767	643	539	415	268	174	113	73
(v) 2.0	1275	1220	1117	1023	858	719	553	357	232	150	98
(vi) 2.5	1594	1525	1396	1278	1072	899	691	447	289	188	122
(vii) 3.0	1912	1830	1675	1534	1286	1079	830	536	347	226	147

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = $(0.001506 \times (1.09116)^{Temp}) \times CT$.

(2) Systems receive the *Cryptosporidium* treatment credit listed in this table by meeting the corresponding ozone CT values for the applicable water temperature, as described in paragraph (a) of this section.

CT VALUES (MG·MIN/L) FOR *Cryptosporidium* INACTIVATION BY OZONE [1]

Log credit	Water Temperature, °C										
	≤0.5	1	2	3	5	7	10	15	20	25	30
(i) 0.25	6.0	5.8	5.2	4.8	4.0	3.3	2.5	1.6	1.0	0.6	0.39
(ii) 0.5	12	12	10	9.5	7.9	6.5	4.9	3.1	2.0	1.2	0.78
(iii) 1.0	24	23	21	19	16	13	9.9	6.2	3.9	2.5	1.6
(iv) 1.5	36	35	31	29	24	20	15	9.3	5.9	3.7	2.4
(v) 2.0	48	46	42	38	32	26	20	12	7.8	4.9	3.1
(vi) 2.5	60	58	52	48	40	33	25	16	9.8	6.2	3.9
(vii) 3.0	72	69	63	57	47	39	30	19	12	7.4	4.7

[1] Systems may use this equation to determine log credit between the indicated values: Log credit = $(0.0397 \times (1.09757)^{Temp}) \times$ CT.

(c) *Site-specific study*. The State may approve alternative chlorine dioxide or ozone CT values to those listed in paragraph (b) of this section on a site-specific basis. The State must base this approval on a site-specific study a system conducts that follows a State-approved protocol.

(d) *Ultraviolet light*. Systems receive *Cryptosporidium*, *Giardia lamblia*, and virus treatment credits for ultraviolet (UV) light reactors by achieving the corresponding UV dose values shown in paragraph (d)(1) of this section. Systems must validate and monitor UV reactors as described in paragraphs (d)(2) and (3) of this section to demonstrate that they are achieving a particular UV dose value for treatment credit.

(1) *UV dose table*. The treatment credits listed in this table are for UV light at a wavelength of 254 nm as produced by a low pressure mercury vapor lamp. To receive treatment credit for other lamp types, systems must demonstrate an equivalent germicidal dose through reactor validation testing, as described in paragraph (d)(2) of this section. The UV dose values in this table are applicable only to post-filter applications of UV in filtered systems and to unfiltered systems.

UV DOSE TABLE FOR *Cryptosporidium, Giardia lamblia,* AND VIRUS INACTIVATION CREDIT

Log credit	*Cryptosporidium* UV dose (mJ/cm ^{2})	*Giardia lamblia* UV dose (mJ/cm ^{2})	Virus UV dose (mJ/cm ^{2})
(i) 0.5	1.6	1.5	39
(ii) 1.0	2.5	2.1	58
(iii) 1.5	3.9	3.0	79
(iv) 2.0	5.8	5.2	100
(v) 2.5	8.5	7.7	121
(vi) 3.0	12	11	143
(vii) 3.5	15	15	163
(viii) 4.0	22	22	186

(2) *Reactor validation testing*. Systems must use UV reactors that have undergone validation testing to determine the operating conditions under which the reactor delivers the UV dose required in paragraph (d)(1) of this section (*i.e.*, validated operating conditions). These operating conditions must include flow rate, UV intensity as measured by a UV sensor, and UV lamp status.

(i) When determining validated operating conditions, systems must account for the following factors: UV absorbance of the water; lamp fouling and aging; measurement uncertainty of on-line sensors; UV dose distributions arising from the velocity profiles through the reactor; failure of UV lamps or other critical system components; and inlet and outlet piping or channel configurations of the UV reactor.

(ii) Validation testing must include the following: Full scale testing of a reactor that conforms uniformly to the UV reactors used by the system and inactivation of a test microorganism whose dose response characteristics have been quantified with a low pressure mercury vapor lamp.

(iii) The State may approve an alternative approach to validation testing.

(3) *Reactor monitoring.* (i) Systems must monitor their UV reactors to determine if the reactors are operating within validated conditions, as determined under paragraph (d)(2) of this section. This monitoring must include UV intensity as measured by a UV sensor, flow rate, lamp status, and other parameters the State designates based on UV reactor operation. Systems must verify the calibration of UV sensors and must recalibrate sensors in accordance with a protocol the State approves.

(ii) To receive treatment credit for UV light, systems must treat at least 95 percent of the water delivered to the public during each month by UV reactors operating within validated conditions for the required UV dose, as described in paragraphs (d)(1) and (2) of this section. Systems must demonstrate compliance with this condition by the monitoring required under paragraph (d)(3)(i) of this section.

REPORTING AND RECORDKEEPING REQUIREMENTS

§ 141.721 Reporting requirements.

(a) Systems must report sampling schedules under § 141.702 and source water monitoring results under § 141.706 unless they notify the State that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d).

(b) Systems must report the use of uncovered finished water storage facilities to the State as described in § 141.714.

(c) Filtered systems must report their *Cryptosporidium* bin classification as described in § 141.710.

(d) Unfiltered systems must report their mean source water *Cryptosporidium* level as described in § 141.712.

(e) Systems must report disinfection profiles and benchmarks to the State as described in §§ 141.708 through 141.709 prior to making a significant change in disinfection practice.

(f) Systems must report to the State in accordance with the following table for any microbial toolbox options used to comply with treatment requirements under § 141.711 or § 141.712. Alternatively, the State may approve a system to certify operation within required parameters for treatment credit rather than reporting monthly operational data for toolbox options.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS

Toolbox option	Systems must submit the following information	On the following schedule
(1) Watershed control program (WCP).	(i) Notice of intention to develop a new or continue an existing watershed control program.	No later than two years before the applicable treatment compliance date in § 141.713
	(ii) Watershed control plan	No later than one year before the applicable treatment compliance date in § 141.713.
	(iii) Annual watershed control program status report.	Every 12 months, beginning one year after the applicable treatment compliance date in § 141.713.
	(iv) Watershed sanitary survey report	For community water systems, every three years beginning three years after the applicable treatment compliance date in § 141.713. For noncommunity water systems, every five years beginning five years after the applicable treatment compliance date in § 141.713.
(2) Alternative source/intake management.	Verification that system has relocated the intake or adopted the intake withdrawal procedure reflected in monitoring results.	No later than the applicable treatment compliance date in § 141.713.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS—Continued

Toolbox option	Systems must submit the following information	On the following schedule
(3) Presedimentation	Monthly verification of the following: (i) Continuous basin operation (ii) Treatment of 100% of the flow (iii) Continuous addition of a coagulant (iv) At least 0.5-log mean reduction of influent turbidity or compliance with alternative State-approved performance criteria.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(4) Two-stage lime softening	Monthly verification of the following: (i) Chemical addition and hardness precipitation occurred in two separate and sequential softening stages prior to filtration (ii) Both stages treated 100% of the plant flow.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(5) Bank filtration	(i) Initial demonstration of the following: (A) Unconsolidated, predominantly sandy aquifer (B) Setback distance of at least 25 ft. (0.5-log credit) or 50 ft. (1.0-log credit).	No later than the applicable treatment compliance date in § 141.713.
	(ii) If monthly average of daily max turbidity is greater than 1 NTU then system must report result and submit an assessment of the cause..	Report within 30 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(6) Combined filter performance	Monthly verification of combined filter effluent (CFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of the 4 hour CFE measurements taken each month.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(7) Individual filter performance	Monthly verification of the following: (i) Individual filter effluent (IFE) turbidity levels less than or equal to 0.15 NTU in at least 95 percent of samples each month in each filter (ii) No individual filter greater than 0.3 NTU in two consecutive readings 15 minutes apart.	Monthly reporting within 10 days following the month in which the monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.]
(8) Demonstration of performance	(i) Results from testing following a State approved protocol.	No later than the applicable treatment compliance date in § 141.713.
	(ii) As required by the State, monthly verification of operation within conditions of State approval for demonstration of performance credit.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(9) Bag filters and cartridge filters	(i) Demonstration that the following criteria are met: (A) Process meets the definition of bag or cartridge filtration; (B) Removal efficiency established through challenge testing that meets criteria in this subpart.	No later than the applicable treatment compliance date in § 141.713.
	(ii) Monthly verification that 100% of plant flow was filtered.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(10) Membrane filtration	(i) Results of verification testing demonstrating the following: (A) Removal efficiency established through challenge testing that meets criteria in this subpart; (B) Integrity test method and parameters, including resolution, sensitivity, test frequency, control limits, and associated baseline.	No later than the applicable treatment compliance date in § 141.713.
	(ii) Monthly report summarizing the following: (A) All direct integrity tests above the control limit; (B) If applicable, any turbidity or alternative state-approved indirect integrity monitoring results triggering direct integrity testing and the corrective action that was taken.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(11) Second stage filtration	Monthly verification that 100% of flow was filtered through both stages and that first stage was preceded by coagulation step.	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.

MICROBIAL TOOLBOX REPORTING REQUIREMENTS—Continued

Toolbox option	Systems must submit the following information	On the following schedule
(12) Slow sand filtration (as secondary filter).	Monthly verification that both a slow sand filter and a preceding separate stage of filtration treated 100% of flow from subpart H sources..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(13) Chlorine dioxide	Summary of CT values for each day as described in § 141.720..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(14) Ozone	Summary of CT values for each day as described in § 141.720..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.
(15) UV	(i) Validation test results demonstrating operating conditions that achieve required UV dose.	No later than the applicable treatment compliance date in § 141.713.
	(ii) Monthly report summarizing the percentage of water entering the distribution system that was not treated by UV reactors operating within validated conditions for the required dose as specified in 141.720(d)..	Within 10 days following the month in which monitoring was conducted, beginning on the applicable treatment compliance date in § 141.713.

§ 141.722 Recordkeeping requirements.

(a) Systems must keep results from the initial round of source water monitoring under § 141.701(a) and the second round of source water monitoring under § 141.701(b) until 3 years after bin classification under § 141.710 for filtered systems or determination of the mean *Cryptosporidium* level under § 141.710 for unfiltered systems for the particular round of monitoring.

(b) Systems must keep any notification to the State that they will not conduct source water monitoring due to meeting the criteria of § 141.701(d) for 3 years.

(c) Systems must keep the results of treatment monitoring associated with microbial toolbox options under §§ 141.716 through 141.720 and with uncovered finished water reservoirs under § 141.714, as applicable, for 3 years.

REQUIREMENTS FOR SANITARY SURVEYS PERFORMED BY EPA

§ 141.723 Requirements to respond to significant deficiencies identified in sanitary surveys performed by EPA.

(a) A sanitary survey is an onsite review of the water source (identifying sources of contamination by using results of source water assessments where available), facilities, equipment, operation, maintenance, and monitoring compliance of a PWS to evaluate the adequacy of the PWS, its sources and operations, and the distribution of safe drinking water.

(b) For the purposes of this section, a significant deficiency includes a defect in design, operation, or maintenance, or a failure or malfunction of the sources, treatment, storage, or distribution system that EPA determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers.

(c) For sanitary surveys performed by EPA, systems must respond in writing to significant deficiencies identified in sanitary survey reports no later than 45 days after receipt of the report, indicating how and on what schedule the system will address significant deficiencies noted in the survey.

(d) Systems must correct significant deficiencies identified in sanitary survey reports according to the schedule approved by EPA, or if there is no approved schedule, according to the schedule reported under paragraph (c) of this section if such deficiencies are within the control of the system.

Subpart X—Aircraft Drinking Water Rule

SOURCE: 74 FR 53618, Oct. 19, 2009, unless otherwise noted.

§ 141.800 Applicability and compliance date.

(a) *Applicability.* The requirements of this subpart constitute the National Primary Drinking Water Regulations for aircraft that are public water systems and that board only finished water for human consumption. Aircraft public water systems are considered transient non-community water systems (TNCWS). To the extent there is a conflict between the requirements in this subpart and the regulatory requirements established elsewhere in this part, this subpart governs.

(b) *Compliance date.* Aircraft public water systems must comply, unless otherwise noted, with the requirements of this subpart beginning October 19, 2011. Until this compliance date, air carriers remain subject to existing national primary drinking water regulations.

§ 141.801 Definitions.

As used in this subpart, the term:

Administrator means the Administrator of the United States Environmental Protection Agency or his/her authorized representative.

Air carrier means a person who undertakes directly by lease, or other arrangement, to engage in air transportation. The air carrier is responsible for ensuring all of the aircraft it owns or operates that are public water systems comply with all provisions of this subpart.

Aircraft means a device that is used or intended to be used for flight in the air.

Aircraft water system means an aircraft that qualifies as a public water system under the Safe Drinking Water Act and the national primary drinking water regulations. The components of an aircraft water system include the water service panel, the filler neck of the aircraft finished water storage tank, and all finished water storage tanks, piping, treatment equipment, and plumbing fixtures within the aircraft that supply water for human consumption to passengers or crew.

Aircraft water system operations and maintenance plan means the schedules and procedures for operating, monitoring, and maintaining an aircraft water system that is included in an aircraft operation and maintenance program accepted by the Federal Aviation Administration. (14 CFR part 43, 14 CFR part 91, 14 CFR part 121)

Finished water means water that is introduced into the distribution system of a public water system and is intended for distribution and consumption without further treatment, except as treatment necessary to maintain water quality in the distribution system (e.g., supplemental disinfection, addition of corrosion control chemicals). (40 CFR 141.2)

Human consumption means drinking, bathing, showering, hand washing, teeth brushing, food preparation, dishwashing, and maintaining oral hygiene.

Self inspection means an onsite review of the aircraft water system, including the water service panel, the filler neck of the aircraft finished water storage tank; all finished water storage tanks, piping, treatment equipment, and plumbing fixtures; and a review of the aircraft operations, maintenance, monitoring, and recordkeeping for the purpose of evaluating the adequacy of such water system components and practices for providing safe drinking water to passengers and crew.

Watering point means the water supply, methods, and facilities used for the delivery of finished water to the aircraft. These facilities may include water trucks, carts, cabinets, and hoses.

§ 141.802 Coliform sampling plan.

(a) Each air carrier under this subpart must develop a coliform sampling plan covering each aircraft water system owned or operated by the air carrier that identifies the following:

(1) Coliform sample collection procedures that are consistent with the requirements of § 141.803(a) and (b).

(2) Sample tap location(s) representative of the aircraft water system as specified in § 141.803(b)(2) and (b)(4).

(3) Frequency and number of routine coliform samples to be collected as specified in § 141.803(b)(3).

(4) Frequency of routine disinfection and flushing as specified in the operations and maintenance plan under § 141.804.

(5) Procedures for communicating sample results promptly so that any

required actions, including repeat and follow-up sampling, corrective action, and notification of passengers and crew, will be conducted in a timely manner.

(b) Each air carrier must develop a coliform sampling plan for each aircraft with a water system meeting the definition of a public water system by April 19, 2011.

(c) The coliform sampling plan must be included in the Aircraft Water System Operations and Maintenance Plan required in § 141.804. Any subsequent changes to the coliform sampling plan must also be included in the Aircraft Water System Operations and Maintenance Plan required in § 141.804.

§ 141.803 Coliform sampling.

(a) *Analytical methodology.* Air carriers must follow the sampling and analysis requirements under this section.

(1) The standard sample volume required for total coliform analysis, regardless of analytical method used, is 100 mL.

(2) Air carriers need determine only the presence or absence of total coliforms and/or *E. coli*; a determination of density of these organisms is not required.

(3) Air carriers must conduct analyses for total coliform and *E. coli* in accordance with the analytical methods approved in § 141.21(f)(3) and 141.21(f)(6)) until March 31, 2016, and in accordance with the analytical methods approved in § 141.852 beginning April 1, 2016.

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

(5) The invalidation of a total coliform sample result can be made only by the Administrator in accordance with § 141.21(c)(1)(i), (ii), or (iii) or by the certified laboratory in accordance with § 141.21(c)(2) until March 31, 2016, or in accordance with § 141.853(c) beginning April 1, 2016, with the Administrator acting as the State.

(6) *Certified laboratories.* For the purpose of determining compliance with this subpart, samples may be considered only if they have been analyzed by a laboratory certified by a State or EPA. For the purposes of this paragraph, ''State'' refers to a State or Tribe that has received primacy for public water systems (other than aircraft water systems) under section 1413 of SDWA.

(b) *Routine monitoring.* For each aircraft water system, the sampling frequency must be determined by the disinfection and flushing frequency recommended by the aircraft water system manufacturer, when available, and as identified in the operations and maintenance plan in § 141.804.

(1) Except as provided in paragraph (b)(2) of this section, the air carrier must collect two 100 mL total coliform routine samples at the frequency specified in the sampling plan in § 141.802 and in accordance with paragraph (b)(3) of this section;

(2) The air carrier may collect one 100 mL total coliform routine sample at the frequency specified in the sampling plan in § 141.802 for aircraft with a removable or portable tank that is drained every day of passenger service, and the aircraft has only one tap. Aircraft meeting the requirements of this paragraph do not have to comply with paragraph (b)(4) of this section.

(3) Air carriers must perform routine monitoring for total coliform at a frequency corresponding to the frequency of routine disinfection and flushing as specified in the Table b–1 (Routine Disinfection and Flushing and Routine Sample Frequencies). Air carriers must follow the disinfection and flushing frequency recommended by the aircraft water system manufacturer, when available. Where the aircraft water system manufacturer does not specify a recommended routine disinfection and flushing frequency, the air carrier must choose a frequency from Table b–1 (Routine Disinfection and Flushing and Routine Sample Frequencies):

TABLE B–1—ROUTINE DISINFECTION AND FLUSHING AND ROUTINE SAMPLE FREQUENCIES

Minimum routine disinfection & flushing per aircraft	Minimum frequency of routine samples per aircraft
At least 4 times per year = At least once within every three-month period (quarterly).	At least 1 time per year = At least once within every twelve-month period (annually).
At least 3 times per year = At least once within every four-month period.	At least 2 times per year = At least once within every six-month period (semi-annually).
At least 2 times per year = At least once within every six-month period (semi-annually).	At least 4 times per year = At least once within every three-month period (quarterly).
At least 1 time per year or less = At least once within every twelve-month period (annually) or less.	At least 12 times per year = At least once every month (monthly).

(4) One sample must be taken from a lavatory and one from a galley; each sample must be analyzed for total coliform. If only one water tap is located in the aircraft water system due to aircraft model type and construction, then a single tap may be used to collect two separate 100 mL samples.

(5) If any routine, repeat, or follow-up coliform sample is total coliform-positive, the air carrier must analyze that total coliform-positive culture medium to determine if *E. coli* is present.

(6) Routine total coliform samples must not be collected within 72 hours after completing routine disinfection and flushing procedures.

(c) *Routine coliform sample results*—(1) *Negative routine coliform sample results.* If all routine sample results are total coliform-negative, then the air carrier must maintain the routine monitoring frequency for total coliform as specified in the sampling plan in §141.802.

(2) *Positive routine E. coli sample results.* If any routine sample is *E. coli*-positive, the air carrier must perform all of the following:

(i) *Restrict public access.* Restrict public access to the aircraft water system in accordance with paragraph (d) of this section as expeditiously as possible, but in no case later than 24 hours after the laboratory notifies the air carrier of the *E. coli*-positive result or discovery of the applicable failure as specified in paragraphs (g) and (h) of this section. All public access restrictions, including applicable public notification requirements, must remain in-place until the aircraft water system has been disinfected and flushed and a complete set of follow-up samples is total coliform-negative; and

(ii) *Disinfect and flush.* Conduct disinfection and flushing in accordance with §141.804(b)(2). If the aircraft water system cannot be physically disconnected or shut-off, or the flow of water otherwise prevented through the tap(s), then the air carrier must disinfect and flush the system no later than 72 hours after the laboratory notifies the air carrier of the *E. coli*-positive result or discovery of the applicable failure as specified in paragraphs (g) and (h) of this section; and

(iii) *Follow-up sampling.* Collect follow-up samples in accordance with paragraph (e) of this section. A complete set of follow-up sample results must be total coliform-negative before the air carrier provides water for human consumption from the aircraft water system and returns to the routine monitoring frequency as specified in the sampling plan required by §141.802.

(3) *Positive routine total coliform sample results.* If any routine sample is total coliform-positive and *E. coli*-negative, then the air carrier must perform at least one of the following three corrective actions and continue through with that action until a complete set of follow-up or repeat samples is total coliform-negative:

(i) *Disinfect and flush.* In accordance with §141.804(b)(2), conduct disinfection and flushing of the system no later than 72 hours after the laboratory notifies the air carrier of the total coliform-positive and *E. coli*-negative result. After disinfection and flushing is completed, the air carrier must collect follow-up samples in accordance with paragraph (e) of this section prior to providing water for human consumption from the aircraft water system. A complete set of follow-up sample results must be total coliform-negative before the air carrier returns to the routine monitoring frequency as specified in the sampling plan required by §141.802; or

(ii) *Restrict public access.* In accordance with paragraph (d) of this section, restrict public access to the aircraft water system as expeditiously as possible, but in no case later than 72 hours after the laboratory notifies the air carrier of the total coliform-positive and *E. coli*-negative result or discovery of the applicable failure as specified in paragraphs (f), (g), and, (i) of this section. All public access restrictions, including applicable public notification requirements, must remain in-place until the aircraft water system has been disinfected and flushed, and a complete set of follow-up samples has been collected. The air carrier must conduct disinfection and flushing in accordance with §141.804(b)(2). After disinfection and flushing is completed, the air carrier must collect follow-up samples in accordance with paragraph (e) of this section prior to providing water for human consumption from the aircraft water system. A complete set of follow-up sample results must be total coliform-negative before the air carrier returns to the routine monitoring frequency as specified in the sampling plan required by §141.802; or

(iii) *Repeat sampling.* Collect three 100 mL repeat samples no later than 24 hours after the laboratory notifies the air carrier of the routine total coliform-positive and *E. coli*-negative result. Repeat samples must be collected and analyzed from three taps within the aircraft as follows: The tap which resulted in the total coliform-positive sample, one other lavatory tap, and one other galley tap. If fewer than three taps exist, then a total of three 100 mL samples must be collected and analyzed from the available taps within the aircraft water system.

(A) If all repeat samples are total coliform-negative, then the air carrier must maintain the routine monitoring frequency for total coliform as specified in the sampling plan in §141.802.

(B) If any repeat sample is *E. coli*-positive, the air carrier must perform all the corrective actions as specified in paragraphs (c)(2)(i), (c)(2)(ii), and (c)(2)(iii) of this section.

(C) If any repeat sample is total coliform-positive and *E. coli*-negative, then the air carrier must perform the corrective actions specified in paragraphs (c)(3)(i) or (c)(3)(ii) of this section, and continue through with that action until a complete set of follow-up samples is total coliform-negative.

(d) *Restriction of public access.* Restriction of public access to the aircraft water system includes, but need not be limited to, the following:

(1) Physically disconnecting or shutting off the aircraft water system, where feasible, or otherwise preventing the flow of water through the tap(s);

(2) Providing public notification to passengers and crew in accordance with §141.805.

(3) Providing alternatives to water from the aircraft water system, such as bottled water for drinking and coffee or tea preparation; antiseptic hand gels or wipes in accordance with 21 CFR part 333—''Topical Anti-microbial Drug Products for Over-the-Counter Human Use'' in the galleys and lavatories; and other feasible measures that reduce or eliminate the need to use the aircraft water system during the limited period before public use of the aircraft water system is unrestricted.

(e) *Post disinfection and flushing follow-up sampling.* Following corrective action disinfection and flushing, air carriers must comply with post disinfection and flushing follow-up sampling procedures that, at a minimum, consist of the following:

(1) For each aircraft water system, the air carrier must collect a complete set of total coliform follow-up samples consisting of two 100 mL total coliform samples at the same routine sample locations as identified in paragraphs (b)(2) and (b)(4) of this section.

(2) Follow-up samples must be collected prior to providing water to the public for human consumption from the aircraft water system.

(3) If a complete set of follow-up samples is total coliform-negative, the air carrier must return to the routine monitoring frequency for total coliform as specified in the sampling plan required by §141.802.

(4) If any follow-up sample is *E. coli*-positive, the air carrier must perform all the corrective actions as specified

in paragraphs (c)(2)(i), (c)(2)(ii), and (c)(2)(iii) of this section.

(5) If any follow-up sample is total coliform-positive and *E. coli*-negative the air carrier must restrict public access to the aircraft water system in accordance with paragraph (d) of this section as expeditiously as possible, but in no case later than 72 hours after the laboratory notifies the air carrier of the total coliform-positive and *E. coli*-negative result. All public access restrictions, including applicable public notification requirements, must remain in-place until the aircraft water system has been disinfected and flushed in accordance with §141.804(b)(2) and a complete set of follow-up samples is total coliform-negative. The air carrier must collect follow-up samples in accordance with paragraph (e) of this section. A complete set of follow-up sample results must be total coliform-negative before the air carrier provides water for human consumption from the aircraft water system and returns to the routine monitoring frequency for coliform as specified in §141.802.

(f) *Failure to perform required routine disinfection and flushing or failure to collect required routine samples.* If the air carrier fails to perform routine disinfection and flushing or fails to collect and analyze the required number of routine coliform samples, the air carrier must perform all the corrective actions as specified in paragraph (c)(3)(ii) of this section.

(g) *Failure to collect repeat or follow-up samples.* If the air carrier fails to collect and analyze the required follow-up samples as a result of an *E. coli*-positive result, then the air carrier must perform all the corrective actions as specified in paragraphs (c)(2)(i), (c)(2)(ii), and (c)(2)(iii) of this section. If the air carrier fails to collect and analyze the required repeat samples or follow-up samples as a result of a total coliform-positive and *E. coli*-negative result, then the air carrier must perform all the corrective actions as specified in paragraph (c)(3)(ii) of this section.

(h) *Failure to board water from a safe watering point (E. coli-positive).* For the aircraft water system, the air carrier must perform all the corrective actions specified in paragraphs (c)(2)(i), (c)(2)(ii), and (c)(2)(iii) of this section when it becomes aware of an *E. coli*-positive event resulting from:

(1) Boarding water from a watering point not in accordance with FDA regulations (21 CFR part 1240 subpart E), or

(2) Boarding water that does not meet NPDWRs applicable to transient non-community water systems (§§141.62 and 141.63, as applied to TNCWS),

(3) Boarding water that is otherwise determined to be unsafe due to noncompliance with the procedures specified in §141.804(b)(6).

(i) *Failure to board water from a safe watering point (non-E. coli-positive).* For the aircraft water system, the air carrier must perform all the corrective actions specified in paragraphs (c)(3)(ii) of this section when it becomes aware of a non-*E. coli*-positive event resulting from:

(1) Boarding water from a watering point not in accordance with FDA regulations (21 CFR part 1240, subpart E),

(2) Boarding water that does not meet NPDWRs applicable to transient non-community water systems (§§141.62 and 141.63, as applied to TNCWS), or

(3) Boarding water that is otherwise determined to be unsafe due to noncompliance with the procedures specified in §141.804(b)(6).

[74 FR 53618, Oct. 19, 2009, as amended at 78 FR 10354, Feb. 13, 2013]

§ 141.804 Aircraft water system operations and maintenance plan.

(a) Each air carrier must develop and implement an aircraft water system operations and maintenance plan for each aircraft water system that it owns or operates. This plan must be included in a Federal Aviation Administration (FAA)-accepted air carrier operations and maintenance program (14 CFR part 43, 14 CFR part 91, 14 CFR part 121).

(b) Each aircraft water system operations and maintenance plan must include the following:

(1) *Watering point selection requirement.* All watering points must be selected in accordance with Food and Drug Administration (FDA) regulations (21 CFR part 1240, subpart E).

(2) *Procedures for disinfection and flushing.* The plan must include the following requirements for procedures for disinfection and flushing of aircraft water system.

(i) The air carrier must conduct disinfection and flushing of the aircraft water system in accordance with, or is consistent with, the water system manufacturer's recommendations. The air carrier may conduct disinfection and flushing more frequently, but not less frequently, than the manufacturer recommends.

(ii) The operations and maintenance plan must identify the disinfection frequency, type of disinfecting agent, disinfectant concentration to be used, and the disinfectant contact time, and flushing volume or flushing time.

(iii) In cases where a recommended routine disinfection and flushing frequency is not specified by the aircraft water system manufacturer, the air carrier must choose a disinfection and flushing, and corresponding monitoring frequency specified in § 141.803(b)(3).

(3) *Follow-up sampling.* The plan must include the procedures for follow-up sampling in accordance with § 141.803(e).

(4) *Training requirements.* Training for all personnel involved with the aircraft water system operation and maintenance provisions of this regulation must include, but is not limited to the following:

(i) Boarding water procedures;

(ii) Sample collection procedures;

(iii) Disinfection and flushing procedures;

(iv) Public health and safety reasons for the requirements of this subpart.

(5) *Procedures for conducting self-inspections of the aircraft water system.* Procedures must include, but are not limited to, inspection of storage tank, distribution system, supplemental treatment, fixtures, valves, and backflow prevention devices.

(6) *Procedures for boarding water.* The plan must include the following requirements and procedures for boarding water:

(i) Within the United States, the air carrier must board water from watering points in accordance with Food and Drug Administration (FDA) regulations (21 CFR part 1240, subpart E).

(ii) A description of how the water will be transferred from the watering point to the aircraft in a manner that ensures it will not become contaminated during the transfer.

(iii) A description of how the carrier will ensure that water boarded outside the United States is safe for human consumption.

(iv) A description of emergency procedures that meet the requirements in § 141.803(h) and (i) that must be used in the event that the air carrier becomes aware that water was boarded to operate essential systems, such as toilets, but was boarded from a watering point not in accordance with FDA regulations, does not meet NPDWRs applicable to transient non-community water systems (§§ 141.62 and 141.63, as applied to TNCWSs), or is otherwise unsafe.

(7) *Coliform sampling plan.* The air carrier must include the coliform sampling plan prepared in accordance with § 141.802.

(8) *Aircraft water system disconnect/shut-off, or prevent flow of water through the tap(s) statement.* An explanation of whether the aircraft water system can be physically disconnected/shut-off, or the flow of water otherwise prevented through the tap(s) to the crew and passengers.

(c) For existing aircraft, the air carrier must develop the water system operations and maintenance plan required by this section by April 19, 2011;

(d) For new aircraft, the air carrier must develop the operations and maintenance plan required in this section within the first calendar quarter of initial operation of the aircraft.

(e) Any changes to the aircraft water system operations and maintenance plan must be included in the FAA-accepted air carrier operations and maintenance program.

§ 141.805 Notification to passengers and crew.

(a) Air carriers must give public notice for each aircraft in all of the following situations:

(1) Public access to the aircraft water system is restricted in response to a routine, repeat or follow-up total coliform-positive or *E. coli*-positive sample result in accordance with § 141.803(d);

(2) Failure to perform required routine disinfection and flushing or failure to collect required routine samples in accordance with § 141.803(f);

(3) Failure to collect the required follow-up samples in response to a sample result that is *E. coli*-positive in accordance with § 141.803(g);

(4) Failure to collect the required repeat samples or failure to collect the required follow-up samples in response to a sample result that is total coliform-positive and *E. coli*-negative in accordance with § 141.803(g);

(5) In accordance with § 141.803(h), the air carrier becomes aware of an *E. coli*-positive event resulting from water that has been boarded from a watering point not in accordance with FDA regulations (21 CFR part 1240, subpart E), or that does not meet NPDWRs applicable to transient non-community water systems, or that is otherwise determined to be unsafe due to non-compliance with the procedures specified in § 141.804(b)(6);

(6) In accordance with § 141.803(i), the air carrier becomes aware of a non-*E. coli*-positive event resulting from water that has been boarded from a watering point not in accordance with FDA regulations (21 CFR part 1240, subpart E), or that does not meet NPDWRs applicable to transient non-community water systems, or that is otherwise determined to be unsafe due to non-compliance with the procedures specified in § 141.804(b)(6).

(7) The Administrator, the carrier, or the crew otherwise determines that notification is necessary to protect public health.

(b) *Public notification:* (1) Must be displayed in a conspicuous way when printed or posted;

(2) Must not contain overly technical language or very small print;

(3) Must not be formatted in a way that defeats the purpose of the notice;

(4) Must not contain language that nullifies the purpose of the notice;

(5) Must contain information in the appropriate language(s) regarding the importance of the notice, reflecting a good faith effort to reach the non-English speaking population served, including, where applicable, an easily recognized symbol for non-potable water.

(c) Public notification for paragraph (a)(1) of this section must meet the requirements of paragraph (b) of this section in addition to the following:

(1) Public notification must include a prominently displayed, clear statement in each lavatory indicating that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use; and

(2) A prominent notice in the galley directed at the crew which includes:

(i) A clear statement that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use;

(ii) A description of the violation or situation triggering the notice, including the contaminant(s) of concern;

(iii) When the violation or situation occurred;

(iv) Any potential adverse health effects from the violation or situation, as appropriate, under paragraph (g) of this section;

(v) The population at risk, including sensitive subpopulations particularly vulnerable if exposed to the contaminant in the drinking water;

(vi) What the air carrier is doing to correct the violation or situation; and

(vii) When the air carrier expects to return the system to unrestricted public access.

(3) If passenger access to the water system is physically prevented through disconnecting or shutting off the water, or the flow of water prevented through the tap(s), or if water is supplied only to lavatory toilets, and not to any lavatory or galley taps, then only the notice specified in paragraph (c)(2) of this section is required.

(4) Air carriers must initiate public notification when restriction of public access is initiated in accordance with § 141.803(d) and must continue until the aircraft water system is returned to unrestricted public access.

(d) Public notification for paragraphs (a)(2), (a)(4), and (a)(6) of this section must meet the requirements of paragraph (b) of this section in addition to the following:

(1) Public notification must include a prominently displayed, clear statement

in each lavatory indicating that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use; and

(2) A prominent notice in the galley directed at the crew which includes:

(i) A clear statement that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use;

(ii) A clear statement that it is not known whether the water is contaminated because there was a failure to perform required routine disinfection and flushing; or a failure to perform required monitoring; or water was boarded from a watering point not in accordance with FDA regulations, or that does not meet NPDWRs applicable to transient noncommunity water systems, or that is otherwise determined to be unsafe due to noncompliance with the procedures specified in §141.804(b)(6);

(iii) When and where the unsafe water was boarded or when the specific monitoring or disinfection and flushing requirement was not met;

(iv) Any potential adverse health effects from exposure to waterborne pathogens that might be in the water, as appropriate, under paragraph (g) of this section;

(v) The population at risk, including sensitive subpopulations particularly vulnerable if exposed to the contaminant in the drinking water; and

(vi) A statement indicating when the system will be disinfected and flushed and returned to unrestricted public access.

(3) If passenger access to the water system is physically prevented through disconnecting or shutting off the water, or the flow of water prevented through the tap(s), or if water is supplied only to lavatory toilets, and not to any lavatory or galley taps, then only the notice specified in paragraph (d)(2) of this section is required.

(4) Air carriers must initiate public notification when restriction of public access is initiated in accordance with §141.803(d) and must continue until the aircraft water system is returned to unrestricted public access.

(e) Public notification for paragraphs (a)(3) and (a)(5) of this section must meet the requirements of paragraph (b) of this section in addition to the following:

(1) Public notification must include a prominently displayed, clear statement in each lavatory indicating that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use; and

(2) A prominent notice in the galley directed at the crew which includes:

(i) A clear statement that the water is non-potable and should not be used for drinking, food or beverage preparation, hand washing, teeth brushing, or any other consumptive use;

(ii) A clear statement that the water is contaminated and there was a failure to conduct required monitoring; or a clear statement that water is contaminated because water was boarded from a watering point not in accordance with FDA regulations, or that does not meet NPDWRs applicable to transient noncommunity water systems, or that is otherwise determined to be unsafe due to noncompliance with the procedures specified in §141.804(b)(6);

(iii) A description of the contaminant(s) of concern;

(iv) When and where the unsafe water was boarded or when the specific monitoring requirement was not met;

(v) Any potential adverse health effects from the situation, as appropriate, under paragraph (g) of this section;

(vi) The population at risk, including sensitive subpopulations particularly vulnerable if exposed to the contaminant in the drinking water;

(vii) A statement indicating what the air carrier is doing to correct the situation; and

(viii) When the air carrier expects to return the system to unrestricted public access.

(3) If passenger access to the water system is physically prevented through disconnecting or shutting off the water, or the flow of water prevented through the tap(s), or if water is supplied only to lavatory toilets, and not to any lavatory or galley taps, then

only the notice specified in paragraph (e)(2) of this section is required.

(4) Air carriers must initiate public notification when restriction of public access is initiated in accordance with §141.803(d) and must continue public notification until a complete set of required follow-up samples are total coliform-negative.

(f) Public notification for paragraph (a)(7) of this section must meet the requirements of paragraph (b) of this section in addition to the following:

(1) Notification must be in a form and manner reasonably calculated to reach all passengers and crew while on board the aircraft by using one or more of the following forms of delivery:

(i) Broadcast over public announcement system on aircraft;

(ii) Posting of the notice in conspicuous locations throughout the area served by the water system. These locations would normally be the galleys and in the lavatories of each aircraft requiring posting;

(iii) Hand delivery of the notice to passengers and crew;

(iv) Another delivery method approved in writing by the Administrator.

(2) Air carriers must initiate public notification within 24 hours of being informed by EPA to perform notification and must continue notification for the duration determined by EPA.

(g) In each public notice to the crew, air carriers must use the following standard health effects language that corresponds to the situations in paragraphs (a)(1) through (a)(6) of this section.

(1) Health effects language to be used when public notice is initiated due to the detection of total coliforms only (not *E. coli*) in accordance with paragraph (a)(1) of this section:

Coliform are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, bacteria may be present. Coliforms were found in [INSERT NUMBER OF SAMPLES DETECTED] samples collected and this is a warning of potential problems. If human pathogens are present, they can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

(2) Health effects language to be used when public notice is initiated due to any *E. coli*-positive routine, repeat, or follow-up sample in accordance with paragraph (a)(1) of this section:

E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

(3) Health effects language to be used when public notice is initiated due to a failure to conduct routine monitoring or routine disinfection and flushing in accordance with paragraph (a)(2) of this section; or when there is a failure to conduct repeat or follow-up sampling in accordance with paragraph (a)(4) of this section; or in accordance with paragraph (a)(6) of this section, when the air carrier becomes aware of a non-*E. coli*-positive event that is the result of water that was boarded from a watering point not in accordance with FDA regulations (21 CFR part 1240, subpart E), or that does not meet NPDWRs applicable to transient non-community water systems, or that is otherwise determined to be unsafe due to non-compliance with the procedures specified in §141.804(b)(6):

Because [REQUIRED MONITORING AND ANALYSIS WAS NOT CONDUCTED], [REQUIRED DISINFECTION AND FLUSHING WAS NOT CONDUCTED] [WATER WAS BOARDED FROM A WATERING POINT NOT IN ACCORDANCE WITH FDA REGULATIONS (21 CR 1240 SUBPART E)], or [OTHER APPROPRIATE EXPLANATION], we cannot be sure of the quality of the drinking water at this time. However, drinking water contaminated with human pathogens can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

(4) Health effects language to be used when public notice is initiated due to a failure to conduct required follow-up

monitoring in response to a sample result that is *E. coli*-positive in accordance with paragraph (a)(3) of this section; or in accordance with paragraph (a)(5) of this section, when the air carrier becomes aware of an *E. coli*-positive event that is the result of water that was boarded from a watering point not in accordance with FDA regulations (21 CFR part 1240, subpart E), or that does not meet NPDWRs applicable to transient non-community water systems, or that is otherwise determined to be unsafe due to non-compliance with the procedures specified in §141.804(b)(6):

Because required follow-up monitoring and analysis was not conducted after the aircraft water system tested positive for *E. coli*, we cannot be sure of the quality of the drinking water at this time. *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

OR

Water was boarded that is contaminated with *E. coli* because [WATER WAS BOARDED FROM A WATERING POINT NOT IN ACCORDANCE WITH FDA REGULATIONS (21 CR 1240 SUBPART E)], or [OTHER APPROPRIATE EXPLANATION]. *E. coli* are bacteria whose presence indicates that the water may be contaminated with human or animal wastes. Microbes in these wastes can cause short-term health effects, such as diarrhea, cramps, nausea, headaches, or other symptoms. They may pose a special health risk for infants, young children, some of the elderly, and people with severely compromised immune systems.

§ 141.806 Reporting requirements.

(a) The air carrier must comply with the following requirements regarding reporting of the development of the coliform sampling plan, the operations and maintenance plan, and the disinfection and flushing and coliform sampling frequencies.

(1) The air carrier must report to the Administrator that it has developed the coliform sampling plan required by §141.802, which covers each existing aircraft water system, as well as report the frequency for routine coliform sampling identified in the coliform sampling plan by April 19, 2011. The air carrier must report to the Administrator that it has developed its operations and maintenance plan required by §141.804 and report the frequency for routine disinfection and flushing by April 19, 2011;

(2) For each new aircraft meeting the definition of an aircraft water system, which becomes operational after publication of this subpart, the air carrier must report to the Administrator that it has developed the coliform sampling plan required by §141.802, as well as report the frequency for routine coliform sampling identified in the coliform sampling plan, within the first calendar quarter of initial operation of the aircraft. The air carrier must report to the Administrator that it has developed the aircraft water system operations and maintenance plan required by §141.804, and report the frequency for routine disinfection and flushing within the first calendar quarter of initial operation of the aircraft.

(b) The air carrier must report the following information to the Administrator:

(1) A complete inventory of aircraft that are public water systems by April 19, 2011. Inventory information includes, at a minimum, the following:

(i) The unique aircraft identifier number;

(ii) The status (active or inactive) of any aircraft as an aircraft water system as defined in §141.801;

(iii) The type and location of any supplemental treatment equipment installed on the water system; and

(iv) Whether the aircraft water system can be physically disconnected or shut-off, or the flow of water prevented through the tap(s).

(2) Changes in aircraft inventory no later than 10 days following the calendar month in which the change occurred. Changes in inventory information include, at a minimum, the following:

(i) Change in the unique identifier number for any new aircraft, or any aircraft removed from the carrier's fleet;

(ii) Change in status (active or inactive) of any aircraft as an aircraft water system as defined in §141.801; and

(iii) Change to the type and location of any supplemental treatment equipment added to or removed from the water system.

(iv) Change to whether the aircraft water system can be physically disconnected or shut-off, or the flow of water prevented through the tap(s).

(3) All sampling results no later than 10 calendar days following the monitoring period in which the sampling occurred. The monitoring period is based on the monitoring frequency identified in the coliform sampling plan required under §141.802. Routine disinfection and flushing events must be reported no later than 10 calendar days following the disinfection and flushing period in which the disinfection and flushing occurred. The disinfection and flushing period is based on the frequency identified in the operations and maintenance plan required under §141.804.

(4) All events requiring notification to passengers or crew, or non-routine disinfection and flushing, or non-routine sampling, within 10 days of the event (e.g., notification of positive sample result by laboratory), including information on whether required notification was provided to passengers or crew or both.

(5) Failure to comply with the monitoring or disinfection and flushing requirements of this subpart within 10 calendar days of discovery of the failure.

(6) Changes in disinfection and flushing and coliform sampling frequencies no later than 10 days following the calendar month in which the change occurred. Changes to an aircraft's routine coliform sampling frequency and routine disinfection and flushing frequency must be included in the aircraft water system operation and maintenance plan that is included in the air carrier operations and maintenance program accepted by FAA in accordance with §141.804.

(c) The air carrier must provide evidence of a self-inspection to the Administrator within 90 days of completion of the self-inspection required under §141.808(b), including reporting whether all deficiencies were addressed in accordance with §141.808(c). The air carrier must also report to the Administrator within 90 days that any deficiency identified during a compliance audit conducted in accordance with §141.808(a) has been addressed. If any deficiency has not been addressed within 90 days of identification of the deficiency, the report must also include a description of the deficiency, an explanation as to why it has not yet been addressed, and a schedule for addressing it as expeditiously as possible.

(d) All information required to be reported to the Administrator under this subpart must be in an electronic format established or approved by the Administrator. If an air carrier is unable to report electronically, the air carrier may use an alternative approach that the Administrator approves.

§ 141.807 Recordkeeping requirements.

(a) The air carrier must keep records of bacteriological analyses for at least 5 years and must include the following information:

(1) The date, time, and place of sampling, and the name of the person who collected the sample;

(2) Identification of the sample as a routine, repeat, follow-up, or other special purpose sample;

(3) Date of the analysis;

(4) Laboratory and person responsible for performing the analysis;

(5) The analytical technique/method used; and

(6) The results of the analysis.

(b) The air carrier must keep records of any disinfection and flushing for at least 5 years and must include the following information:

(1) The date and time of the disinfection and flushing; and

(2) The type of disinfection and flushing (*i.e.*, routine or corrective action).

(c) The air carrier must keep records of a self-inspection for at least 10 years and must include the following information:

(1) The completion date of the self-inspection; and

(2) Copies of any written reports, summaries, or communications related to the self-inspection.

(d) The air carrier must maintain sampling plans and make such plans available for review by the Administrator upon request, including during compliance audits.

(e) The air carrier must maintain aircraft water system operations and maintenance plans in accordance with FAA requirements, and make such plans available for review by the Administrator upon request, including during compliance audits.

(f) The air carrier must keep copies of public notices to passengers and crew issued as required by this subpart for at least 3 years after issuance.

§ 141.808 Audits and inspections.

(a) The Administrator may conduct routine compliance audits as deemed necessary in providing regulatory oversight to ensure proper implementation of the requirements in this subpart. Compliance audits may include, but are not limited to:

(1) Bacteriological sampling of aircraft water system;

(2) Reviews and audits of records as they pertain to water system operations and maintenance such as log entries, disinfection and flushing procedures, and sampling results; and

(3) Observation of procedures involving the handling of finished water, watering point selection, boarding of water, operation, disinfection and flushing, and general maintenance and self-inspections of aircraft water system.

(b) Air carriers or their representatives must perform a self-inspection of all water system components for each aircraft water system no less frequently than once every 5 years.

(c) The air carrier must address any deficiency identified during compliance audits or routine self-inspections within 90 days of identification of the deficiency, or where such deficiency is identified during extended or heavy maintenance, before the aircraft is put back into service. This includes any deficiency in the water system's design, construction, operation, maintenance, or administration, as well as any failure or malfunction of any system component that has the potential to cause an unacceptable risk to health or that could affect the reliable delivery of safe drinking water.

§ 141.809 Supplemental treatment.

(a) Any supplemental drinking water treatment units installed onboard existing or new aircraft must be acceptable to FAA and FDA; and must be installed, operated, and maintained in accordance with the manufacturer's plans and specifications and FAA requirements.

(b) Water supplemental treatment and production equipment must produce water that meets the standards prescribed in this part.

§ 141.810 Violations.

An air carrier is in violation of this subpart when, for any aircraft water system it owns or operates, any of the following occur:

(a) It fails to perform any of the requirements in accordance with § 141.803 or § 141.804.

(b) It has an *E. coli*-positive sample in any monitoring period (routine and repeat samples are used in this determination).

(c) It fails to provide notification to passengers and crew in accordance with § 141.805.

(d) It fails to comply with the reporting and recordkeeping requirements of this subpart.

(e) It fails to conduct a self-inspection or address a deficiency in accordance with § 141.808.

(f) It fails to develop a coliform sampling plan in accordance with § 141.802, or fails to have and follow an operations and maintenance plan, which is included in a FAA accepted program in accordance with § 141.804.

Subpart Y—Revised Total Coliform Rule

SOURCE: 78 FR 10354, Feb. 13, 2013, unless otherwise noted.

§ 141.851 General.

(a) *General.* The provisions of this subpart include both maximum contaminant level and treatment technique requirements.

(b) *Applicability.* The provisions of this subpart apply to all public water systems.

(c) *Compliance date.* Systems must comply with the provisions of this subpart beginning April 1, 2016, unless otherwise specified in this subpart.

(d) *Implementation with EPA as State.* Systems falling under direct oversight of EPA, where EPA acts as the State, must comply with decisions made by EPA for implementation of subpart Y. EPA has authority to establish such procedures and criteria as are necessary to implement subpart Y.

(e) *Violations of national primary drinking water regulations.* Failure to comply with the applicable requirements of §§ 141.851 through 141.861, including requirements established by the State pursuant to these provisions, is a violation of the national primary drinking water regulations under subpart Y.

§ 141.852 Analytical methods and laboratory certification.

(a) *Analytical methodology.* (1) The standard sample volume required for analysis, regardless of analytical method used, is 100 ml.

(2) Systems need only determine the presence or absence of total coliforms and *E. coli;* a determination of density is not required.

(3) The time from sample collection to initiation of test medium incubation may not exceed 30 hours. Systems are encouraged but not required to hold samples below 10 deg. C during transit.

(4) If water having residual chlorine (measured as free, combined, or total chlorine) is to be analyzed, sufficient sodium thiosulfate ($Na_2S_2O_3$) must be added to the sample bottle before sterilization to neutralize any residual chlorine in the water sample. Dechlorination procedures are addressed in Section 9060A.2 of *Standard Methods for the Examination of Water and Wastewater* (20th and 21st editions).

(5) Systems must conduct total coliform and *E. coli* analyses in accordance with one of the analytical methods in the following table or one of the alternative methods listed in Appendix A to subpart C of part 141.

Organism	Methodology category	Method[1]	Citation[1]
Total Coliforms	Lactose Fermentation Methods	Standard Total Coliform Fermentation Technique.	Standard Methods 9221 B.1, B.2 (20th ed.; 21st ed.).[2,3]
			Standard Methods Online 9221 B.1, B.2–99.[2,3]
		Presence-Absence (P–A) Coliform Test	Standard Methods 9221 D.1, D.2 (20th ed.; 21st ed.).[2,7]
			Standard Methods Online 9221 D.1, D.2–99.[2,7]
	Membrane Filtration Methods	Standard Total Coliform Membrane Filter Procedure.	Standard Methods 9222 B, C (20th ed.; 21st ed.).[2,4]
			Standard Methods Online 9222 B–97[2,4], 9222 C–97.[2,4]
		Membrane Filtration using MI medium	EPA Method 1604.[2]
		m-ColiBlue24® Test[2,4].	
		Chromocult[2,4].	
	Enzyme Substrate Methods	Colilert®	Standard Methods 9223 B (20th ed.; 21st ed.).[2,5]
			Standard Methods Online 9223 B–97.[2,5]
		Colisure®	Standard Methods 9223 B (20th ed.; 21st ed.).[2,5,6]
			Standard Methods Online 9223 B–97.[2,5,6]
		E*Colite® Test[2].	
		Readycult® Test[2].	
		modified Colitag® Test[2].	
Escherichia coli.	*Escherichia coli* Procedure (following Lactose Fermentation Methods).	EC–MUG medium	Standard Methods 9221 F.1 (20th ed.; 21st ed.)[2]
	Escherichia coli Partition Method	EC broth with MUG (EC–MUG)	Standard Methods 9222 G.1*c*(2) (20th ed.; 21st ed.)[2,8]
		NA–MUG medium	Standard Methods 9222 G.1*c*(1) (20th ed.; 21st ed.)[2]
	Membrane Filtration Methods	Membrane Filtration using MI medium	EPA Method 1604[2]
		m-ColiBlue24® Test[2,4]	
		Chromocult[2,4].	
	Enzyme Substrate Methods	Colilert®	Standard Methods 9223 B (20th ed.; 21st ed.)[2,5]
			Standard Methods Online 9223 B–97[2,5,6]
		Colisure®	Standard Methods 9223 B (20th ed.; 21st ed.)[2,5,6]
			Standard Methods Online 9223 B–97[2,5,6]
		E*Colite® Test[2].	
		Readycult® Test[2].	
		modified Colitag® Test[2].	

[1] The procedures must be done in accordance with the documents listed in paragraph (c) of this section. For Standard Methods, either editions, 20th (1998) or 21st (2005), may be used. For the Standard Methods Online, the year in which each method was approved by the Standard Methods Committee is designated by the last two digits following the hyphen in the method number. The methods listed are the only online versions that may be used. For vendor methods, the date of the method listed in paragraph (c) of this section is the date/version of the approved method. The methods listed are the only versions that may be used for compliance with this rule. Laboratories should be careful to use only the approved versions of the methods, as product package inserts may not be the same as the approved versions of the methods.

[2] Incorporated by reference. See paragraph (c) of this section.

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

[4] All filtration series must begin with membrane filtration equipment that has been sterilized by autoclaving. Exposure of filtration equipment to UV light is not adequate to ensure sterilization. Subsequent to the initial autoclaving, exposure of the filtration equipment to UV light may be used to sanitize the funnels between filtrations within a filtration series. Alternatively, membrane filtration equipment that is pre-sterilized by the manufacturer (*i.e.*, disposable funnel units) may be used.

[5] Multiple-tube and multi-well enumerative formats for this method are approved for use in presence-absence determination under this regulation.

[6] Colisure® results may be read after an incubation time of 24 hours.

[7] A multiple tube enumerative format, as described in *Standard Methods for the Examination of Water and Wastewater* 9221, is approved for this method for use in presence-absence determination under this regulation.

[8] The following changes must be made to the EC broth with MUG (EC–MUG) formulation: Potassium dihydrogen phosphate, KH_2PO_4, must be 1.5g, and 4-methylumbelliferyl-Beta-D-glucuronide must be 0.05 g.

(b) *Laboratory certification.* Systems must have all compliance samples required under this subpart analyzed by a laboratory certified by the EPA or a primacy State to analyze drinking water samples. The laboratory used by the system must be certified for each method (and associated contaminant(s)) used for compliance monitoring analyses under this rule.

(c) *Incorporation by reference.* The standards required in this section are incorporated by reference into this section with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, EPA must publish notice of change in the FEDERAL REGISTER and the material must be available to the public. All approved material is available for inspection either electronically at *www.regulations.gov,* in hard copy at the Water Docket, or from the sources indicated below. The Docket ID is EPA–HQ–OW–2008–0878. Hard copies of these documents may be viewed at the Water Docket in the EPA Docket Center, (EPA/DC) EPA West, Room 3334, 1301 Constitution Ave. NW., Washington, DC. The EPA Docket Center Public Reading Room is open from 8:30 a.m. to 4:30 p.m., Monday through Friday, excluding legal holidays. The telephone number for the Public Reading Room is 1–202–566–1744, and the telephone number for the Water Docket is 1–202–566–2426. Copyrighted materials are only available for viewing in hard copy. These documents are also available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 1–202–741–6030 or go to: *http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.*

(1) American Public Health Association, 800 I Street, NW., Washington, DC 20001.

(i) ''Standard Methods for the Examination of Water and Wastewater,'' 20th edition (1998):

(A) Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' B.1, B.2, ''Standard Total Coliform Fermentation Technique.''

(B) Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' D.1, D.2, ''Presence-Absence (P–A) Coliform Test.''

(C) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' B, ''Standard Total Coliform Membrane Filter Procedure.''

(D) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' C, ''Delayed-Incubation Total Coliform Procedure.''

(E) Standard Methods 9223, ''Enzyme Substrate Coliform Test,'' B, ''Enzyme Substrate Test,'' Colilert® and Colisure®.

(F) Standard Methods 9221, ''Multiple Tube Fermentation Technique for Members of the Coliform Group,'' F.1, ''*Escherichia coli* Procedure: EC–MUG medium.''

(G) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.*c*(2), ''*Escherichia coli* Partition Method: EC broth with MUG (EC–MUG).''

(H) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.*c*(1), ''*Escherichia coli* Partition Method: NA–MUG medium.''

(ii) ''Standard Methods for the Examination of Water and Wastewater,'' 21st edition (2005):

(A) Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' B.1, B.2, ''Standard Total Coliform Fermentation Technique.''

(B) Standard Methods 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group,'' D.1, D.2, ''Presence-Absence (P–A) Coliform Test.''

(C) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' B, ''Standard Total Coliform Membrane Filter Procedure.''

(D) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' C, ''Delayed-Incubation Total Coliform Procedure.''

(E) Standard Methods 9223, ''Enzyme Substrate Coliform Test,'' B, ''Enzyme Substrate Test,'' Colilert® and Colisure®.

(F) Standard Methods 9221, ''Multiple Tube Fermentation Technique for Members of the Coliform Group,'' F.1, ''*Escherichia coli* Procedure: EC–MUG medium.''

(G) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.*c*(2), ''*Escherichia coli* Partition Method: EC broth with MUG (EC–MUG).''

(H) Standard Methods 9222, ''Membrane Filter Technique for Members of the Coliform Group,'' G.1.*c*(1), ''*Escherichia coli* Partition Method: NA–MUG medium.''

(iii) ''Standard Methods Online'' available at *http://www.standardmethods.org:*

(A) Standard Methods Online 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group'' (1999), B.1, B.2–99, ''Standard Total Coliform Fermentation Technique.''

(B) Standard Methods Online 9221, ''Multiple-Tube Fermentation Technique for Members of the Coliform Group'' (1999), D.1, D.2–99, ''Presence-Absence (P–A) Coliform Test.''

(C) Standard Methods Online 9222, ''Membrane Filter Technique for Members of the Coliform Group'' (1997), B–97, ''Standard Total Coliform Membrane Filter Procedure.''

(D) Standard Methods Online 9222, ''Membrane Filter Technique for Members of the Coliform Group'' (1997), C–97, ''Delayed-Incubation Total Coliform Procedure.''

(E) Standard Methods Online 9223, ''Enzyme Substrate Coliform Test'' (1997), B–97, ''Enzyme Substrate Test'', Colilert® and Colisure®.

(2) Charm Sciences, Inc., 659 Andover Street, Lawrence, MA 01843–1032, telephone 1–800–343–2170:

(i) E*Colite®—''Charm E*Colite™ Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Drinking Water,'' January 9, 1998.

(ii) [Reserved]

(3) CPI International, Inc., 5580 Skylane Blvd., Santa Rosa, CA, 95403, telephone 1–800–878–7654:

(i) modified Colitag®, ATP D05–0035—''Modified Colitag™ Test Method for the Simultaneous Detection of *E. coli* and other Total Coliforms in Water,'' August 28, 2009.

(ii) [Reserved]

(4) EMD Millipore (a division of Merck KGaA, Darmstadt Germany), 290 Concord Road, Billerica, MA 01821, telephone 1–800–645–5476:

(i) Chromocult—''Chromocult® Coliform Agar Presence/Absence Membrane Filter Test Method for Detection and Identification of Coliform Bacteria and *Escherichia coli* for Finished Waters,'' November 2000, Version 1.0.

(ii) Readycult®—''Readycult® Coliforms 100 Presence/Absence Test for Detection and Identification of Coliform Bacteria and *Escherichia coli* in Finished Waters,'' January 2007, Version 1.1.

(5) EPA's Water Resource Center (MC–4100T), 1200 Pennsylvania Avenue NW., Washington, DC 20460, telephone 1–202–566–1729:

(i) EPA Method 1604, EPA 821–R–02–024—''EPA Method 1604: Total Coliforms and *Escherichia coli* in Water by Membrane Filtration Using a Simultaneous Detection Technique (MI Medium),'' September 2002, *http://www.epa.gov/nerlcwww/1604sp02.pdf*.

(ii) [Reserved]

(6) Hach Company, P.O. Box 389, Loveland, CO 80539, telephone 1–800–604–3493:

(i) m-ColiBlue24®—''Membrane Filtration Method m-ColiBlue24® Broth,'' Revision 2, August 17, 1999.

(ii) [Reserved]

[78 FR 10354, Feb. 13, 2013, as amended at 79 FR 10669, Feb. 26, 2014]

§ 141.853 General monitoring requirements for all public water systems.

(a) *Sample siting plans*. (1) Systems must develop a written sample siting plan that identifies sampling sites and a sample collection schedule that are representative of water throughout the distribution system not later than March 31, 2016. These plans are subject to State review and revision. Systems must collect total coliform samples according to the written sample siting plan. Monitoring required by §§ 141.854 through 141.858 may take place at a customer's premise, dedicated sampling station, or other designated compliance sampling location. Routine and repeat sample sites and any sampling points necessary to meet the requirements of subpart S must be reflected in the sampling plan.

(2) Systems must collect samples at regular time intervals throughout the month, except that systems that use only ground water and serve 4,900 or fewer people may collect all required samples on a single day if they are taken from different sites.

(3) Systems must take at least the minimum number of required samples even if the system has had an *E. coli* MCL violation or has exceeded the coliform treatment technique triggers in §141.859(a).

(4) A system may conduct more compliance monitoring than is required by this subpart to investigate potential problems in the distribution system and use monitoring as a tool to assist in uncovering problems. A system may take more than the minimum number of required routine samples and must include the results in calculating whether the coliform treatment technique trigger in §141.859(a)(1)(i) and (ii) has been exceeded only if the samples are taken in accordance with the existing sample siting plan and are representative of water throughout the distribution system.

(5) Systems must identify repeat monitoring locations in the sample siting plan. Unless the provisions of paragraphs (a)(5)(i) or (a)(5)(ii) of this section are met, the system must collect at least one repeat sample from the sampling tap where the original total coliform-positive sample was taken, and at least one repeat sample at a tap within five service connections upstream and at least one repeat sample at a tap within five service connections downstream of the original sampling site. If a total coliform-positive sample is at the end of the distribution system, or one service connection away from the end of the distribution system, the system must still take all required repeat samples. However, the State may allow an alternative sampling location in lieu of the requirement to collect at least one repeat sample upstream or downstream of the original sampling site. Except as provided for in paragraph (a)(5)(ii) of this section, systems required to conduct triggered source water monitoring under §141.402(a) must take ground water source sample(s) in addition to repeat samples required under this subpart.

(i) Systems may propose repeat monitoring locations to the State that the system believes to be representative of a pathway for contamination of the distribution system. A system may elect to specify either alternative fixed locations or criteria for selecting repeat sampling sites on a situational basis in a standard operating procedure (SOP) in its sample siting plan. The system must design its SOP to focus the repeat samples at locations that best verify and determine the extent of potential contamination of the distribution system area based on specific situations. The State may modify the SOP or require alternative monitoring locations as needed.

(ii) Ground water systems serving 1,000 or fewer people may propose repeat sampling locations to the State that differentiate potential source water and distribution system contamination (e.g., by sampling at entry points to the distribution system). A ground water system with a single well required to conduct triggered source water monitoring may, with written State approval, take one of its repeat samples at the monitoring location required for triggered source water monitoring under §141.402(a) if the system demonstrates to the State's satisfaction that the sample siting plan remains representative of water quality in the distribution system. If approved by the State, the system may use that sample result to meet the monitoring requirements in both §141.402(a) and this section.

(A) If a repeat sample taken at the monitoring location required for triggered source water monitoring is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with §141.402(a)(3). If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring, the system may reduce the number of additional source water samples required under §141.402(a)(3) by the number of repeat samples taken at that location that were not *E. coli*-positive.

(B) If a system takes more than one repeat sample at the monitoring location required for triggered source water monitoring under § 141.402(a), and more than one repeat sample is *E. coli*-positive, the system has violated the *E. coli* MCL and must also comply with § 141.403(a)(1).

(C) If all repeat samples taken at the monitoring location required for triggered source water monitoring are *E. coli*-negative and a repeat sample taken at a monitoring location other than the one required for triggered source water monitoring is *E. coli*-positive, the system has violated the *E. coli* MCL, but is not required to comply with § 141.402(a)(3).

(6) States may review, revise, and approve, as appropriate, repeat sampling proposed by systems under paragraphs (a)(5)(i) and (ii) of this section. The system must demonstrate that the sample siting plan remains representative of the water quality in the distribution system. The State may determine that monitoring at the entry point to the distribution system (especially for undisinfected ground water systems) is effective to differentiate between potential source water and distribution system problems.

(b) *Special purpose samples.* Special purpose samples, such as those taken to determine whether disinfection practices are sufficient following pipe placement, replacement, or repair, must not be used to determine whether the coliform treatment technique trigger has been exceeded. Repeat samples taken pursuant to § 141.858 are not considered special purpose samples, and must be used to determine whether the coliform treatment technique trigger has been exceeded.

(c) *Invalidation of total coliform samples.* A total coliform-positive sample invalidated under this paragraph (c) of this section does not count toward meeting the minimum monitoring requirements of this subpart.

(1) The State may invalidate a total coliform-positive sample only if the conditions of paragraph (c)(1)(i), (ii), or (iii) of this section are met.

(i) The laboratory establishes that improper sample analysis caused the total coliform-positive result.

(ii) The State, on the basis of the results of repeat samples collected as required under § 141.858(a), determines that the total coliform-positive sample resulted from a domestic or other non-distribution system plumbing problem. The State cannot invalidate a sample on the basis of repeat sample results unless all repeat sample(s) collected at the same tap as the original total coliform-positive sample are also total coliform-positive, and all repeat samples collected at a location other than the original tap are total coliform-negative (e.g., a State cannot invalidate a total coliform-positive sample on the basis of repeat samples if all the repeat samples are total coliform-negative, or if the system has only one service connection).

(iii) The State has substantial grounds to believe that a total coliform-positive result is due to a circumstance or condition that does not reflect water quality in the distribution system. In this case, the system must still collect all repeat samples required under § 141.858(a), and use them to determine whether a coliform treatment technique trigger in § 141.859 has been exceeded. To invalidate a total coliform-positive sample under this paragraph, the decision and supporting rationale must be documented in writing, and approved and signed by the supervisor of the State official who recommended the decision. The State must make this document available to EPA and the public. The written documentation must state the specific cause of the total coliform-positive sample, and what action the system has taken, or will take, to correct this problem. The State may not invalidate a total coliform-positive sample solely on the grounds that all repeat samples are total coliform-negative.

(2) A laboratory must invalidate a total coliform sample (unless total coliforms are detected) if the sample produces a turbid culture in the absence of gas production using an analytical method where gas formation is examined (e.g., the Multiple-Tube Fermentation Technique), produces a turbid culture in the absence of an acid reaction in the Presence-Absence (P–A) Coliform Test, or exhibits confluent

growth or produces colonies too numerous to count with an analytical method using a membrane filter (e.g., Membrane Filter Technique). If a laboratory invalidates a sample because of such interference, the system must collect another sample from the same location as the original sample within 24 hours of being notified of the interference problem, and have it analyzed for the presence of total coliforms. The system must continue to re-sample within 24 hours and have the samples analyzed until it obtains a valid result. The State may waive the 24-hour time limit on a case-by-case basis. Alternatively, the State may implement criteria for waiving the 24-hour sampling time limit to use in lieu of case-by-case extensions.

§ 141.854 Routine monitoring requirements for non-community water systems serving 1,000 or fewer people using only ground water.

(a) *General.* (1) The provisions of this section apply to non-community water systems using only ground water (except ground water under the direct influence of surface water, as defined in § 141.2) and serving 1,000 or fewer people.

(2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in § 141.858.

(3) Once all monitoring required by this section and § 141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in § 141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by § 141.859.

(4) For the purpose of determining eligibility for remaining on or qualifying for quarterly monitoring under the provisions of paragraphs (f)(4) and (g)(2), respectively, of this section for transient non-community water systems, the State may elect to not count monitoring violations under § 141.860(c)(1) of this part if the missed sample is collected no later than the end of the monitoring period following the monitoring period in which the sample was missed. The system must collect the make-up sample in a different week than the routine sample for that monitoring period and should collect the sample as soon as possible during the monitoring period. The State may not use this provision under paragraph (h) of this section. This authority does not affect the provisions of §§ 141.860(c)(1) and 141.861(a)(4) of this part.

(b) *Monitoring frequency for total coliforms.* Systems must monitor each calendar quarter that the system provides water to the public, except for seasonal systems or as provided under paragraphs (c) through (h) and (j) of this section. Seasonal systems must meet the monitoring requirements of paragraph (i) of this section.

(c) *Transition to subpart Y.* (1) Systems, including seasonal systems, must continue to monitor according to the total coliform monitoring schedules under § 141.21 that were in effect on March 31, 2016, unless any of the conditions for increased monitoring in paragraph (f) of this section are triggered on or after April 1, 2016, or unless otherwise directed by the State.

(2) Beginning April 1, 2016, the State must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the State has performed the special monitoring evaluation during each sanitary survey, the State may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this section. The State may not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section. For seasonal systems on quarterly or annual monitoring, this evaluation must include review of the approved sample siting plan, which must designate the time period(s) for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). The seasonal system

must collect compliance samples during these time periods.

(d) *Annual site visits.* Beginning no later than calendar year 2017, systems on annual monitoring, including seasonal systems, must have an initial and recurring annual site visit by the State that is equivalent to a Level 2 assessment or an annual voluntary Level 2 assessment that meets the criteria in §141.859(b) to remain on annual monitoring. The periodic required sanitary survey may be used to meet the requirement for an annual site visit for the year in which the sanitary survey was completed.

(e) *Criteria for annual monitoring.* Beginning April 1, 2016, the State may reduce the monitoring frequency for a well-operated ground water system from quarterly routine monitoring to no less than annual monitoring, if the system demonstrates that it meets the criteria for reduced monitoring in paragraphs (e)(1) through (e)(3) of this section, except for a system that has been on increased monitoring under the provisions of paragraph (f) of this section. A system on increased monitoring under paragraph (f) of this section must meet the provisions of paragraph (g) of this section to go to quarterly monitoring and must meet the provisions of paragraph (h) of this section to go to annual monitoring.

(1) The system has a clean compliance history for a minimum of 12 months;

(2) The most recent sanitary survey shows that the system is free of sanitary defects or has corrected all identified sanitary defects, has a protected water source, and meets approved construction standards; and

(3) The State has conducted an annual site visit within the last 12 months and the system has corrected all identified sanitary defects. The system may substitute a Level 2 assessment that meets the criteria in §141.859(b) for the State annual site visit.

(f) *Increased monitoring requirements for systems on quarterly or annual monitoring.* A system on quarterly or annual monitoring that experiences any of the events identified in paragraphs (f)(1) through (f)(4) of this section must begin monthly monitoring the month following the event. A system on annual monitoring that experiences the event identified in paragraphs (f)(5) of this section must begin quarterly monitoring the quarter following the event. The system must continue monthly or quarterly monitoring until the requirements in paragraph (g) of this section for quarterly monitoring or paragraph (h) of this section for annual monitoring are met. A system on monthly monitoring for reasons other than those identified in paragraphs (f)(1) through (f)(4) of this section is not considered to be on increased monitoring for the purposes of paragraphs (g) and (h) of this section.

(1) The system triggers a Level 2 assessment or two Level 1 assessments under the provisions of §141.859 in a rolling 12-month period.

(2) The system has an *E. coli* MCL violation.

(3) The system has a coliform treatment technique violation.

(4) The system has two subpart Y monitoring violations or one subpart Y monitoring violation and one Level 1 assessment under the provisions of §141.859 in a rolling 12-month period for a system on quarterly monitoring.

(5) The system has one subpart Y monitoring violation for a system on annual monitoring.

(g) *Requirements for returning to quarterly monitoring.* The State may reduce the monitoring frequency for a system on monthly monitoring triggered under paragraph (f) of this section to quarterly monitoring if the system meets the criteria in paragraphs (g)(1) and (g)(2) of this section.

(1) Within the last 12 months, the system must have a completed sanitary survey or a site visit by the State or a voluntary Level 2 assessment by a party approved by the State, be free of sanitary defects, and have a protected water source; and

(2) The system must have a clean compliance history for a minimum of 12 months.

(h) *Requirements for systems on increased monitoring to qualify for annual monitoring.* The State may reduce the monitoring frequency for a system on increased monitoring under paragraph (f) of this section if the system meets the criteria in paragraph (g) of this section plus the criteria in paragraphs (h)(1) and (h)(2) of this section.

(1) An annual site visit by the State and correction of all identified sanitary defects. The system may substitute a voluntary Level 2 assessment by a party approved by the State for the State annual site visit in any given year.

(2) The system must have in place or adopt one or more additional enhancements to the water system barriers to contamination in paragraphs (h)(2)(i) through (h)(2)(v) of this section.

(i) Cross connection control, as approved by the State.

(ii) An operator certified by an appropriate State certification program or regular visits by a circuit rider certified by an appropriate State certification program.

(iii) Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the State.

(iv) Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under §141.403(b)(3).

(v) Other equivalent enhancements to water system barriers as approved by the State.

(i) *Seasonal systems.* (1) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for startup sampling prior to serving water to the public.

(2) A seasonal system must monitor every month that it is in operation unless it meets the criteria in paragraphs (i)(2)(i) through (iii) of this section to be eligible for monitoring less frequently than monthly beginning April 1, 2016, except as provided under paragraph (c) of this section.

(i) Seasonal systems monitoring less frequently than monthly must have an approved sample siting plan that designates the time period for monitoring based on site-specific considerations (e.g., during periods of highest demand or highest vulnerability to contamination). Seasonal systems must collect compliance samples during this time period.

(ii) To be eligible for quarterly monitoring, the system must meet the criteria in paragraph (g) of this section.

(iii) To be eligible for annual monitoring, the system must meet the criteria under paragraph (h) of this section.

(3) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating, except that systems that monitor less frequently than monthly must still monitor during the vulnerable period designated by the State.

(j) *Additional routine monitoring the month following a total coliform-positive sample.* Systems collecting samples on a quarterly or annual frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the State may waive this requirement if the conditions of paragraph (j)(1), (2), or (3) of this section are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations under §141.859(a).

(1) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

(2) The State may waive the requirement to collect three routine samples

the next month in which the system provides water to the public if the State has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.

(3) The State may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the State determines that the system has corrected the contamination problem before the system takes the set of repeat samples required in §141.858, and all repeat samples were total coliform-negative, the State may waive the requirement for additional routine monitoring the next month.

§ 141.855 Routine monitoring requirements for community water systems serving 1,000 or fewer people using only ground water.

(a) *General.* (1) The provisions of this section apply to community water systems using only ground water (except ground water under the direct influence of surface water, as defined in §141.2) and serving 1,000 or fewer people.

(2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.

(3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.

(b) *Monitoring frequency for total coliforms.* The monitoring frequency for total coliforms is one sample/month, except as provided for under paragraphs (c) through (f) of this section.

(c) *Transition to subpart Y.* (1) All systems must continue to monitor according to the total coliform monitoring schedules under §141.21 that were in effect on March 31, 2016, unless any of the conditions in paragraph (e) of this section are triggered on or after April 1, 2016, or unless otherwise directed by the State.

(2) Beginning April 1, 2016, the State must perform a special monitoring evaluation during each sanitary survey to review the status of the system, including the distribution system, to determine whether the system is on an appropriate monitoring schedule. After the State has performed the special monitoring evaluation during each sanitary survey, the State may modify the system's monitoring schedule, as necessary, or it may allow the system to stay on its existing monitoring schedule, consistent with the provisions of this section. The State may not allow systems to begin less frequent monitoring under the special monitoring evaluation unless the system has already met the applicable criteria for less frequent monitoring in this section.

(d) *Criteria for reduced monitoring.* (1) The State may reduce the monitoring frequency from monthly monitoring to no less than quarterly monitoring if the system is in compliance with State-certified operator provisions and demonstrates that it meets the criteria in paragraphs (d)(1)(i) through (d)(1)(iii) of this section. A system that loses its certified operator must return to monthly monitoring the month following that loss.

(i) The system has a clean compliance history for a minimum of 12 months.

(ii) The most recent sanitary survey shows the system is free of sanitary defects (or has an approved plan and schedule to correct them and is in compliance with the plan and the schedule), has a protected water source and meets approved construction standards.

(iii) The system meets at least one of the following criteria:

(A) An annual site visit by the State that is equivalent to a Level 2 assessment or an annual Level 2 assessment by a party approved by the State and correction of all identified sanitary defects (or an approved plan and schedule to correct them and is in compliance with the plan and schedule).

(B) Cross connection control, as approved by the State.

(C) Continuous disinfection entering the distribution system and a residual in the distribution system in accordance with criteria specified by the State.

(D) Demonstration of maintenance of at least a 4-log removal or inactivation of viruses as provided for under §141.403(b)(3).

(E) Other equivalent enhancements to water system barriers as approved by the State.

(2) [Reserved]

(e) *Return to routine monthly monitoring requirements.* Systems on quarterly monitoring that experience any of the events in paragraphs (e)(1) through (e)(4) of this section must begin monthly monitoring the month following the event. The system must continue monthly monitoring until it meets the reduced monitoring requirements in paragraph (d) of this section.

(1) The system triggers a Level 2 assessment or two Level 1 assessments in a rolling 12-month period.

(2) The system has an *E. coli* MCL violation.

(3) The system has a coliform treatment technique violation.

(4) The system has two subpart Y monitoring violations in a rolling 12-month period.

(f) *Additional routine monitoring the month following a total coliform-positive sample.* Systems collecting samples on a quarterly frequency must conduct additional routine monitoring the month following one or more total coliform-positive samples (with or without a Level 1 treatment technique trigger). Systems must collect at least three routine samples during the next month, except that the State may waive this requirement if the conditions of paragraph (f)(1), (2), or (3) of this section are met. Systems may either collect samples at regular time intervals throughout the month or may collect all required routine samples on a single day if samples are taken from different sites. Systems must use the results of additional routine samples in coliform treatment technique trigger calculations.

(1) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State, or an agent approved by the State, performs a site visit before the end of the next month in which the system provides water to the public. Although a sanitary survey need not be performed, the site visit must be sufficiently detailed to allow the State to determine whether additional monitoring and/or any corrective action is needed. The State cannot approve an employee of the system to perform this site visit, even if the employee is an agent approved by the State to perform sanitary surveys.

(2) The State may waive the requirement to collect three routine samples the next month in which the system provides water to the public if the State has determined why the sample was total coliform-positive and has established that the system has corrected the problem or will correct the problem before the end of the next month in which the system serves water to the public. In this case, the State must document this decision to waive the following month's additional monitoring requirement in writing, have it approved and signed by the supervisor of the State official who recommends such a decision, and make this document available to the EPA and the public. The written documentation must describe the specific cause of the total coliform-positive sample and what action the system has taken and/or will take to correct this problem.

(3) The State may not waive the requirement to collect three additional routine samples the next month in which the system provides water to the public solely on the grounds that all repeat samples are total coliform-negative. If the State determines that the

system has corrected the contamination problem before the system takes the set of repeat samples required in §141.858, and all repeat samples were total coliform-negative, the State may waive the requirement for additional routine monitoring the next month.

§ 141.856 Routine monitoring requirements for subpart H public water systems serving 1,000 or fewer people.

(a) *General.* (1) The provisions of this section apply to subpart H public water systems of this part serving 1,000 or fewer people.

(2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.

(3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.

(4) Seasonal systems. (i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for start-up sampling prior to serving water to the public.

(ii) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.

(b) *Routine monitoring frequency for total coliforms.* Subpart H systems of this part (including consecutive systems) must monitor monthly. Systems may not reduce monitoring.

(c) *Unfiltered subpart H systems.* A subpart H system of this part that does not practice filtration in compliance with subparts H, P, T, and W must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in §141.74(b)(2), exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in §141.859 has been exceeded.

§ 141.857 Routine monitoring requirements for public water systems serving more than 1,000 people.

(a) *General.* (1) The provisions of this section apply to public water systems serving more than 1,000 persons.

(2) Following any total coliform-positive sample taken under the provisions of this section, systems must comply with the repeat monitoring requirements and *E. coli* analytical requirements in §141.858.

(3) Once all monitoring required by this section and §141.858 for a calendar month has been completed, systems must determine whether any coliform treatment technique triggers specified in §141.859 have been exceeded. If any trigger has been exceeded, systems must complete assessments as required by §141.859.

(4) *Seasonal systems.* (i) Beginning April 1, 2016, all seasonal systems must demonstrate completion of a State-approved start-up procedure, which may include a requirement for start-up sampling prior to serving water to the public.

(ii) The State may exempt any seasonal system from some or all of the requirements for seasonal systems if the entire distribution system remains pressurized during the entire period that the system is not operating.

(b) *Monitoring frequency for total coliforms.* The monitoring frequency for total coliforms is based on the population served by the system, as follows:

TOTAL COLIFORM MONITORING FREQUENCY FOR PUBLIC WATER SYSTEMS SERVING MORE THAN 1,000 PEOPLE

Population served	Minimum number of samples per month
1,001 to 2,500	2
2,501 to 3,300	3
3,301 to 4,100	4
4,101 to 4,900	5
4,901 to 5,800	6
5,801 to 6,700	7
6,701 to 7,600	8
7,601 to 8,500	9
8,501 to 12,900	10
12,901 to 17,200	15
17,201 to 21,500	20
21,501 to 25,000	25
25,001 to 33,000	30
33,001 to 41,000	40
41,001 to 50,000	50
50,001 to 59,000	60
59,001 to 70,000	70
70,001 to 83,000	80
83,001 to 96,000	90
96,001 to 130,000	100
130,001 to 220,000	120
220,001 to 320,000	150
320,001 to 450,000	180
450,001 to 600,000	210
600,001 to 780,000	240
780,001 to 970,000	270
970,001 to 1,230,000	300
1,230,001 to 1,520,000	330
1,520,001 to 1,850,000	360
1,850,001 to 2,270,000	390
2,270,001 to 3,020,000	420
3,020,001 to 3,960,000	450
3,960,001 or more	480

(c) *Unfiltered subpart H systems.* A subpart H system of this part that does not practice filtration in compliance with subparts H, P, T, and W must collect at least one total coliform sample near the first service connection each day the turbidity level of the source water, measured as specified in § 141.74(b)(2), exceeds 1 NTU. When one or more turbidity measurements in any day exceed 1 NTU, the system must collect this coliform sample within 24 hours of the first exceedance, unless the State determines that the system, for logistical reasons outside the system's control, cannot have the sample analyzed within 30 hours of collection and identifies an alternative sample collection schedule. Sample results from this coliform monitoring must be included in determining whether the coliform treatment technique trigger in § 141.859 has been exceeded.

(d) *Reduced monitoring.* Systems may not reduce monitoring, except for non-community water systems using only ground water (and not ground water under the direct influence of surface water) serving 1,000 or fewer people in some months and more than 1,000 persons in other months. In months when more than 1,000 persons are served, the systems must monitor at the frequency specified in paragraph (a) of this section. In months when 1,000 or fewer people are served, the State may reduce the monitoring frequency, in writing, to a frequency allowed under § 141.854 for a similarly situated system that always serves 1,000 or fewer people, taking into account the provisions in § 141.854(e) through (g).

§ 141.858 Repeat monitoring and *E. coli* requirements.

(a) *Repeat monitoring.* (1) If a sample taken under §§ 141.854 though 141.857 is total coliform-positive, the system must collect a set of repeat samples within 24 hours of being notified of the positive result. The system must collect no fewer than three repeat samples for each total coliform-positive sample found. The State may extend the 24-hour limit on a case-by-case basis if the system has a logistical problem in collecting the repeat samples within 24 hours that is beyond its control. Alternatively, the State may implement criteria for the system to use in lieu of case-by-case extensions. In the case of an extension, the State must specify how much time the system has to collect the repeat samples. The State cannot waive the requirement for a system to collect repeat samples in paragraphs (a)(1) through (a)(3) of this section.

(2) The system must collect all repeat samples on the same day, except that the State may allow a system with a single service connection to collect the required set of repeat samples over a three-day period or to collect a larger volume repeat sample(s) in one or more sample containers of any size, as long as the total volume collected is at least 300 ml.

(3) The system must collect an additional set of repeat samples in the manner specified in paragraphs (a)(1) through (a)(3) of this section if one or more repeat samples in the current set of repeat samples is total coliform-positive. The system must collect the additional set of repeat samples within

24 hours of being notified of the positive result, unless the State extends the limit as provided in paragraph (a)(1) of this section. The system must continue to collect additional sets of repeat samples until either total coliforms are not detected in one complete set of repeat samples or the system determines that a coliform treatment technique trigger specified in §141.859(a) has been exceeded as a result of a repeat sample being total coliform-positive and notifies the State. If a trigger identified in §141.859 is exceeded as a result of a routine sample being total coliform-positive, systems are required to conduct only one round of repeat monitoring for each total coliform-positive routine sample.

(4) After a system collects a routine sample and before it learns the results of the analysis of that sample, if it collects another routine sample(s) from within five adjacent service connections of the initial sample, and the initial sample, after analysis, is found to contain total coliforms, then the system may count the subsequent sample(s) as a repeat sample instead of as a routine sample.

(5) Results of all routine and repeat samples taken under §§141.854 through 141.858 not invalidated by the State must be used to determine whether a coliform treatment technique trigger specified in §141.859 has been exceeded.

(b) *Escherichia coli (E. coli) testing.* (1) If any routine or repeat sample is total coliform-positive, the system must analyze that total coliform-positive culture medium to determine if *E. coli* are present. If *E. coli* are present, the system must notify the State by the end of the day when the system is notified of the test result, unless the system is notified of the result after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day.

(2) The State has the discretion to allow a system, on a case-by-case basis, to forgo *E. coli* testing on a total coliform-positive sample if that system assumes that the total coliform-positive sample is *E. coli*-positive. Accordingly, the system must notify the State as specified in paragraph (b)(1) of this section and the provisions of §141.63(c) apply.

§ 141.859 Coliform treatment technique triggers and assessment requirements for protection against potential fecal contamination.

(a) *Treatment technique triggers.* Systems must conduct assessments in accordance with paragraph (b) of this section after exceeding treatment technique triggers in paragraphs (a)(1) and (a)(2) of this section.

(1) Level 1 treatment technique triggers.

(i) For systems taking 40 or more samples per month, the system exceeds 5.0% total coliform-positive samples for the month.

(ii) For systems taking fewer than 40 samples per month, the system has two or more total coliform-positive samples in the same month.

(iii) The system fails to take every required repeat sample after any single total coliform-positive sample.

(2) Level 2 treatment technique triggers.

(i) An *E. coli* MCL violation, as specified in §141.860(a).

(ii) A second Level 1 trigger as defined in paragraph (a)(1) of this section, within a rolling 12-month period, unless the State has determined a likely reason that the samples that caused the first Level 1 treatment technique trigger were total coliform-positive and has established that the system has corrected the problem.

(iii) For systems with approved annual monitoring, a Level 1 trigger in two consecutive years.

(b) *Requirements for assessments.* (1) Systems must ensure that Level 1 and 2 assessments are conducted in order to identify the possible presence of sanitary defects and defects in distribution system coliform monitoring practices. Level 2 assessments must be conducted by parties approved by the State.

(2) When conducting assessments, systems must ensure that the assessor evaluates minimum elements that include review and identification of inadequacies in sample sites; sampling protocol; sample processing; atypical events that could affect distributed water quality or indicate that distributed water quality was impaired;

changes in distribution system maintenance and operation that could affect distributed water quality (including water storage); source and treatment considerations that bear on distributed water quality, where appropriate (e.g., small ground water systems); and existing water quality monitoring data. The system must conduct the assessment consistent with any State directives that tailor specific assessment elements with respect to the size and type of the system and the size, type, and characteristics of the distribution system.

(3) *Level 1 assessments.* A system must conduct a Level 1 assessment consistent with State requirements if the system exceeds one of the treatment technique triggers in paragraph (a)(1) of this section.

(i) The system must complete a Level 1 assessment as soon as practical after any trigger in paragraph (a)(1) of this section. In the completed assessment form, the system must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified. The system must submit the completed Level 1 assessment form to the State within 30 days after the system learns that it has exceeded a trigger.

(ii) If the State reviews the completed Level 1 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the State must consult with the system. If the State requires revisions after consultation, the system must submit a revised assessment form to the State on an agreed-upon schedule not to exceed 30 days from the date of the consultation.

(iii) Upon completion and submission of the assessment form by the system, the State must determine if the system has identified a likely cause for the Level 1 trigger and, if so, establish that the system has corrected the problem, or has included a schedule acceptable to the State for correcting the problem.

(4) *Level 2 assessments.* A system must ensure that a Level 2 assessment consistent with State requirements is conducted if the system exceeds one of the treatment technique triggers in paragraph (a)(2) of this section. The system must comply with any expedited actions or additional actions required by the State in the case of an *E. coli* MCL violation.

(i) The system must ensure that a Level 2 assessment is completed by the State or by a party approved by the State as soon as practical after any trigger in paragraph (a)(2) of this section. The system must submit a completed Level 2 assessment form to the State within 30 days after the system learns that it has exceeded a trigger. The assessment form must describe sanitary defects detected, corrective actions completed, and a proposed timetable for any corrective actions not already completed. The assessment form may also note that no sanitary defects were identified.

(ii) The system may conduct Level 2 assessments if the system has staff or management with the certification or qualifications specified by the State unless otherwise directed by the State.

(iii) If the State reviews the completed Level 2 assessment and determines that the assessment is not sufficient (including any proposed timetable for any corrective actions not already completed), the State must consult with the system. If the State requires revisions after consultation, the system must submit a revised assessment form to the State on an agreed-upon schedule not to exceed 30 days.

(iv) Upon completion and submission of the assessment form by the system, the State must determine if the system has identified a likely cause for the Level 2 trigger and determine whether the system has corrected the problem, or has included a schedule acceptable to the State for correcting the problem.

(c) *Corrective action.* Systems must correct sanitary defects found through either Level 1 or 2 assessments conducted under paragraph (b) of this section. For corrections not completed by the time of submission of the assessment form, the system must complete the corrective action(s) in compliance with a timetable approved by the State in consultation with the system. The system must notify the State when each scheduled corrective action is completed.

(d) *Consultation.* At any time during the assessment or corrective action phase, either the water system or the State may request a consultation with the other party to determine the appropriate actions to be taken. The system may consult with the State on all relevant information that may impact on its ability to comply with a requirement of this subpart, including the method of accomplishment, an appropriate timeframe, and other relevant information.

§ 141.860 Violations.

(a) *E. coli MCL Violation.* A system is in violation of the MCL for *E. coli* when any of the conditions identified in paragraphs (a)(1) through (a)(4) of this section occur.

(1) The system has an *E. coli*-positive repeat sample following a total coliform-positive routine sample.

(2) The system has a total coliform-positive repeat sample following an *E. coli*-positive routine sample.

(3) The system fails to take all required repeat samples following an *E. coli*-positive routine sample.

(4) The system fails to test for *E. coli* when any repeat sample tests positive for total coliform.

(b) *Treatment technique violation.* (1) A treatment technique violation occurs when a system exceeds a treatment technique trigger specified in § 141.859(a) and then fails to conduct the required assessment or corrective actions within the timeframe specified in § 141.859(b) and (c).

(2) A treatment technique violation occurs when a seasonal system fails to complete a State-approved start-up procedure prior to serving water to the public.

(c) *Monitoring violations.* (1) Failure to take every required routine or additional routine sample in a compliance period is a monitoring violation.

(2) Failure to analyze for *E. coli* following a total coliform-positive routine sample is a monitoring violation.

(d) *Reporting violations.* (1) Failure to submit a monitoring report or completed assessment form after a system properly conducts monitoring or assessment in a timely manner is a reporting violation.

(2) Failure to notify the State following an *E. coli*-positive sample as required by § 141.858(b)(1) in a timely manner is a reporting violation.

(3) Failure to submit certification of completion of State-approved start-up procedure by a seasonal system is a reporting violation.

§ 141.861 Reporting and recordkeeping.

(a) *Reporting*—(1) *E. coli.* (i) A system must notify the State by the end of the day when the system learns of an *E. coli* MCL violation, unless the system learns of the violation after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day, and notify the public in accordance with subpart Q of this part.

(ii) A system must notify the State by the end of the day when the system is notified of an *E. coli*-positive routine sample, unless the system is notified of the result after the State office is closed and the State does not have either an after-hours phone line or an alternative notification procedure, in which case the system must notify the State before the end of the next business day.

(2) A system that has violated the treatment technique for coliforms in § 141.859 must report the violation to the State no later than the end of the next business day after it learns of the violation, and notify the public in accordance with subpart Q of this part.

(3) A system required to conduct an assessment under the provisions of § 141.859 of this part must submit the assessment report within 30 days. The system must notify the State in accordance with § 141.859(c) when each scheduled corrective action is completed for corrections not completed by the time of submission of the assessment form.

(4) A system that has failed to comply with a coliform monitoring requirement must report the monitoring violation to the State within 10 days

after the system discovers the violation, and notify the public in accordance with subpart Q of this part.

(5) A seasonal system must certify, prior to serving water to the public, that it has complied with the State-approved start-up procedure.

(b) *Recordkeeping.* (1) The system must maintain any assessment form, regardless of who conducts the assessment, and documentation of corrective actions completed as a result of those assessments, or other available summary documentation of the sanitary defects and corrective actions taken under § 141.859 for State review. This record must be maintained by the system for a period not less than five years after completion of the assessment or corrective action.

(2) The system must maintain a record of any repeat sample taken that meets State criteria for an extension of the 24-hour period for collecting repeat samples as provided for under § 141.858(a)(1) of this part.

[78 FR 10354, Feb. 13, 2013, as amended at 79 FR 10670, Feb. 26, 2014]

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

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National Archives and Records Administration
1985

Federal Register

Thursday,
December 7, 2000

Part II

Environmental Protection Agency

40 CFR Parts 9, 141, and 142

National Primary Drinking Water Regulations; Radionuclides; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 9, 141, and 142

[FRL–6909–3]

RIN 2040–AC98

National Primary Drinking Water Regulations; Radionuclides; Final Rule

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: Today, EPA is finalizing maximum contaminant level goals (MCLGs), maximum contaminant levels (MCLs), and monitoring, reporting, and public notification requirements for radionuclides. Today's rule is only applicable to community water systems. Today's rule includes requirements for uranium, which is not currently regulated, and revisions to the monitoring requirements for combined radium-226 and radium-228, gross alpha particle radioactivity, and beta particle and photon radioactivity. Based on an improved understanding of the risks associated with radionuclides in drinking water, the current MCL for combined radium-226/-228 and the current MCL for gross alpha particle radioactivity will be retained. Based on the need for further evaluation of the various risk management issues associated with the MCL for beta particle and photon radioactivity and the flexibility to review and modify standards under the Safe Drinking Water Act (SDWA), the current MCL for beta particle and photon radioactivity will be retained in this final rule, but will be further reviewed in the near future.

Some parts of EPA's 1991 proposal, including the addition of MCLGs and the National Primary Drinking Water Regulation (NPDWR) for uranium, are required under the SDWA. Other portions were intended to make the radionuclides NPDWRs more consistent with other NPDWRs, *e.g.,* revisions to monitoring frequencies and the point of compliance. Lastly, some portions were contingent upon 1991 risk analyses, *e.g.,* MCL revisions to the 1976 MCLs for combined radium-226 and -228, gross alpha particle radioactivity, and beta particle and photon radioactivity. The portions required under SDWA and the portions intended to make the radionuclides NPDWRs more consistent with other NPDWRs are being finalized today. The portions contingent upon the outdated risk analyses supporting the 1991 proposal are not being finalized today, in part based on updated risk analyses.

DATES: This regulation is effective December 8, 2003. The incorporation by reference of the publications listed in today's rule is approved by the Director of the Federal Register as of December 8, 2003. For judicial review purposes, this final rule is promulgated as of 1 p.m. Eastern Time on December 7, 2000.

ADDRESSES: The record for this regulation has been established under the docket name: National Primary Drinking Water Regulations for Radionuclides (W–00–12). The record includes public comments, applicable **Federal Register** notices, other major supporting documents, and a copy of the index to the public docket. The record is available for inspection from 9 a.m. to 4 p.m., Eastern Standard Time, Monday through Friday, excluding Federal holidays, at the Water Docket, 401 M Street SW, East Tower Basement (Room EB 57), Washington, DC 20460. For access to the Docket materials, please call (202) 260–3027 to schedule an appointment.

FOR FURTHER INFORMATION CONTACT: For technical inquiries, contact David Huber, Standards and Risk Management Division, Office of Ground Water and Drinking Water, EPA (MC–4607), 1200 Pennsylvania Avenue, NW., Washington, DC 20460; telephone (202) 260–9566. For general inquiries, the Safe Drinking Water Hotline is open Monday through Friday, excluding Federal holidays, from 9:00 a.m. to 5:30 p.m. Eastern Standard Time. The Safe Drinking Water Hotline toll free number is (800) 426–4791.

SUPPLEMENTARY INFORMATION:

Regulated Entities

Entities potentially regulated by this rule are public water systems that are classified as community water systems (CWSs). Community water systems provide water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serve an average of at least 25 people year-round. Regulated categories and entities include:

Category	Examples of regulated entities
Industry	Privately-owned community water systems.
State, Tribal, Local, and Federal Governments.	Publicly-owned community water systems.

This table is not intended to be exhaustive, but rather, provides a guide for readers regarding entities likely to be regulated by this action. Other types of entities not listed in the table could also be regulated. To determine whether your facility is regulated by this action, you should carefully examine the applicability criteria in §§ 141.26(a)(1)(i), 141.26(a)(1)(ii), 141.26(b)(1), and 141.26(b)(2) of this rule. If you have questions regarding the applicability of this action to a particular entity, consult the person listed in the preceding **FOR FURTHER INFORMATION CONTACT** section.

Abbreviations and Acronyms Used in This Document

ASTM: American Society for Testing and Materials
AWWA: American Water Works Association
BAT: Best available treatment
BEIR: Biological effects of ionizing radiation
CFR: Code of Federal Regulations
CWS: Community water systems
EDE: Effective dose equivalent
EML: Environmental Measurements Laboratory
FR: Federal Register
ICRP: International Commission on Radiological Protection
IE: Ion exchange
kg: Kilogram
L/day: Liter per day
LET: Low energy transfer
LOAEL: Lowest observed adverse effect level
MCL: Maximum contaminant level
MCLG: Maximum contaminant level goal
mg/L: Milligram per liter
μg/L: Microgram per liter
mGy: MilliGray
mrem: Millirem
mrem/yr: Millirem per year
NBS: National Bureau of Standards
NDWAC: National Drinking Water Advisory Committee
NIRS: National Inorganic and Radionuclide Survey
NIST: National Institute of Standards and Technology
NODA: Notice of Data Availability
NPDWRs: National Primary Drinking Water Regulations
NRC: National Research Council
NTIS: National Technical Information Service
NTNC: Non-transient, non-community
NTNCWS: Non-transient, non-community water systems
pCi: Picocurie
pCi/L: Picocurie per liter
PE: Performance evaluation
PNR: Public Notification Rule
POE: Point-of-entry
POU: Point-of-use
PQL: Practical quantitation level
PT: Performance testing
RADRISK: A computer code for radiation risk estimation
RfD: Reference dose
RO: Reverse osmosis
SM: Standard methods
SMF: Standardized monitoring framework
SSCTL: "Small Systems Compliance Technology List"
SWTR: Surface Water Treatment Rule
TAW: Technical Advisory Workgroup
UCMR: Unregulated Contaminant Monitoring Rule

UNSCEAR: United Nations Scientific Committee on the Effects of Atomic Radiation
USDOE: United States Department of Energy
USEPA: United States Environmental Protection Agency
USGS: United States Geological Survey

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I. Background and Summary of the Final Rule

A. What Did EPA Propose in 1991?

In 1991, EPA proposed a number of changes and additions to the radionuclides NPDWRs. Among other things, EPA proposed to:

- Set a maximum contaminant level goal (MCLG) of zero for all radionuclides.
- Set a maximum contaminant level (MCL) of 20 µg/L or 30 pCi/L for uranium (with options of 5 pCi/L to 80 µg/L).
- Change the radium standard from a combined limit for radium-226 and 228 of 5 pCi/L to separate standards at 20 pCi/L.
- Remove radium-226 from the radionuclides included in the definition

of gross alpha, while keeping the gross alpha MCL at 15 pCi/L, since the proposed radium-226 MCL was greater than the gross alpha MCL.

- Change dose limit from critical organ dose (millirems) to ''weighted whole body dose'' (millirems-effective dose equivalent).
- Require community water systems which are determined by the State to be vulnerable or contaminated to monitor for beta particle and photon radioactivity, rather than at all surface water systems serving a population over 100,000 people (as under the current 1976 rule).
- Establish a monitoring framework more in line with the standardized monitoring framework used for other contaminants.
- Exclude compositing for beta particle and photon emitters.
- Include non-transient, non-community water systems (NTNCWSs) in the regulation.
- Require that each entry point to the distribution system be monitored to ensure that each household in the system received water protective at the MCL.

B. Why Did EPA Propose Changes to the Radionuclides Drinking Water Regulations in 1991?

In 1976, National Interim Primary Drinking Water Regulations were promulgated for radium-226 and -228, gross alpha particle radioactivity and beta particle and photon radioactivity. The health risk basis for the 1976 radionuclides MCLs was described in the recent radionuclides Notice of Data Availability (NODA), (65 FR 21575, April 21, 2000). The 1986 reauthorization of the Safe Drinking Water Act (SDWA) required EPA to promulgate MCLGs and National Primary Drinking Water Regulations (NPDWRs) for the above radionuclides, radon and uranium. Also in 1986, EPA published an Advance Notice of Proposed Rulemaking for the radionuclides NPDWRs (EPA 1986), which stated EPA's intent to accomplish this goal. In 1991, EPA proposed changes to the current radionuclides standards and new standards for radon and uranium. EPA determined that both combined radium-226 and -228 and uranium could be analytically quantified and treated to 5 pCi/L. However, EPA concluded that, given the much greater cost-effectiveness of reducing risk through radon water treatment relative to radium and uranium, the feasible levels were 20 pCi/L each for radium-226 and -228 and 20 µg/L (or 30 pCi/L) for uranium. Between 1986 and 1991, EPA made risk estimates based on then-current models and information, as described in the NODA (EPA 2000e) and its Technical Support Document (USEPA 2000h). The 1991 risk estimates[1] indicated that the proposed MCL changes would result in lifetime cancer risks within the risk range of 10^{-6} and 10^{-4} (one in one million to one in ten thousand) that EPA considers in establishing NPDWRs. The 1991 proposed uranium MCL was based on both kidney toxicity risk and cancer risk. All MCLGs for radionuclides were proposed as zero pCi/L, based on a linear no-threshold cancer risk model for ionizing radiation. A summary of the difference between the 1976 rule and the 1991 proposal are presented in Table I–1. The detailed differences between the 1976 rule and the 1991 proposal can be found in the record for this rulemaking (EPA 1976; 1986; 1991; 2000a).

TABLE I–1.—COMPARISON OF THE 1976 RULE, 1991 PROPOSAL, AND 2000 FINAL RULE

Provision	1976 rule (current rule)	1991 proposal	2000 final rule
Affected Systems	CWS	CWS + NTNC	CSW.
MCLG for all radionuclides.	No MCLG	MCLG of zero	MCLG of zero.
Radium MCL	Combined Ra-226 + Ra-228 MCL of 5pCi/L.	Ra-226 MCL of 20 pCi/L Ra-228 MCL of 20 pCi/L	Maintain current MCL based on the newly estimated risk level associated with the 1991 proposed MCL.
Beta/Photon Radioactivity MCL.	• ≤ 4 mrem/y to the total body or any given internal organ • Except for H-3 and Sr-90, derived radionucide-specific activity concentrations yielding 4 mrem/y based on NSB Handbood 69 and 2L/d • H-3 = 20,000 pCi/L; Sr-90 = 8 pCi/L • Total dose from co-occurring beta/photon emitters must be ≤ 4 mrem/y to the total body of any internal organ	• 4 mrem/y effective dose equivalent (ede) • Re-derived radionuclide-specific activity concentrations yielding 4 mrem/y ede based on EPA RADRISK code and 2 L/d • Total dose from co-occurring beta/photon emitters must be < 4 mrem/y ede	Maintain current MCL based on the newly estimated risk level associated with the 1991 proposed MCL. This MCL will be reviewed within 2 to 3 years based on a need for further re-evaluation of risk management issues.
Gross alpha MCL	15 pCi/L excluding U and Rn, but including Ra-226.	''Adjusted'' gross aplha MCL of 15 pCi/L, excluding Ra-226, radon, and uranium.	Maintain current MCL based on the newly estimated risk level associated with the 1991 proposed MCL.
Polonium-210	Included in gross alpha	Included in gross alpha	Included under gross alpha, as in current rule. Monitoring required under the UCMR rule. Further action may be proposed at a later date.
Lead-210	Not Regulated	Included in beta particle and photon radioactivity; concentration limit proposed at 1 pCi/L.	No changes to current rule. Monitoring required under the UCMR rule. Further action may be proposed at a later date.
Uranium MCL	Not Regulated	20 g/L or 30 pCi/L w/ option for 5 pCi/L–80 g/L.	30 µ/L.

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[1] The 1991 cancer risk estimates were based on the now-outdated RADRISK model (see the NODA and its Technical Support Document, USEPA 2000e and h).

TABLE I–1.—COMPARISON OF THE 1976 RULE, 1991 PROPOSAL, AND 2000 FINAL RULE—Continued

Provision	1976 rule (current rule)	1991 proposal	2000 final rule
Ra-224	Part of gross alpha, but sample holding time too long to capture Ra-224.	Part of gross alpha, but sample holding time too long to capture Ra-224.	No changes to current gross alpha rule. Will collect national occurrence information; further action may be proposed at a later date.
Radium monitoring	Ra-226 linked to Ra-228; measure Ra-228 if Ra-226 > 3 pCi/L and sum.	Measure Ra-226 and -228 separately	Measure Ra-226 and -228 separately.
Monitoring baseline	4 quarterly measurements. Monitoring reduction based on results: > 50% of MCL required 4 samples every 4 yrs; < 50% of MCL reguired 1 sample every 4 yrs	Annual samples for 3 years; Std Monitoring Framework: > 50% of MCL required 1 sample every 3 years; < 50% of MCL enabled system to apply for waiver to 1 sample every 9 years.	Implement Std Monitoring Framework as proposed in 1991. Four initial consecutive quarterly samples in first cycle. If initial average level > 50% of MCL: 1 sample every 3 years; < 50% of MCL: 1 sample every 6 years; Non-detect: 1 sample every 9 years. (beta particle and photon radioactivity has a unique schedule—see section III, part—K) States will have discretion in data grandfathering for establishing initial monitoring baseline.
Beta particle and photon emitters monitoring.	Surface water systems > 100,000 population Screen at 50 pCi/L/; vulnerable systems screen at 15 pCi/L.	Ground and surface water systems within 15 miles of source screen at 30 or 50 pCi/K.	CWSs determined to be vulnerable by the State screen at 50 pCi/L.
Gross alpha monitoring.	Analyze up to one year later	Six month holding time for gross alpha samples; Annual compositing of samples allowed.	As proposed in 1991.
Analytical Methods	Provide methods	Method updates proposed in 1991; Current methods were updated in 1997.	Current methods with clarifications.

C. What New Information Has Become Available Since 1991? Overview of the 2000 Notice of Data Availability (NODA)

EPA published a Notice of Data Availability (NODA) on April 21, 2000. This NODA described the new information that has become available since the 1991 proposal and the basis for today's final regulatory decisions. The most significant source of new information is Federal Guidance Report-13 (FGR–13) (USEPA 1999b), ''Cancer Risk Coefficients for Environmental Exposure to Radionuclides,'' which provides the numerical factors used in estimating cancer risks from low-level exposures to radionuclides. The risk coefficients in FGR–13 are based on state-of-the-art methods and models and are a significant improvement over the risk coefficients that supported the 1991 radionuclides proposal. FGR–13 is the latest report in a series of Federal guidance documents that are intended to provide Federal and State agencies technical information to assist their implementation of radiation protection programs. FGR–13 was formally reviewed by EPA's Science Advisory Board and was peer-reviewed by academic and government radiation experts. An interim version of the report was published for public comment in January of 1998. Comments were provided by Federal Agencies, including the Nuclear Regulatory Commission and the Department of Energy, State Agencies, and the public. The final version (September 1999) reflects consideration of all of these comments. The risk analyses supporting today's regulatory decisions are described in detail in the NODA (EPA 2000e) and its Technical Support Document (USEPA 2000h).

The NODA also reported the results from a June 1998 USEPA workshop held to discuss non-cancer toxicity issues associated with exposure to uranium from drinking water. At this workshop, a panel of experts reviewed and evaluated new information regarding kidney toxicity was examined. The findings from this workshop can be found in the NODA's Technical Support Document (USEPA 2000h).

Other important new information includes the results from a 1998 U.S. Geological Survey study which targeted the occurrence of radium-224 and beta particle/photon radioactivity (USEPA 2000e and h). Previously, it was assumed that the alpha-emitting radium-224 isotope rarely occurred in drinking water. If present in drinking water, because of its short half-life (3.6 days) and estimated low occurrence, it was thought that sufficient time would elapse to allow the isotope to decay to low levels before entry into the distribution system. Hence, radium-224 was not thought to appreciably occur in drinking water. This new information indicates that radium-224 significantly (positively) correlates with both radium-228 (correlation coefficient of 0.82) and radium-226 (correlation coefficient of 0.69), suggesting that radium-224 should be evaluated as a potential drinking water contaminant of national concern (USEPA 2000h). The impact of this and other information on decisions regarding radium-224 is discussed in part D of this section. In addition to the radium-224 occurrence information, the USGS study also determined that the majority of the beta particle/photon radioactivity in the samples collected was due to the presence of radium-228 and potassium-40, both naturally occurring contaminants. Since radium-228 is regulated under the combined radium-226/-228 standard and potassium-40 is not regulated, this suggests that most situations in which the beta/photon screening level is exceeded will not result in MCL violations. Of more concern, minor contributions from naturally occurring lead-210 were also reported. Lead-210 occurrence will be studied under the Unregulated Contaminant Monitoring Rule (UCMR).

In addition to this new technical information, the NODA also described the 1996 changes to the statutory framework for setting drinking water NPDWRs. The SDWA, as amended in 1996, requires EPA to review and revise, as appropriate, each national drinking water regulation at least once every six years. The Act also requires that any revision to an NPDWR ''maintain, or provide for greater, protection of the health of persons'' (section 1412(b)(9)).

Regarding the setting of new NPDWRs, the SDWA as amended in 1996 gives EPA the flexibility to set an MCL at a level less stringent than the feasible level, if the Administrator determines that the benefits do not justify the costs at the feasible level. If the Administrator makes this finding, the Act directs EPA to set the MCL at a level that ''maximizes health risk reduction benefits at a cost that is justified by the benefits'' (section 1412(b)(6)). This provision applies to uranium only, since it is the only contaminant for which a new MCL is being established by today's regulatory action.

D. What Are the Rationales for the Regulatory Decisions Being Promulgated Today?

As previously discussed, EPA is retaining the current MCLs for combined radium-226 and 228, gross alpha particle radioactivity, and beta particle and photon radioactivity and is promulgating a new standard for uranium. The following is a discussion of the rationales supporting these decisions. In addition to the responses to major comments in the following section, responses to each individual comment are in the comment response document which is available for review in the docket for this final rule.

1. Retaining the Combined Radium-226 and Radium-228 MCL

The 1991 proposed changes to the MCLs for combined radium-226 and radium-228 were premised on a cost-effectiveness trade-off between radium mitigation and radon mitigation (a radon standard was also included in the 1991 proposal). This cost-effectiveness argument was used to support a proposal to raise the combined radium-226/-228 MCL of 5 pCi/L to individual MCLs of 20 pCi/L for each isotope. At the time, it was thought that the risks associated with 20 pCi/L of radium-226 and radium-228 were within the 10^{-6} to 10^{-4} risk range. However, current risk analyses based on Federal Guidance Report-13 (see Part C of this section) indicate that these higher MCLs have associated risks that are well above the 10^{-6} to 10^{-4} risk range. For details on the basis and findings of this risk analysis, see the NODA (USEPA 2000e) and its Technical Support Document (USEPA 2000h). Since this proposed change would introduce higher risks than envisioned in the original 1976 rule, approaching lifetime cancer risks of one in one thousand (10^{-3}) for occurrence at or near the 1991 proposed MCLs, EPA believes that its decision to retain the current combined radium-226/-228 MCL of 5 pCi/L is justified. Under the 1996 Amendments to the Safe Drinking Water Act, EPA is required to ensure that any revision to a drinking water regulation maintains or provides for greater protection of the health of persons (section 1412(b)(9)).

a. Major Comments Regarding Retention of the Combined Radium-226 and Radium-228 MCL

The major comments and responses concerning the retention of the combined radium-226 and radium-228 MCL are summarized in part E of this section (''What are the health effects that may result from exposure to radionuclides in drinking water?'').

2. The Final Uranium MCL

a. What Is the Final MCL for Uranium and the Rationale for That Regulatory Level?

With today's rule, EPA is promulgating a uranium MCL of 30 μg/L. The SDWA generally requires that EPA set the MCL for each contaminant as close as feasible to the MCLG, based on available technology and taking costs to large systems into account. The 1996 amendments to the SDWA added the requirement that the Administrator determine whether or not the quantifiable and non-quantifiable benefits of an MCL justify the quantifiable and non-quantifiable costs based on the Health Risk Reduction and Cost Analysis (HRRCA) required under section 1412(b)(3)(C). The 1996 SDWA amendments also provided new discretionary authority for the Administrator to set an MCL that is less stringent than the feasible level if the benefits of an MCL set at the feasible level would not justify the costs (section 1412(b)(6)). This final rule establishing an MCL for uranium of 30 μg/L is the first time EPA has invoked this new authority.

In conducting this analysis, EPA considered all available scientific information concerning the health effects of uranium, including various uncertainties in the interpretation of the results, as well as all costs and benefits, both quantifiable and non-quantifiable. As discussed in more detail below, all health endpoints of concern were considered in this analysis. For some of these, the risk can currently be quantified (*i.e.,* expressed in numerical terms); and for some, it cannot. Similarly, there are a variety of health and other benefits attributable to reductions in levels of uranium in drinking water, some of which can be monetized (*i.e.,* expressed in monetary terms) and others that cannot yet be monetized. All were considered in this analysis. A detailed discussion of each of the principal factors considered follows.

b. MCLG and Feasible Level for Uranium

Since uranium is radioactive and EPA uses a non-threshold linear risk model for ionizing radiation, today's rule sets the MCLG (non-enforceable health-based goal) for this contaminant at zero. The Safe Drinking Water Act requires EPA to set the MCL as close to the MCLG as is feasible, where this is defined as ''feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration) * * * '' [section 1412(b)(4)(D)]. EPA proposed a feasible level of 20 μg/L in its 1991 proposal. In doing so, EPA determined that uranium may be treatable and quantifiable at levels below 20 μg/L, however, levels below 20 μg/L were not considered feasible under the Safe Drinking Water Act. EPA believes the feasible level is still 20 μg/L.

c. Basis for 1991 Proposed MCL and Cancer Risk from Uranium

EPA is required by the Safe Drinking Water Act (section 1412(b)(2)) to regulate uranium in drinking water. In 1991, EPA proposed a uranium MCL of 20 μg/L (''mass concentration'') based on health effects endpoints of kidney toxicity and carcinogenicity. In the proposal, EPA estimated that 20 μg/L would typically[2] correspond to 30 pCi/L (''activity''), based on an assumed mass:activity ratio of 1.5 pCi/μg. While such values are known to occur in ground water, this conversion factor does not reflect our ''best estimate'' today. The best estimate of a geometric average mass:activity ratio is 0.9 pCi/μg for values near the MCL, based on data from the National Inorganics and Radionuclides Survey (see USEPA 2000h). Given the closeness of this

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[2] The actual relationship between mass concentration (μg/L) and activity (pCi/L) varies somewhat in drinking water sources, since the relative amounts of the radioactive isotopes that make up naturally occurring uranium (U–238, U–235, and U–234) vary between drinking water sources. The typical conversion factors that are observed in drinking water range from 0.67 up to 1.5 pCi/μg.

value to unity (1 pCi/μg), the available data suggests that, to a first approximation [3], the mass:activity ratio is 1:1 for typical systems. The 1991 proposed MCL of 20 μg/L was determined, at that time, to correspond to a ''drinking water equivalent level'' (DWEL [4]) with respect to kidney toxicity for a lifetime exposure. The corresponding 30 pCi/L level (based on the 1991 mass to activity conversion) was estimated to have a lifetime cancer risk of slightly below the 10^{-4} level.

Because the kidney toxicity health effects and the corresponding non-quantifiable kidney toxicity benefits are a very important consideration in setting the MCL, we first provide background on these effects before discussing the rationale for setting the uranium MCL.

d. Uranium Health Effects: Kidney Toxicity

Each kidney consists of over a million nephrons, the filtration functional units of the kidney. The nephron consists of glomeruli, which filter the blood, and renal tubules (proximal, distal, collecting duct, etc.), which collect the fluid that passes through the glomeruli (the ''filtrate''). After the filtrate flows into renal tubules, glucose, proteins, sodium, water, amino acids, and other essential substances are reabsorbed, while wastes and some fraction of electrolytes are left behind for later excretion. The efficiency of this process can be monitored by analyzing urine (''urinalysis''), which reveals the concentrations of the various constituents making up the urine. For example, protein or albumin in the urine (proteinuria or albuminuria) indicates reabsorption deficiency or leakage of albumin, a class of proteins found in blood and which are responsible for maintaining fluid balance between blood and body cells. In the case of uranium toxicity, it is not clear whether long-term exposure may lead to marked albumin loss.

The level of proteinuria in urine is an indication of the degree of kidney toxicity: levels are divided into ''trace'', ''mild'', ''moderate'', or ''marked'', which are defined by increasing levels of proteinuria. Increased excretion of protein in the urine could be the result of tubular damage, inflammation, or increased glomerular permeability. It should be noted that a gradual loss of nephrons is asymptomatic until the loss is well advanced; the kidneys normally have the ability to compensate for nephron-loss. For example, chronic renal failure occurs when there is around 60% nephron loss. During the gradual loss of functioning nephrons, the remaining nephrons appear to adapt, increasing their capacity for filtration, reabsorption, and excretion.

Uranium has been identified as a nephrotoxic metal (kidney toxicant), exerting its toxic effects by chemical action mostly in the proximal tubules in humans and animals. However, uranium is a less potent nephrotoxin than the classical nephrotoxic metals such as cadmium, lead, and mercury. Uranium has an affinity for renal proximal tubular cells and interferes with reabsorption of proteins, as previously described. Specifically, uranium-induced renal tubular dysfunction in humans is marked by mild proteinuria, due to reduced reabsorption in the proximal renal tubules. Furthermore, the pathogenesis of the kidney damage in short-term animal studies indicates that regeneration of the tubular cells may occur upon discontinuation of exposure to uranium. We do not know if uranium-induced proteinuria is an indicator of the beginning of an adverse effect or whether it is a reversible effect that does not typically result in kidney disease. Based on the uncertainty involved in the ultimate effects, the scientists at our experts workshop (discussed next) treated this effect as an indicator of an incipient change in kidney function that may lead ultimately to frank adverse effects such as breakdown of kidney tubular function. For general information on proteinuria, kidney function, and kidney disease, see the fact sheets at ''http://www.niddk.nih.gov/health/kidney/pubs/ proteinuria/proteinuria.htm'', ''http://www.niddk.nih.gov/health/kidney/pubs/yourkids/index.htm'', and ''http://www.niddk.nih.gov/health/kidney/kidney.htm'' (NIH 2000a, NIH 2000b, and NIH 2000c).

e. New Kidney Toxicity Analyses Announced in the NODA

Since the 1991 radionuclides proposal, EPA has re-evaluated the available kidney toxicity data and, based on the results of an experts workshop (see the NODA, USEPA 2000e, for details), has estimated the DWEL to be 20 μg/L. The DWEL is derived from the Reference Dose (RfD), which is an estimate of a daily ingestion exposure to the population, including sensitive subgroups, that is likely to be without an appreciable risk of deleterious effects during a lifetime. The RfD (in μg of uranium per kg of body mass per day; μg/kg/day) for uranium was calculated from the Lowest Observed Adverse Effects Level (''LOAEL''), which is the lowest level at which adverse effects were observed to occur. The LOAEL is taken directly from health effects data. The RfD is calculated by dividing the LOAEL by a numerical uncertainty factor which accounts for areas of variability in human populations because of uncertainty in the uranium health database. EPA followed the recommended methodology of the National Academy of Sciences in estimating the uncertainty factor.

As described in the NODA, we reported that our best-estimate of the LOAEL is 60 μg/kg/day, based on rat data. In support of this estimate of the DWEL, EPA has some human data which demonstrates that mild proteinuria has been observed at drinking water levels between 20 and 100 μg/L. In estimating the RfD, we have used an uncertainty factor of 100 (rounded from the product of 3 for intra-species variability, 10 for inter-species variability, and 3 for the use of a LOAEL). Using this uncertainty factor, the RfD is calculated to be 0.6 μg/kg/day. The estimated uncertainty in the RfD spans an order of magnitude (a factor of ten). The 20 μg/L DWEL is calculated by using this RfD and assuming that an adult with a body mass of 70 kilograms drinks 2 liters of water per day [5] and that 80% of exposure to uranium is from water. These calculations are described in more detail in the NODA's Technical Support Document (USEPA 2000h).

The Agency believes that 30 μg/L is protective against kidney toxicity. While 20 μg/L is the Agency's best estimate of the DWEL, there are several reasons, in the Agency's judgment, that demonstrate that there is not a predictable difference in health effects due to exposure between the DWEL of 20 μg/L and a level of 30 μg/L. For instance, variability in the normal range for proteinuria in humans is very large and there is additional variability in proteinuria levels observed at uranium

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[3] This is mentioned since, for the sake of simplicity, the reader may thus easily convert between μg/L and pCi/L. However, in current calculations, we use the geometric mean from the NIRS data, which is 0.9 pCi/μg. We reiterate that conversion factors ranging from 0.67 up to 1.5 pCi/μg do occur in drinking water sources.

[4] The drinking water equivalent level (DWEL) (μg/L) is the best estimate of the drinking water concentration that results in the Reference Dose (μg/kg/day), assuming a water ingestion rate of 2 L/day and a body mass of 70 kg.

[5] The standard assumptions for the DWEL are conservative, since the ingestion rate is at the 90th percentile, while the body mass is more typical. Conservative assumptions are used to ensure that the resulting exposure level is protective of individuals that consume significantly more water than typical and children (low body masses).

exposures large enough to induce the effect. In the existing few epidemiology studies, each of which are based on small study populations, there were some persons exposed to over five times the DWEL of 20 µg/L without the observation of effects more serious than mild proteinuria (within the high end of the normal range). An MCL of 30 µg/L represents a relatively small increase over the DWEL compared to the over-all uncertainty in the RfD and the uncertainty in the importance of the mild proteinuria observed for uranium exposures from high drinking water levels (keeping in mind that, as discussed previously, the DWEL is based on the RfD and is an estimate of a no effect level for a population). While it is assumed that risk of an effect (here a mild effect) increases as exposure increases over the RfD, it is not known at what exposure an effect is likely. Given that the uncertainty factor of 100 provides a relatively wide margin of safety, the likelihood of any significant effect in the population at 30 µg/L is very small. EPA, thus, believes that the difference in kidney toxicity risk for exposures at 20 µg/L versus 30 µg/L is insignificant.

f. Costs and Benefits From Regulating Uranium in Drinking Water

As discussed in the NODA, EPA has estimated the risk reductions, monetized benefits, and costs associated with compliance with an MCL of 20 µg/L, 40 µg/L, and 80 µg/L. In the NODA, EPA solicited comment on using its statutory authority provided in section 1412(b)(6) of the Safe Drinking Water Act to set the uranium MCL at a level higher than the proposed level of 20 µg/L, based on its analysis of costs and benefits.

The monetized costs and benefits associated with various MCL options are discussed further in section IV of today's notice and in more detail in the economic analysis support document (USEPA 2000g). Table I–2 shows incremental annual cancer risk reductions, total national annual compliance costs and monetized benefits (excluding kidney toxicity benefits), and the numbers of community water systems predicted to have MCL violations for MCLs of 80, 30, and 20 µg/L (assuming the 0.9 pCi/µg conversion factor for estimating cancer risk reductions and benefits). Keeping in mind that the monetized benefits and risk reductions exclude kidney toxicity benefits, several things can be noted from the analysis. Focusing on the MCL change from 30 µg/L to 20 µg/L (see lower part of table I–2), one can see that the incremental benefits for implementing an MCL of 30 µg/L are three times greater than the incremental benefits for a lower MCL of 20 µg/L, while the incremental annual costs are much closer in magnitude ($54 million vs. $39 million). In terms of incremental cancer cases avoided, the estimated number of cancer cases avoided for an MCL of 30 µg/L is 0.8 annually, while lowering the MCL to 20 µg/L would result in an additional 0.2 cases avoided annually (25% reduction) at an additional cost of $39 million annually (75% increase). Approximately 37% of systems predicted to have MCL violations occur between 30 µg/L and 20 µg/L, resulting in significant increases in annual compliance costs (42% of national compliance costs occur between 30 µg/L and 20 µg/L), while the number of cancer cases avoided increases much less significantly (only 20% of cancer risk reduction occurs between 30 µg/L and 20 µg/L).

Since the kidney benefits are not quantified, this is an incomplete picture, but EPA believes that the uncertainties in the analysis of health effects are such that it is not known whether the risk of mild proteinuria are appreciably different between 20 µg/L and 30 µg/L. Assuming that there is a risk increase, it would be expected to be negligible compared to the risk increase that occurs between the highest uranium levels that occur in drinking water (*i.e.,* approximately 200 µg/L) and an MCL of 30 µg/L. Considering only cancer risk reduction benefits, the annual net benefits [6] for a uranium MCL of 20 µg/L are negative $90 million [7] and for an MCL of 30 µg/L are negative $50 million. Since the cancer risk reduction net benefits are higher at 30 µg/L than at 20 µg/L and the non-quantified kidney toxicity benefits are expected to be substantially the same at 20 µg/L and 30 µg/L, EPA believes an MCL of 30 µg/L maximizes the benefits at a cost justified by the benefits. EPA does not believe that uranium levels above 30 µg/L are protective of kidney toxicity with an acceptable margin of safety. (EPA believes that the margin of safety associated with a 30 µg/L are comparable with those at 20 µg/L.) Further, EPA believes that the net kidney toxicity benefits of an MCL greater than 30 µg/L would be less than those at 30 µg/L. Finally, EPA believes that 30 µg/L is protective of the general population, including children and the elderly.

TABLE I–2.—INCREMENTAL COSTS AND BENEFITS FOR URANIUM MCLS OF 80 µG/L, 30 µG/L, AND 20 µG/L

Uranium MCL	Exposure change	Incremental annual cancer cases avoided	Incremental annual compliance costs (in millions)	Incremental annual monetized cancer benefits (kidney benefits not monetized) (in millions)	Incremental number of community water systems impacted
80 µg/L	∞–80 µg/L	0.5	$16	$2	100
30 µg/L	80–30 µg/L	0.4	38	1	400
20 µg/L	30–20 µg/L	0.2	39	1	290
Incremental Costs and Benefits for Uranium MCLs of 30 µg/L (µg/L) and 20 µg/L only					
30 µg/L	∞–30 µg/L	0.8	54	3	500
20 µg/L	30–20 µg/L	0.2	39	1	290

Note: Numbers are rounded, so numbers resulting from addition and subtraction of the numbers shown may appear to yield incongruous results. However, the numbers shown are calculated using more significant figures and rounded after, which is the appropriate approach for numbers with large uncertainties.

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[6] Not incremental net benefits, but net benefits: ''Benefits for an MCL in isolation''—''Cost of an MCL in isolation''.

[7] Annual net benefits for an MCL of 20 µg/L = $4 million—$93 million, which rounds to negative $90 million; annual net benefits for an MCL of 30 µg/L = $3 million—$54 million, which rounds to negative $50 million. See Table IV–1, ''Summary of Costs and Benefits for Community Water Systems Predicted to Be Impacted by the Regulatory Options Being Considered for Finalization'', in today's notice and the supporting Economic Analysis (USEPA 2000g) for more details.

g. Administrator's Decision To Promulgate MCL Higher Than Feasible Level

Based on the relatively modest annual cancer risk reductions and the expected modest kidney toxicity risk reductions between 30 μg/L and 20 μg/L (see Table I–2) and the high annual compliance costs for an MCL of 20 μg/L, the Administrator has determined that the benefits do not justify the costs at the feasible level. Furthermore, as previously described, the Administrator has determined that an MCL of 30 μg/L maximizes the health risk reduction benefits at a cost justified by the benefits. In summary, this finding is based on the fact that potential uranium MCLs lower than 30 μg/L have substantially higher associated compliance costs and only modest additional cancer risk reduction and kidney toxicity benefits. EPA has not selected a higher MCL for several reasons. Higher uranium MCLs would still incur implementation and monitoring costs, with benefits greatly diminished because uranium does not occur significantly at levels much higher than 30 μg/L. Additionally, EPA believes that a uranium MCL of 30 μg/L is appropriate since it is protective of kidney toxicity and cancer with an adequate margin of safety. We do not believe that MCL options higher than 30 μg/L afford a sufficient measure of protection against kidney toxicity.

Assuming a conversion factor of 0.9 pCi/μg, an MCL of 30 μg/L will typically correspond to 27 pCi/L, which has a lifetime radiogenic cancer risk of slightly less than one in ten thousand, within the Agency's target risk range of one in one million to one in ten thousand. EPA is aware that circumstances may exist in which more extreme conversion factors (> 1.5 pCi/μg) apply. EPA does not have extensive data on these ratios at local levels, but believes these higher ratios to be rare. In these rare circumstances, uranium activities in drinking water may exceed 40 pCi/L. Although these concentrations are still within EPA's target risk ceiling of 1×10^{-4}, EPA recommends that drinking water systems subject to extreme pCi/μg conversion factors mitigate uranium levels to 30 pCi/L or less, to provide greater assurance that adequate protection from cancer health effects is being afforded.

In today's final rule, the Administrator is exercising her authority to set an MCL at a level higher than feasible (section 1412(b)(6)), based on the finding that benefits do not justify the costs at the feasible level (20 μg/L) and that the net benefits are maximized at a level (30 μg/L) that is still protective of kidney toxicity and carcinogenicity with an adequate margin of safety. EPA believes that there are considerable non-quantifiable benefits associated with ensuring that kidney toxicity risks are minimized and has weighed these non-quantifiable benefits in its decision to exercise its discretionary authority under SDWA section 1412(b)(6).

In invoking the discretionary authority of section 1412(b)(6) to set an MCL level higher than feasible, the Agency is in compliance with the provisions of section 1412(b)(6)(B). This provision provides that the judgment with respect to when benefits of the regulation would justify the costs under subparagraph (6)(A) is to be made based on assessment of costs and benefits experienced by persons served by large systems and those other systems unlikely to receive small system variances (*e.g.* systems serving up to 10,000 persons). In effect, the costs to systems likely to receive a small system variance are not to be considered in judging the point at which benefits justify costs. Subparagraph (6)(B) also provides, however, that this adjusted assessment does not apply in the case of a contaminant found ''almost exclusively'' in ''small systems eligible'' for a small system variance. Because the contaminants addressed in today's rule are found almost exclusively in small systems and because the Agency has identified affordable treatment technologies for small systems that would need to comply with today's rule (*i.e.,* we do not contemplate granting small system variances), the Agency has not adjusted the proposed MCL pursuant to subparagraph (B).

h. California Drinking Water Regulation

Approximately one-third of the community water systems that are expected to be impacted by the uranium MCL are located in California. Thus, current and likely future practices of these systems is of particular interest. The State of California currently has a drinking water standard for uranium of 20 pCi/L (enforced as 35 μg/L), which it adopted in 1989. EPA has used comments and information from the State of California in considering its MCL for uranium. The California standard is based on the California Department of Health Services' 1989 estimate of the DWEL for kidney toxicity, 35 μg/L. While California has recently proposed revising its non-enforceable public health goal for uranium in drinking water, it is not currently known what the final estimate will be. In response to the NODA, representatives of the California Department of Health Services commented that at uranium levels of 35 μg/L, most of its small water systems were able to use alternate sources of water (new wells) as a means of complying with the standard, but that 20 μg/L would lead to many of these small systems having to install treatment, which, because of waste disposal issues (*i.e.,* inability to safely dispose of hazardous radioactive wastes), could lead to a significant number of small systems being unable to come into compliance through treatment. EPA believes that these comments lend support to the choice of an MCL of 30 μg/L as being both protective of kidney toxicity and a standard that allows for significant use of non-treatment options by small systems, reducing the need for dealing with radioactive waste handling and disposal.

i. Summary of Major Comments on the Uranium Options

(1) Costs and Benefits of Uranium MCLs of 20, 40, and 80 μg/L or pCi/L: Most commenters stated that the benefits of an MCL of 20 μg/L or pCi/L did not justify the costs and suggested that EPA should exercise its authority under SDWA section 1412(b)(6) to set an MCL higher than the feasible level. As discussed previously in this section, EPA agrees that the benefits of an MCL at 20 μg/L do not justify the costs and has exercised its SDWA authority by setting the uranium MCL at a level of 30 μg/L, a level at which EPA believes the benefits do justify the costs.

(2) The Calculation of the Safe Level for Uranium in Water: One commenter suggested that the use of 70 kg as the reference body mass with a ''90th percentile ingestion rate'' of 2 L/day will lead to a kidney toxicity DWEL that is more protective than the 90th percentile. EPA agrees that it is possible that 20 μg/L is more protective than the 90th percentile value for the general population. EPA has performed a preliminary Monte Carlo analysis of the safe level that replaces point estimates for consumption rate and body mass with distributions based on the available data. Based on this analysis the 90th percentile (for the general population) equivalent level could be as high as 30 μg/L.

(3) Compliance Options for Small Systems for an MCL of 20 μg/L or pCi/L: Several commenters stated that an MCL of 20 μg/L or pCi/L would force small systems to install water treatment, rather than allowing other compliance options like installing new wells or blending water. The commenters

suggested that an MCL of 20 µg/L or pCi/L would pose a significant hardship on small systems with little benefit, including significant costs and technical problems associated with waste disposal. Commenters also suggested that a higher MCL would allow a larger fraction of small systems to use compliance options other than treatment, most notably, new well installation. EPA agrees that a lower MCL does decrease the probability that some non-treatment options could be used, including new well installation and blending. EPA agrees that the benefits of the MCL of 20 µg/L or pCi/L do not justify the costs and thus has chosen a higher MCL. EPA also believes that an MCL of 30 µg/L should allow a greater fraction of small systems to use non-treatment options for compliance, avoiding waste disposal issues and excessive treatment costs.

(4) The Use of a Dual Standard for Uranium: Commenters suggested that the use of a dual standard for uranium to ensure protectiveness of both kidney toxicity and carcinogenicity, *i.e.,* one in µg/L and one in pCi/L, would be unnecessarily complicated, since it would require that both uranium isotopic analyses and mass analyses be performed by each water system. EPA agrees that a dual standard would be unnecessarily complicated and has chosen a single standard expressed in µg/L that is protective of both kidney toxicity and carcinogenicity.

3. Retaining Beta Particle and Photon Radioactivity MCL

With today's rule, EPA is retaining the existing MCL for beta and photon emitters and the methodology for deriving concentration limits for individual beta and photon emitters that is incorporated by reference. The concentrations for these contaminants were derived from a dosimetry model used at the time the rule was originally promulgated in 1976. When these risks are calculated in accordance with the latest dosimetry models described in Federal Guidance Report 13, the risks associated with these concentrations, while varying considerably, generally fall within the Agency's current risk target range for drinking water contaminants of 10^{-4} to 10^{-6}. Accordingly, we are not changing the MCL for beta particle and photon radioactivity at this time.

We also are concerned that under the regulatory changes for the beta particle and photon radioactivity MCL proposed in 1991[8]) the concentrations of many individual radionuclides have associated lifetime cancer morbidity (and mortality) risks that exceed the Agency's target risk range. A newly proposed MCL expressed in mrem-ede could result in a more consistent risk level within the Agency's target risk range. However, in today's final rule, we are ratifying the current standard since it is protective of public health. At the same time, we believe a near future review of the beta particle and photon radioactivity MCL and the methods for calculating individual radionuclide concentration limits is appropriate. We intend to reevaluate the MCL under the authority of section 1412(b)(9) of the SDWA to ensure that the MCL reflects the best available science. This review will be performed as expeditiously as possible (expected to be 2 to 3 years).

Particular questions that we believe warrant examination as part of such a reevaluation process would include, but are not limited to, the following:

- What additional beta and photon emitters should be regulated?
- What is the appropriate aggregate MCL expression for this category of radionuclides?
- What new information concerning occurrence, analytical methods, health effects, treatment, costs, and benefits would have a bearing on this reevaluation?
- Is there an advantage to setting individual radionuclide concentration limits using a ''uniform risk level MCL''?
- If the basis of the current MCL changes, is there an advantage to and legal basis for setting concentration limits for individual beta particle and photon emitters within a guidance document that can be readily updated as scientific understanding improves?
- To what degree, in keeping with the provisions of sections 1412(b)(9) and 1412(b)(3)(A), can the existing methodology for calculating the concentration limits of individual beta and photon emitters be adjusted in accordance with the best available scientific models and information and still meet the requirement that revised regulations provide ''greater or equivalent protection to the health of persons''?
- How would any adjustments be reconciled with the requirement that MCLs be set ''as close as feasible'' to MCLGs?

Finally, we note that there should be no assumption, from the outset of this reevaluation, that the process will necessarily lead to a different set of individual beta and photon emitter concentration limits than those that result from the methodology incorporated by reference in the current and final rule. This reevaluation will involve a complicated set of legal, regulatory, and technical information that will need to be carefully considered.

a. Summary of Major Comments Regarding the Decision To Retain the Current Beta Particle and Photon Radioactivity MCL

Of the 70 commenters who responded to the April 21, 2000 NODA, approximately 14 commented on the MCL for beta particle and photon radioactivity. The commenters represented Federal agencies, State governments, local governments, water utilities, water associations, nuclear institute representatives and public interest groups. Seven commenters support EPA's proposal to retain the current MCL and several of these commenters agreed that it was appropriate to review the standard under the six year review process[9]. The commenters that supported EPA's proposal to maintain this MCL felt there was no appreciable occurrence of man-made beta emitters in drinking water, so it was not a pressing public health concern to revise the MCL. Several of these commenters also felt it was appropriate to delay action on lead-210 until more occurrence information becomes available.

Three of the 14 commenters objected to EPA's proposal to retain the current standard and to defer re-evaluation to the statutorily required six year process. These commenters felt that the Agency should propose to update the models used as the basis for the MCL on a shorter time-frame than the six year review process. The commenters felt that deferring the reevaluation of beta/photons to the six year review process would increase and perpetuate the uncertainty involved with standards which are used in waste management and cleanup decisions. One commenter pointed out that most DOE sites with

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[8] 4 mrem ede with a look-up table of concentrations different from those calculated using the current MCL and the methodology incorporated by reference in the current rule.

[9] Six Year Review Process—Under the Safe Drinking Water Act (SDWA), the U.S. Environmental Protection Agency (EPA) must periodically review existing National Primary Drinking Water Regulations (NPDWRs) and, if appropriate, revise them. This requirement is contained in section 1412(b)(9) of SDWA, as amended in 1996, which reads, ''The Administrator shall, not less often than every 6 years, review and revise, as appropriate, each national primary drinking water regulation promulgated under this title. Any revision of a national primary drinking water regulation shall be promulgated in accordance with this section, except that each revision shall maintain, or provide for greater, protection of the health of persons.''

radiological contamination are moving towards the final Record of Decision (ROD) stage (as required as part of site clean-up under the Superfund Program). The commenter felt that delaying the re-evaluation of this MCL until the next six year review process (2002–2008) would occur after most RODs were already in place and it would be too late to incorporate a new MCL into the RODs. The commenter further stated that some ROD commitments will be using clean up standards based on the 1976 values and if the standards are eventually relaxed, the committed RODs (which were based on the 1976 values) will be extremely expensive and may not be justifiable. EPA agrees that review of the MCL for beta particle and photon radioactivity is a priority and, as previously discussed in this section, the Agency intends to review this standard within the general time frame established for the U.S. Department of Energy's (DOE) submission of the licensing application for the Yucca Mountain site.

4. Retaining the Current Gross Alpha Particle Activity MCL

In 1991, EPA proposed excluding radium-226 from adjusted gross alpha particle activity, which is currently defined as the gross alpha particle activity result minus the contributions from uranium and radon (in practice, it is not necessary to exclude radon, since it volatilizes before analysis). The 1991 proposal to increase the combined radium-226/-228 MCL from 5 pCi/L combined to 20 pCi/L each made the adjusted gross alpha definition necessary, since the radium-226 MCL exceeded the adjusted gross alpha particle activity MCL. Besides addressing this inconsistency, at the time EPA believed that the unit risk from radium-226 was small enough that the change in the definition of adjusted gross alpha particle activity would not result in a significant change in health protectiveness. As discussed in the NODA, the 1991 risk analysis was based on the EPA RADRISK model, which is now outdated.

The most current risk analyses are based on FGR–13, discussed previously in today's preamble and in detail in the NODA and its Technical Support Document. These new radionuclide cancer risk coefficients greatly improved health effects analyses indicate that the unit risk from radium-226 is too significant to exclude radium-226 from adjusted gross alpha particle activity without an appreciable loss in health protectiveness. For this reason, today's rule does not change the definition of adjusted gross alpha from the current rule.

Also, as discussed in the NODA, further occurrence data will be collected for polonium-210 and radium-224 (discussed in more detail next) and, based on findings, EPA may propose in the future to address these and/or other contaminants that contribute to gross alpha particle activity through changes to the definition of adjusted gross alpha particle activity. Regardless of the findings concerning polonium-210 and radium-224 occurrence, the gross alpha particle activity standard will be reviewed under the required six year regulatory review process.

a. Summary of Major Comments Regarding the Decision to Retain the Current Definition of the (Adjusted) Gross Alpha Particle Activity MCL

Of the 70 commenters who responded to the April 21, 2000 NODA, approximately 23 commented on issues regarding the gross alpha particle activity MCL and/or whether or not to regulate polonium-210 and/or radium-224 separately. The summary of the comments regarding radium-224 is discussed further in the next section. The commenters represented State governments, local governments, water associations, water utilities, associations of elected officials and public interest groups. Of these 23 commenters, 14 stated that EPA should not regulate polonium-210 and/or radium-224 separately. Some commenters felt either the occurrence of these radionuclides is rare in water supplies or they felt that not enough occurrence data was available to warrant separate limits. EPA agrees that occurrence information should be collected before proposing separate standards. Commenters felt that occurrence information should be gathered under an unregulated contaminant monitoring mechanism, which EPA is doing in the case of polonium-210. Only one commenter supported an immediate separate standard for polonium-210 and quick gross alpha particle activity analysis to ensure that radium-224 was included in gross alpha particle activity measurement. EPA points out that a proposal would be necessary for such actions and that a proposal would require adequate occurrence information. Of those commenters who commented on retaining the current definition of the gross alpha particle activity MCL, including radium-226, most supported retaining the standard as is. However, three commenters stated that radium-226 should not be included in the gross alpha particle activity MCL, since it is already regulated in the combined radium-226/-228 standard. EPA points out that the contribution from radium-226 to the over-all risk from gross alpha particle activity is significant and that removing it would reduce the health protectiveness of the gross alpha particle activity standard. Also, two commenters felt that gross alpha particle activity should only be used as a screening tool (versus a standard) since the commonly occurring alpha emitting radionuclides are already covered under other standards. EPA points out polonium-210 is not regulated under any other standard at this time. The gross alpha particle activity standard will be reviewed under six year review and these and other considerations will be taken into account.

5. Further Study of Radium-224

As discussed in section I.C., recent studies show that there is a positive correlation between radium-228 and radium-224 (correlation coefficient of 0.82, approximately 1:1). This correlation means that in most situations in which a system has high radium-224 levels, it will also have high radium-228 levels and, with a less degree of certainty, high radium-226 levels. More details on this relationship, including the summary statistics, can be found in the NODA and its Technical Support Document (USEPA 2000e and 2000h). The expected result of these correlations is that high radium-224 levels will be mitigated by enforcement of the combined radium-226/-228 MCL, keeping in mind that treatment for radium does not differentiate between the different isotopes. Since radium-228 is estimated to be eight times more radiotoxic than radium-224, it appears that radium-224 may not be a pressing public health concern compared to the co-occurring regulated contaminant radium-228. The Agency plans to collect additional national occurrence information for radium-224, which may involve coordination with the USGS, and will evaluate whether future regulatory action or guidance is necessary. Radium-224 occurrence data collection activities are not as high a priority as addressing other radionuclide commitments such as the review of the beta particle and photon radioactivity MCL.

For several reasons, a change in the gross alpha particle activity holding time has been determined to be an inappropriate regulatory solution. First, the uncertainty in the national occurrence data does not allow EPA to determine the number of systems out of compliance with the gross alpha particle activity standard due to radium-224 if a

48–72 hour holding time is required. Since this change may result in a significant number of systems out of compliance with the current gross alpha particle activity MCL, EPA would need to issue a proposed amendment before making such a change. Such a proposal would require national level occurrence data for radium-224 in drinking water. Since EPA's next course of action is to collect such data to determine if a proposal is needed, EPA believes that this course of action is the appropriate one.

a. Summary of Major Comments on Radium-224

(1) The Use of a Short Gross Alpha Particle Activity Sample Holding Time to Measure Radium-224: Several commenters stated that the use of a short gross alpha sample holding time to measure radium-224 would raise technical difficulties and would be costly. Several commenters stated that there was not enough information to warrant a change to the gross alpha holding time or to regulate radium-224 separately. EPA agrees with this comment and, as stated in the Notice of Data Availability (NODA; USEPA 2000e), will not change the gross alpha holding time or regulate radium-224 separately in today's final rule. Some commenters stated that it would not be appropriate to change the holding time or to issue a separate standard in the final rule without a proposal. This is in agreement with what the Agency stated in the NODA.

(2) The Need to Regulate Radium-224: One commenter suggested that the radium-224 cancer mortality risk coefficient from Federal Guidance Report-13 (FGR–13) warranted a health concern and warranted regulating radium-224. While EPA agrees that radium-224 is a health concern, the radium-224 cancer mortality unit risk is eight times less than the radium-228 cancer mortality unit risk. In other words, it would take 40 pCi/L of radium-224 to present an equal cancer mortality risk as 5 pCi/L of radium-228. Since the correlation between radium-224 and radium-228 is approximately one-to-one (1:1) in the areas known to be of concern, one would typically expect to find 5 pCi/L of radium-224 associated with 5 pCi/L of radium-228. Since radium-226 and radium-228 also significantly co-occur, EPA believes that in most situations in which radium-224 occurs it would be present at levels lower than 5 pCi/L for systems in compliance with the combined radium-226/-228 standard. Table I–3 shows the predicted increase in risk for water systems in areas in which radium-224 is known to co-occur with radium-228, assuming a 1:1 correlation. This table shows that the presence of radium-224 increases the over-all combined radium risk by 5%–13%, depending on the relative contributions of radium-226 to radium-228 to the MCL of 5 pCi/L. EPA believes that this situation indicates that radium-224 may be of concern in some areas, but also believes that collecting data to determine if radium-224 is of national concern is the appropriate next step for determining if radium-224 should be regulated separately.

TABLE 1–3.—TYPICAL INCREASE IN COMBINED RADIUM RISK DUE TO PRESENCE OF RA-224 FOR WATER SYSTEMS WITH COMBINED RA-226/-228 LEVELS OF 5 PCI/L, ASSUMING A 1:1 CORRELATION OF RA-224 AND RA-228

Ra–226 (pCi/L)	Ra–228 (pCi/L)	Ra–224 (pCi/L)	Percent increase in risk due to presence of Ra–224
5	0	0	0%
4	1	1	5%
3	2	2	8%
2	3	3	10%
1	4	4	12%
0	5	5	13%

6. Entry Point Monitoring and the Standardized Monitoring Framework

The changes to the existing distribution system-based monitoring scheme proposed in 1991 are promulgated in today's final rule. New monitoring must be performed at entry points to the distribution system, which is meant to ensure that all customers are protected by the radionuclides NPDWRs. The 1976 monitoring scheme ensured that ‘‘average customers’’ were protected, but did not ensure that all customers were served by water at or below the MCL for the various radionuclides.

While EPA is finalizing a change to the point of compliance from a representative distribution system sampling point to all points of entry to the distribution system, EPA realizes that unless data grandfathering is allowed, many systems will have to re-establish monitoring baselines that have been established for many years. The ‘‘monitoring baseline’’ refers to the average contaminant level analytical result that is used for determining the future monitoring frequency. For this reason, EPA is allowing primacy entities (States, Tribes, and other) the option of developing data grandfathering plans that are suited to their individual situations (*e.g.,* occurrence patterns, water system configurations, and other factors) as a part of their primacy packages. This situation will allow primacy entities flexibility to grandfather historical data for determining future monitoring frequencies, while allowing EPA oversight of the process to ensure that the goal of having each entry point in compliance with the MCLs is met. Since future monitoring will be conducted at each entry point, this approach will ensure that compliance is achieved at every entry point.

The new requirements for uranium and radium-228 will mean that initial monitoring baselines for determining future monitoring frequencies will need to be established. Only community water systems that have gross alpha particle activity screening levels greater that 15 pCi/L will be required to monitor for uranium. Thus, many systems will be able to use historical gross alpha data to determine future monitoring frequency under the uranium standard. And, since the current monitoring requirements for gross alpha particle activity already require systems with gross alpha particle activity levels greater than 15 pCi/L to quantify uranium levels (to subtract out the uranium contribution to the gross alpha particle activity), EPA expects that many of these water systems will also be able to grandfather historical uranium data. Given this situation, EPA does not expect uranium monitoring requirements to be overly burdensome to community water systems or drinking water programs.

Community water systems without historical radium-228 data (expected to be those with gross alpha particle activity levels less than 5 pCi/L and radium-226 levels less than 3 pCi/L) will need to establish an initial monitoring baseline to determine future monitoring frequency. Four consecutive quarterly samples will be required to establish this baseline. However, States and Tribes may waive the last two quarterly samples and determine the initial monitoring baseline on the first two samples if the results for the first two samples are below the detection limit (1 pCi/L), which would be considered a non-detect and would be reported as ''zero'' (this discussion assumes that radium-226 levels are also non-detects and are reported as zero). Systems with non-detects for radium-228 and radium-226 would have to monitor once every nine years after the initial monitoring period. Other monitoring requirements are discussed in section I.J.

7. Separate Monitoring for Radium-228 and Change to Systems Required To Monitor for Beta Particle and Photon Radioactivity

Separate monitoring for radium-228, proposed in 1991, is promulgated in today's rule. The need for separate monitoring of radium-228 is supported by the occurrence studies supporting the 1991 proposal and new occurrence studies (USEPA 2000e and i), which indicate that the 1976 radium-228 screens are not robust. Since the unit risks for radium-228 are higher than for radium-226 (described in the NODA and its Technical Support Document, USEPA 2000e and h), EPA believes that separate monitoring for radium-228, as proposed in 1991, is essential to enforcing the combined radium-226/-228 standard.

In addition, today's rule eliminates the previous requirement that all surface water systems serving more than 100,000 persons must monitor for beta particles and photon radioactivity. Beta particle and photon radioactivity monitoring will be performed only by community water systems designated by the State as ''vulnerable'' or ''contaminated''. In 1976, the Agency was concerned about nuclear fallout contaminating surface water sources. The Agency anticipated that large surface water systems (*i.e.* systems serving greater than 100,000 persons) would be vulnerable to becoming contaminated by nuclear testing activities. Therefore, the radionuclides regulation required all surface water systems serving more than 100,000 persons and any other systems determined by the State to be vulnerable to monitor for beta and photon emitters.

Since that time above-ground testing of nuclear weapons has been banned, and sources of man-made radiation are not expected, thus, large surface water systems are not automatically vulnerable to beta and photon emitters. As a result, the Agency has reevaluated the 1975 approach, and in today's rule, as proposed in 1991, is removing the requirement for all large surface water systems to monitor for beta and photon emitters, unless they have been designated as vulnerable by the State. The Agency believes that States are in the best position to determine which systems are vulnerable to beta and photon emitters. The EPA is also encouraging States to reevaluate a system's vulnerability to beta photon emitters when conducting source water assessments and provide immediate notification to those systems that have been deemed vulnerable.

8. Future Actions Regarding the Regulation of Radionuclides at Non-Transient Non-Community Water Systems

EPA will not regulate NTNC water systems with today's rule, but may propose to do so in the future. As described in the NODA (USEPA 2000e), EPA considered regulating non-transient non-community (NTNC) water systems for today's final rule, as proposed in 1991. The NODA also described EPA's analysis of the risks faced by customers of NTNC water systems, potential risk reductions, and compliance costs. EPA stated that several options were being considered for finalization: (1) Not regulating NTNC water systems; (2) regulating all NTNC water systems under the same requirements faced by CWSs; (3) regulating targeted NTNC water systems, based on occurrence potential, typical lengths of exposure, the age distribution of typical customers, and other factors; (4) issuing guidance recommending that States require that targeted NTNC systems monitor, and in some cases, mitigate to acceptable levels.

EPA's rationale for not regulating NTNC water systems at this time is based upon consideration of several factors. EPA summarized the results of a conservative Monte Carlo analysis of risks at NTNC water systems in the NODA and discussed the analysis in more detail in its Technical Support Document (USEPA 2000h). After evaluating the available information and the various comments on the NODA, EPA does not believe that exposure to radionuclides by consumers of water from NTNC systems poses an unacceptable health risk. This conclusion is based on consideration of the total pattern of exposure of individuals, considering their consumption of both NTNC water and water from other types of water systems. However, EPA's information for these radionuclides is limited and will be the subject of additional future analyses and reevaluation, together with any new data that can be obtained.

In the immediate future and in consultation with the National Drinking Water Advisory Committee (NDWAC), EPA will further evaluate various approaches to regulating NTNCs generally (including radionuclides). This further analysis will involve examination of additional data and information and will include further analysis of a full range of possible options. In this evaluation, EPA will consider risk analyses for adults and children, occurrence patterns, the national distribution of NTNC water systems, and other factors. In determining the appropriate action, EPA will consider the issue of consistency between the various regulations for chronic contaminants applicable to NTNC water systems, including future rules.

a. Summary of Major Comments on NTNCWSs and EPA Responses

Of the 70 commenters who responded to the April 21, 2000 NODA, approximately 31 commented on the issue of NTNC water systems and the options presented in the NODA. About 75 percent of these 31 commenters oppose regulation of NTNC water systems. While several of the commenters felt that EPA should only require targeted monitoring, many commenters felt that monitoring of NTNC water systems should be left to the discretion of the States. A few commenters felt that EPA should treat NTNC water systems like CWSs and require regulation and some commenters felt partial coverage of targeted NTNC water systems would be appropriate.

Those opposed to the regulation of NTNC water systems felt the cost/benefit and risk analyses presented in the NODA did not support a requirement to regulate. Some of those opposed to regulating NTNC water systems believe EPA needs to gather more information about the occurrence of radionuclides, the amount and percentage of water consumed, and the duration of exposure at NTNC water systems. Many commenters felt that EPA should allow States the flexibility or discretion to determine whether or not to regulate NTNC water systems and leave it to the States to target specific NTNC water systems. Some commenters suggested that EPA issue guidance that recommends targeted NTNC water systems monitor and meet the CWS MCLs. In addition, some commenters stated that EPA should be consistent in all their rules when considering whether or not to regulate NTNC water systems. EPA believes that all of these comments have merit and that the regulation of radionuclides at NTNC water systems deserves further evaluation along with an analysis of additional data and information. If EPA proposes to regulate NTNC water systems in the future, stakeholders will have future opportunity to comment. Regarding State discretion, States may at any time choose to regulate NTNC water systems, either under a targeted rule or otherwise.

E. What Are the Health Effects That May Result From Exposure to Radionuclides in Drinking Water?

Radioactive drinking water contaminants differ from one another in ways that determine their harmfulness. Each radionuclide has a particular half-life and emits characteristic forms of radiation (alpha particles, beta particles, and/or photons). A radionuclide's half-life and concentration determine its radioactivity, *i.e.,* the number of radioactive ''decay events'' that occur in a particular unit of time. These factors, concentration, half-life, form of radioactive decay, and radiation energy, all determine a particular radionuclide's potential for impacting human health. For a discussion of half-life and the different forms of radioactive decay, see Appendix I (''Fundamentals of Radioactivity in Drinking Water'') to the Radionuclides NODA's Technical Support Document (USEPA 2000h).

The potential for harmful health effects from exposure to radioactive compounds results from the ability of ionizing radiation to chemically change the molecules that make-up biological tissues (*e.g.,* stomach, liver, lung) through a process called ''ionization.'' The radiation (alpha and beta particles and photons) emitted by radionuclides is called ''ionizing radiation'' because the radiation has sufficient energy to strip electrons from nearby atoms as they travel through a cell or other material. Ionization may result in significant chemical changes to biologically important molecules. For example, ionizing radiation can damage important molecules like DNA. DNA is the elementary building block for genes and the chemical that carries genetic information involved in many fundamental biological processes. Damage to the DNA of an individual gene may cause the gene to mutate, changing a cell's genetic code. Such mutation can lead to cancer. Since ionizing radiation may damage genes, it can adversely affect individuals directly exposed as well as their descendants. While much of this cellular damage is repaired by the body, restoring proper biological functions, the net result of an increase in exposure to ionizing radiation is an increase in the risk of cancer or harmful genetic mutations that may be passed on to future generations. (See, EPA's fact sheets on ionizing radiation and associated health effects at http://www.epa.gov/radiation/ionize.htm and in the record of this final rulemaking; (USEPA 1998a and1998c)).

Alpha emitters and beta/photon emitters differ in the magnitude of their biological effects. Alpha particles interact very strongly with matter (*e.g.,* human tissues), transferring their energy through these interactions. Beta particles interact less strongly, which allows them to travel further through tissue before being absorbed. The difference of interest is in the concentration of tissue damage. Alpha particles may damage many molecules over a short distance, while beta particles may damage molecules spread out over a greater distance. The actual number of potentially damaged molecules depends upon the energy of the alpha particle or beta particle (which differs between individual alpha emitters and beta emitters). Photon emissions may also interact with tissues, but they interact over much longer distances (they can pass through the body entirely). Exposure to any of these forms of radiation increases the risk of cancer.

All people are chronically exposed to background levels of radiation present in the environment. Many people also receive additional chronic exposures, including exposure to radionuclides in drinking water, and/or relatively small acute exposures, for example from medical X-rays. For populations receiving such exposures, the primary concern is that radiation could increase the risk of cancers or harmful genetic effects.

The likelihood of developing cancer or genetic mutations from short-term exposure to the concentrations of radionuclides found in drinking water supplies is negligible. However, long-term exposures may result in increased risks of genetic effects and other effects such as cancer, precancerous lesions, benign tumors, and congenital defects. For example, an individual that is exposed to relatively high levels of radium-228 (*e.g.,* 20 pCi/L) in drinking water over the course of a lifetime is projected to have a significantly increased chance of developing fatal cancer (roughly a one in one thousand increased risk if exposed to radium-228 at 20 pCi/L over a lifetime of 70 years).

The probability of a radiation-caused cancer or genetic effect is related to the total amount of radiation accumulated by an individual. Based on current scientific models, it is assumed that any exposure to radiation may be harmful (or may increase the risk of cancer); however, at very low exposures (*e.g.,* drinking water exposures below the MCL), the estimated increases in risk are very small and uncertain. For this reason, cancer rates in populations receiving very low doses of radiation may not show increases over the rates for unexposed populations.

For information on effects at high levels of exposure, scientists largely depend on epidemiological data on survivors of the Japanese atomic bomb explosions and on people receiving large doses of radiation for medical purposes. These data demonstrate a higher incidence of cancer among exposed individuals and a greater probability of cancer as the exposure increases. In the absence of more direct information, that data is also used to estimate what the effects could be at lower exposures. Where questions arise, scientists extrapolate from information obtained from cellular and molecular studies, but these extrapolations are acknowledged to be only estimates. Professionals in the radiation protection field prudently assume that the chance of a fatal cancer from radiation exposure increases in proportion to the magnitude of the exposure.

In the case of uranium in drinking water, we must consider not only carcinogenic health effects but also damage to the kidneys that may result from ingestion. When uranium radioactively decays in the body, it results in increased cancer risks. However, natural uranium isotopes have long half-lives, which means that uranium tends to persist in the body until it is excreted or stored in tissue. As discussed in detail in the Notice of Data Availability (USEPA 2000e), its Technical Support Document (USEPA 2000h), and the Toxicological Review of Uranium (USEPA 2000b) this persistent uranium may result in kidney toxicity. See section I.D.2 for a brief summary of kidney (renal) function and uranium toxicity.

1. Major Comments

Most comments on Health Effects related to three areas of risk estimation: (1) The use of a linear, non-threshold model, (2) not finding a threshold for radium, and (3) not promoting claimed beneficial effects of ionizing radiation.

a. Linear Non-threshold Model: Some commenters suggested that the Agency abandon the linear nonthreshold (LNT) model it employs to estimate radiation induced carcinogenesis. They suggest a new paradigm should be used.

The Agency disagrees and believes its position is based on weight of evidence and support from national and international groups of experts interested in radiation protection. EPA classifies all radionuclides as Group A (known human) carcinogens. This classification is based on the considerable weight of epidemiological evidence that exposure to high doses of ionizing radiation causes cancer in humans and on the fact that all radionuclides emit ionizing radiation. Radiation has been shown to induce unique DNA damage, mutations, and transformation of cells in culture. The monoclonal nature of cancers is evidence that a single ''wild'' cell can give rise to a cancer. For alpha particles, it has been shown experimentally that a single alpha passing through a cell is sufficient to induce a mutational event; there are strong theoretical reasons to expect that the same is true for low energy transfer (LET) radiation such as gamma rays. Since a single particle traversal of a cell is the minimum event for radiation exposure, a prudent assumption is that there is no threshold for radiation induced mutations.

To estimate radiogenic cancer risks and to regulate low-dose radiation exposures from continuous intakes of radionuclides in environmental media, EPA uses a linear, non-threshold (LNT) dose-response model. The LNT model permits direct extrapolation of low-dose cancer risks from high-dose exposures—allowing for adjustments, as needed, for differences in radiation quality, dose rate, and exposed populations, including such factors as age at exposure, time since exposure, baseline cancer rates, and gender and assumes that there is no threshold for effects; *i.e.,* it is assumed that exposure to any amount of radioactivity has a finite potential to induce cancers in humans. As noted above, support for the LNT model comes in part from the linear dose-response relationships observed for most types of cancers in the intermediate- to high-dose range for atomic bomb survivors, and from results of molecular and cellular studies. Several such studies have shown that a single radiation track traversing a cell nucleus can cause unrepaired or misrepaired DNA lesions and chromosomal aberrations. Other studies have shown that DNA lesions and chromosomal aberrations can lead to cancer. From these studies, it is assumed that the probability of DNA damage and carcinogenesis is linearly proportional to the dose.

EPA's application of the LNT model to estimate and regulate cancer risks from environmental exposures to radionuclides is entirely consistent with all past and current observations and recommendations of the International Commission on Radiological Protection (ICRP), the National Council on Radiation Protection and Measurements (NCRP), the National Academy of Sciences Committee on the Biological Effects of Ionizing Radiation (BEIR), and the United Nations Scientific Committee on the Effect of Atomic Radiation (UNSCEAR), and the National Radiation Protection Board (NRBP). Citing the recommendations of these national and international advisory bodies, the U.S. Department of Energy, the U.S. Nuclear Regulatory Commission, and other Federal and State agencies with regulatory authority over radioactive materials also apply the LNT model as the basis for setting regulations and guidelines for radiation protection. However, to address these limitations and the uncertainties associated with this model and improve its radiation risk assessments, EPA is actively supporting national and international studies of radiation dosimetry and dose reconstruction, radionuclide biokinetics, quantitative techniques for uncertainty analyses, and long-term follow-up epidemiological studies of populations exposed chronically to low-dose radiation. The Agency also continues to review its policies and positions as new reports and data are published so that the best science is applied.

b. Radium Carcinogenicity Threshold: Some commenters have suggested that there is a threshold for radium carcinogenicity. They generally base this conclusion on the ''Radium Dial Painter'' studies.

The Agency disagrees. While the ''Radium Dial Painter'' studies are interesting, they are of limited value for the estimation of risk. First, no one knows the quantity of radium ingested in those studies, so dose estimates are speculative. The intake estimates are based on the body burden the first time the subjects were measured and back-calculated with biokinetics modeling. Moreover, the quantities of radium ingested by the subjects was great enough to cause extensive skeletal pathology and interfere with normal bone metabolism. In addition to problems of radium dosimetry, the high mortality in some groups, and the small numbers of subjects in all exposure groups, would impair use of the data to develop dose response relationships.

Only a small fraction of persons known to have been exposed to radium have been located and their radium content at that time measured. Of 6,675 subjects identified above as being in the data base and as having been exposed to radium, 2,383 have been measured to determine their radium-226 burden. (21 of the 85 osteosarcomas occurred in subjects who had never been measured for radium burden.) Since the radium intake in dial painters is unknown, body burden is known only from the date of first radioassay (usually many years after the radium intake), and metabolism is estimated from other sources, estimates of the radiation dose must be based on a series of poorly verified assumptions. In spite of these inherent problems in the data set, efforts have been made to use the radium dial workers, or some subset of them, to establish a ''practical threshold'' for radium or other internal emitter exposure.

The ''practical threshold'' concept is derived from studies of chemical carcinogenesis which include dose levels causing extensive life shortening. Plots of the mean age at tumor onset vs dose indicates an increase in tumor latency with decreasing dose. Extrapolation of these curves to environmental dose levels has led some investigators to conclude at these dose levels tumor latency would exceed the human life span. This ''practical threshold'' is as an argument for a threshold and against LNT models. The ''practical threshold'' model has been examined and rejected by experts at the International Agency for Research on Cancer (IARC). The IARC warned in their discussion regarding mean tumor latency or mean age at tumor onset that ''care must be taken not to extrapolate the observed tendency for the mean age at onset to increase with decreasing dose below the dose range in which most animals get cancer. Failure to observe this restriction has led to the unjustified speculation that progressively lower and lower human doses of environmental contaminants will produce cancers only at age 200 or 300 years; for refutation, see Peto (1978).''

Even if there were no problems with intake, dose, metabolism, extensive pathology, etc., as mentioned above, the radium dial studies would be uninformative on the subject of the dose response relationship at environmental exposure levels. The number of subjects and their distribution in dose categories is too small. The number of subjects needed to show a given risk increases as the square of the decrease in dose. For example, if 10 subjects are required to show an radiogenic risk at dose level x, 250 would be needed to show the same risk at dose level x/5, and 1000 at dose level x/10. There just are not enough subjects at lower dose levels to show the risk, giving the illusion of a threshold.

The claims regarding a possible ''practical threshold'' addressed above are based solely on the bone cancer data. However, bone cancer constitutes only a fraction of the estimated risk from ingested radium. Radium-226 has also been found to induce epithelial cancers in sinuses in the head (due to radon-222 released into the sinus air spaces from the decay of radium-226 in bone). The data in the dial painter study is inadequate to develop a dose response relationship for sinus cancers, however the number of epithelial cancers expected in the dial painters is about the same as the number of bone cancers. The number of bone cancers in the Agency's radium-226 risk model is doubled to get an estimate of combined bone and sinus cancers. In addition to bone cancer, patients treated with radium-224 were found to have significant increases in breast cancer, soft tissue sarcomas, liver cancer, thyroid cancer, cancers of urinary organs, and leukemia. Given our understanding of radium metabolism and the effects of alpha irradiation, it is expected that ingestion of any of the radium isotopes will increase the risks for various types of cancer other than bone. EPA's risk estimates include all these potential sites.

c. ''Beneficial Effects'' of Radiation: One commenter suggests there are beneficial effects of radiation, ''Hormesis'' (small doses of radiation are good for you) and ''Adaptive Response'' (relatively small doses of radiation protect against large doses of radiation).

The Agency finds that, based on available scientific evidence, these phenomena are not relevant to environmental radiation protection. Neither has been shown to occur at environmental dose levels. Neither has been shown to influence the dose response for induction of radiation induced cancer. Hormesis has not been demonstrated in normal healthy active populations of mammals, much less in humans. Adaptive response may have some application in radiotherapy (very high radiation doses), but it is not relevant to environmental exposure levels.

Hormesis is a non-specific phenomenon. Biological, chemical, or physical agents may stimulate hormesis; thus, cold, physical stress, toxic chemicals, antibiotics, as well as ionizing radiation, can be hormetins. Hormesis originally was used to describe a stimulatory effect, which was not inherently good or bad. Recent usage of the term ''Radiation Hormesis'' implies the discussion relates to beneficial effects. It should not, however, imply absence of radiation carcinogenesis.

The ''adaptive response'' is also a nonspecific response to stress, which has been observed at the cellular level. An ''adaptive response'' is observed experimentally when a ''conditioning'' exposure is given, followed at some later time by a ''challenge'' exposure, and the response in the ''conditioned'' organism or cell culture is less than in controls; that is, the conditioning exposure was ''protective'' against the challenge. In typical studies where cells in culture are given a conditioning dose of radiation in the range of 0.2 to 20 rad (2 to 200 milliGray or mGy), a dose of 100 to 200 rad (1000 to 2000 mGy) given later causes only about 50% as great an effect as that observed in controls with no conditioning exposure. However several points are noteworthy: not all cells respond, effects may be different for cells at different stages in the cell cycle, not all conditioning doses give the same response (sometimes instead of protection there is synergism between doses), the ''adaptive'' effects are transient, and the timing of the challenge dose may be critical to response. Given these limitations, EPA does not believe it is appropriate at this time to consider such an adaptive response in its assessment of the risks from environmental levels of radiation.

F. Does This Regulation Apply to My Water System?

The NPDWRs for combined radium-226 and radium-228, gross alpha particle radioactivity, beta particle and photon radioactivity, and uranium apply to all community water systems.

G. What Are the Final Drinking Water Regulatory Standards for Radionuclides (Maximum Contaminant Level Goals and Maximum Contaminant Levels)?

The maximum contaminant level goals (non-enforceable health-based target, MCLGs) and maximum contaminant levels (enforceable regulatory limits, MCLs) are listed in table I–4. For the reasons already described, EPA is retaining the existing MCLs for combined radium-226 and radium-228, gross alpha, and beta particle and photon radioactivity. EPA is finalizing an MCL of 30 µg/L for uranium, based on kidney toxicity and cancer risk endpoints. The final MCLGs are zero for all radionuclides, based on the no-threshold cancer risk model for ionizing radiation.

TABLE I–4.—MCLGS AND MCLS FOR RADIONUCLIDES IN DRINKING WATER (OTHER THAN RADON)

Contaminant	MCLG (pCi/L)	MCL
Combined Radium-226 and Radium-228	Zero	5 pCi/L.
Gross Alpha (Excluding radon and uranium)	Zero	15 pCi/L.
Beta Particle and Photon Radioactivity	Zero	4 mrem/year.
Uranium	Zero	30 µg/L.

H. What Are the Best Available Technologies (BATs) for Removing Radionuclides From Drinking Water?

Under the SDWA, EPA must specify the best available technology (BAT) for each MCL that is set. PWSs that are unable to achieve an MCL may be granted a variance if they use the BAT and meet other requirements (see section I.M for a discussion of variances and exemptions). Table I–5 lists the best available technologies (BATs) for complying with the radionuclides MCLs.

TABLE I–5.—BEST AVAILABLE TECHNOLOGIES (BATS) FOR RADIONUCLIDES IN DRINKING WATER

Contaminant	BAT
Combined radium-226 and radium-228	Ion Exchange, Lime Softening, Reverse Osmosis.

Table I–5.—Best Available Technologies (BATs) for Radionuclides in Drinking Water—Continued

Contaminant	BAT
Gross alpha (excluding radon and uranium)	Reverse Osmosis.
Beta particle and photon radioactivity	Ion Exchange and Reverse Osmosis.
Uranium	Ion Exchange, Lime Softening; Reverse Osmosis, Enhanced Coagulation/Filtration.

In addition to BATs, the SDWA, as amended in 1996, requires EPA to list small system compliance technologies (the requirements are described in section I.M). EPA published a list of small systems compliance technologies for the existing radionuclide MCLs in 1998 (63 FR 42032) and issued a guidance document on their use (USEPA 1998f). EPA took comment on small system compliance technologies for uranium in the NODA (USEPA 2000e; 65 FR 21576). Table I–6 is a compilation of all of the small systems compliance technologies for radionuclides, including limitations, required operator skill, raw water quality ranges, and other considerations. Table I–7 shows the small systems compliance technologies listed for: combined radium-226 and radium-228, gross alpha particle radioactivity, beta particle and photon radioactivity, and uranium.

Table I–6.—List of Small Systems Compliance Technologies for Radionuclides and Limitations to Use

Unit technologies	Limitations (see footnotes)	Operator skill level required[1]	Raw water quality range & considerations[1]
1. Ion Exchange (IE)	(a)	Intermediate	All ground waters.
2. Point of Use (POU[2]) IE	(b)	Basic	All ground waters.
3. Reverse Osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration.
4. POU[2] RO	(b)	Basic	Surface waters usually require pre-filtration.
5. Lime Softening	(d)	Advanced	All waters.
6. Green Sand Filtration	(e)	Basic	
7. Co-precipitation with Barium Sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/Electrodialysis Reversal.		Basic to Intermediate	All ground waters.
9. Pre-formed Hydrous Manganese Oxide Filtration.	(g)	Intermediate	All ground waters.
10. Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11. Enhanced coagulation/filtration	(i)	Advanced	Can treat a wide range of water qualities.

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

[2] 2A POU, or "point-of-use" technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes to Table I–6: Technologies for Radionuclides

[a] The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

[b] When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

[c] Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

[e] Removal efficiencies can vary depending on water quality.

[f] This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

[g] This technology is most applicable to small systems that already have filtration in place.

[h] Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

[i] Assumes modification to a coagulation/filtration process already in place.

Table I–7.—Compliance Technologies by System Size Category for Radionuclide NPDWRs

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

TABLE I–7.—COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDE NPDWRS—Continued

Contaminant	Compliance technologies[1] for system size categories (population served)		
	25–500	501–3,300	3,300–10,000
Uranium	1, 2, 4, 10, 11	1, 2, 3, 4, 5, 10, 11	1, 2, 3, 4, 5, 10, 11

Note: (1) Numbers correspond to those technologies found listed in the table I–6 above.

I. What Analytical Methods Are for Compliance Monitoring of Radionuclides?

The approved methods for compliance monitoring of radionuclides are listed in § 141.25. These methods are shown in Table I–8. A large portion of the approved methods for radionuclides were added after the 1991 proposed rule (56 FR 33050). There, the Agency proposed to approve fifty-six methods for the measurement of radionuclides in drinking water (excluding radon). Fifty-four of the fifty-six were actually promulgated in the March 5, 1997 final methods rule (62 FR 10168). In addition to these fifty-four, EPA also promulgated 12 radiochemical methods in the March 5, 1997 final methods rule, which were submitted by commenters after the 1991 proposed rule.

In the March 5, 1997 final methods rule for radionuclides (62 FR 10168), the Agency approved several methods for the analysis of uranium. Specific analysis for uranium can be performed by radiochemical methods, alpha spectrometry, fluorometric (mass), or laser phosphorimetry (mass) (see Table I–8). The radio-chemical method separates and concentrates uranium from potentially-interfering radionuclides and non-radioactive sample constituents. The resulting concentrate, depending on the method, can then be counted by gas flow proportional counting, alpha scintillation, or alpha spectrometry. Results from proportional counting or alpha scintillation counting accurately determine the alpha emission rate from total uranium in the sample; however, the uranium isotope ratio (uranium-234/uranium-238) cannot be determined and the uranium mass cannot be estimated unless an empirical conversion factor is applied to the measured count rate. The use of alpha spectrometry allows for the determination of individual isotopes of uranium and the accurate calculation of the mass of uranium-238 present in the sample. Additionally, the concentration of uranium-234 can be accurately measured, if necessary to assess the radiotoxicity of this isotope.

Both the fluorometric and the laser phosphorimetry methods measure the mass of uranium-238 present in the sample; a conversion factor must be used to convert the mass measurement to an approximate radioactivity concentration in picoCuries. The computed radioactivity is only approximate because the ratio of uranium isotopes must be assumed. The use of mass-type methods is acceptable provided a conversion factor of 0.67 pCi/μg is used to convert the fluorometric or laser phosphorimetry uranium-238 mass result from micrograms to picoCuries. This conversion factor is conservative and is based on a 1:1 ratio of uranium-234 to uranium-238 in uranium-bearing minerals. The scientific literature indicates that the activity ratio varies in ground water from region to region (typically from 0.67 to 1.5 pCi/μg).

EPA recognizes that the mass conversion factor is conservative in that the calculated uranium alpha emission rate based on the mass measurement may be biased low (*i.e.,* underestimated). The use of this conversion factor may result in a larger net gross alpha (gross alpha less the calculated uranium gross alpha contribution), which may require additional testing to resolve. Conversely, the calculated mass of uranium based on gross alpha could be biased high and result in an overestimation, which may require additional testing to resolve. Both situations are protective in that the bias requires additional testing to resolve when the uranium concentration in a sample is near the proposed MCL regardless of which method is used to measure the uranium.

1. Major Comments

a. Request for ICP-MS Method for Uranium: In response to the NODA, several commenters asked EPA to consider the approval of an Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method for uranium analysis (a mass method). Many commenters stated that the ICP-MS method (*i.e.,* EPA 200.8 or SM 3125) is more cost-effective, less labor-intensive and offers greater sensitivity than some of the currently approved methods for uranium analysis. EPA is currently reviewing the ICP-MS method for uranium and will publish a proposal and a final in a future rulemaking.

b. Detection Limit for Uranium: In 1976, the NPDWRs defined the ‘‘detection limit’’ (DL) as the ‘‘concentration which can be counted with a precision of plus or minus 100 percent at the 95 percent confidence level (1.96 σ, where σ is the standard deviation of the net counting rate of the sample).’’ The detection limits for gross alpha, radium-226, radium-228, gross beta and other radionuclides are listed at § 141.25 and reproduced in Table I–9. In the NODA, EPA stated that it would maintain the use of detection limits as the required measures of sensitivity for radiochemical analysis, instead of using the method detection limit (MDL), the practical quantitation level (PQL) and acceptance limits, as was proposed in 1991. Although no comments were submitted about EPA's decision to maintain the use of the detection limits listed in § 141.25, several commenters submitted comments about the appropriate measure of sensitivity for uranium.

Since uranium was not previously regulated, no detection limit is listed in the CFR and none was proposed in 1991. In 1991, the Agency only proposed a PQL (5 pCi/L) and an acceptance limit (±30%) for uranium. Because the NODA was not the appropriate mechanism to propose a detection limit for uranium, the Agency stated that it ‘‘may have to adopt the PQL for uranium until a detection limit is proposed.’’ Several commenters disagreed with the use of a PQL and acceptance limits for uranium. They felt that EPA should be consistent with other regulated radionuclides and set a detection limit for uranium as the required measure of sensitivity. The Agency agrees with the commenters and will propose a detection limit for uranium in a future rulemaking before the compliance date of this rule to be consistent with the sensitivity measures used for other radionuclides.

TABLE I–8.—ANALYTICAL METHODS APPROVED BY EPA FOR RADIONUCLIDE MONITORING (§ 141.25)

Contaminant	Methodology	Reference (method or page number)								
		EPA[1]	EPA[2]	EPA[3]	EPA[4]	SM[5]	ASTM[6]	USGS[7]	DOE[8]	Other
Naturally occurring:										
Gross alpha[11] and beta	Evaporation	900.0	p 1	00–01	p 1	302, 7110 B		R–1120–76		
Gross alpha[11]	Co-precipitation	....		00–02		7110 C				
Radium 226	Radon emanation	903.1	p 16	Ra-04	p 19	7500-Ra C	D 3454–91	R–1141–76	Ra-05	N.Y.[9]
	Radiochemical	903.0	p 13	Ra-03		304, 305, 7500-Ra B	D 2460–90	R–1140–76		
Radium 228	Radiochemical	904.0	p 24	Ra-05	p 19	304, 7500-Ra D		R–1142–76		N.Y.[9] N.J.[10]
Uranium[12]	Radiochemical	908.0				7500-U B				
	Fluorometric	908.1				7500-U C (17th Ed.)	D 2907–91	R–1180–76 R–1181–76	U-04	
	Alpha spectrometry	....		00–07	p 33	7500-U C (18th or 19th Ed.)	D 3972–90	R–1182–76	U-02	
	Laser phosphorimetry	....					D 5174–91			
Man-made:										
Radioactive cesium	Radiochemical	901.0	p 4			7500-Cs B	D 2459–72	R–1111–76		
	Gamma ray spectrometry	901.1			p 92	7120	D 3649–91	R–1110–76	4.5.2.3	
Radioactive iodine	Radiochemical	902.0	p 6			7500–1 B				
			p 9			7500–1 C	D 3649–91			
						7500–1 D				
	Gamma ray spectrometry	901.1			p 92	7120 (19th Ed.)	D 4785–88		4.5.2.3	
Radioactive Strontium 89, 90.	Radiochemical	905.0	p 29	Sr-4	p. 65	303, 7500-Sr B		R–1160–76	Sr-01 Sr-02	
Tritium	Liquid scintillation	906.0	p 34	H-2	p. 87	306,7500–3H B	D 4107–91	R–1171–76		
Gamma emitters	Gamma ray spectrometry	901.1			p 92	7120 (19th Ed.)	D 3649–91	R–1110–76	4.5.2.3	
		902.0				7500-Cs B	D 4785–88			
		901.0				7500-I B				

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

[2] ''Interim Radiochemical Methodology for Drinking Water,'' EPA 600/4–75–008 (revised), March 1976. Available at NTIS, ibid. PB 253258.

[3] ''Radiochemistry Procedures Manual'', EPA 520/5–84–006, December 1987. Available at NTIS, ibid. PB 84–215581.

[4] ''Radiochemical Analytical Procedures for Analysis of Environmental Samples,'' U.S. Department of Energy, March 1979. Available at NTIS, ibid. EMSL LV 053917.

[5] Standard Methods for the Examination of Water and Wastewater, 13th, 17th, 18th, 19th Editions, 1971, 1989, 1992, 1995. Available at American Public Health Association, 1015 Fifteenth Street N.W., Washington, D.C. 20005. Methods 302, 303, 304, 305 and 306 are only in the 13th edition. Methods 7110B, 7110 C, 7500-Ra B, 7500-Ra C, 7500-Ra D, 7500-U B, 7500-Cs B, 7500-I B, 750–9I C, 7500–D, 7500-Sr B, 7500–3H B are in the 17th, 18th and 19th editions. Method 7500-U C Fluorometric Uranium is only in the 17th Edition, and 7500-U C Alpha spectrometry is only in the 18th and 19th editions. Method 7120 is only in the 19th edition. Methods 302, 303, 304, 305 and 306 are only in the 13th edition.

[6] Annual Book of ASTM Standards, Vol. 11.02, 1994; American Society for Testing and Materials; any year containing the cited version of the method may be used. Copies may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

[7] ''Methods for Determination of Radioactive Substances in Water and Fluvial Sediments,'' Chapter A5 in Book 5 of Techniques of Water-Resources Investigations of the United States Geological Survey, 1977. Available at U.S. Geological Survey Information Services, Box 25286, Federal Center, Denver, CO 80225–0425.

[8] ''EML Procedures Manual'', 27th Edition, Volume 1, 1990. Available at the Environmental Measurements Laboratory, U.S. Department of Energy (DOE), 376 Hudson Street, New York, NY 10014–3621.

[9] ''Determination of Ra-226 and Ra-228 (Ra-02),'' January 1980; Revised June 1982. Available at Radiological Sciences Institute Center for Laboratories and Research, New York State Department of Health, Empire State Plaza, Albany, NY 12201.

[10] ''Determination of Radium 228 in Drinking Water,'' August 1980. Available at State of New Jersey, Department of Environmental Protection, Division of Environmental Quality, Bureau of Radiation and Inorganic Analytical Services, 9 Ewing Street, Trenton, NJ 08625.

[11] Natural uranium and thorium-230 are approved as gross alpha-particle activity calibration standards for the gross alpha co-precipitation and evaporation methods; americium-241 is approved for use with the gross alpha co-precipitation methods.

[12] If uranium (U) is determined by mass-type methods (*i.e.,* fluorometric or laser phosphorimetry), a 0.67 pCi/µg uranium conversion factor must be used. This conversion factor is conservative and is based on the 1:1 activity ratio of U-234 to U-238 that is characteristic of naturally-occurring uranium in rock.

TABLE I–9.—REQUIRED REGULATORY DETECTION LIMITS FOR THE VARIOUS RADIOCHEMICAL CONTAMINANTS (§ 141.25)

Contaminant	Detection Limit (pCi/L)
Gross Alpha	3
Gross Beta	4
Radium-226	1
Radium-228	1
Cesium-134	10
Strontium-89	10
Strontium-90	2
Iodine-131	1
Tritium	1,000
Other Radionuclides and Photon/Gamma Emitters.	1/10th of the rule.

J. Where and How Often Must a Water System Test for Radionuclides?

1. Monitoring Frequency for Gross Alpha, Radium 226, Radium 228, and Uranium

The monitoring scheme being finalized today provides for more frequent, but less sample-intensive (on a per compliance site basis), monitoring for systems with a demonstrated inherent vulnerability and reduced monitoring for systems with low contaminant levels, which will apply to most systems. Instead of the current monitoring framework for radionuclides of four samples every four years for results above 50% of the MCL and one sample every 4 years for those at or below 50% (at State discretion), the revised rule calls for one sample every three years for compliant systems with average contaminant levels above 50% of the MCL but at or below the MCL, one sample every 6 years for systems with levels above the detection limit and at or below 50% of the MCL, and every 9 years for systems with levels below the detection limit.

2. Monitoring Frequency for Beta Particle and Photon Radioactivity

Beta particle and photon radioactivity monitoring will be performed only by community water systems designated by the State as ''vulnerable'' or ''contaminated''. A community water systems (both surface and ground water) designated by the State as vulnerable must collect quarterly samples for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system, beginning within one quarter after being notified by the State. Systems already designated by the State must continue to sample until the State reviews and either reaffirms or removes the designation. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average less than or equal to 50 pCi/L (screening level), the system may reduce the frequency of monitoring at that sampling point to once every 3 years.

Community water systems (both surface and ground water) designated by the State as utilizing waters contaminated by effluents from nuclear facilities must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system, beginning within one quarter after being notified by the State. Systems already designated by the State as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the State reviews and either reaffirms or removes the designation. If the gross beta particle activity beta minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average less than or equal to 15 pCi/L (screening level), the system may reduce the frequency of monitoring at that sampling point to every 3 years.

For CWS in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. Community water systems designated by the State to monitor for beta particle and photon radioactivity can not apply to the State for a waiver from the monitoring frequencies.

Several USGS studies, including the study entitled Gross-beta Activity in Ground Water: Natural Sources and Artifacts of Sampling and Laboratory Analysis, have found that Potassium-40 and Radium-228 appear to be the primary sources of beta activity in ground water. EPA recognizes that naturally occurring potassium could trigger many systems into conducting expensive beta speciation analysis due to exceedance of the screening level. Therefore, as noted above, naturally occurring Potassium-40 analyzed from the same or equivalent sample used for the gross beta analysis may be subtracted from the total gross beta activity to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82. If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with § 141.66(d). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

The regulatory language in § 141.26(b)(6) of today's rule requires systems to monitor monthly at sampling points which exceed the maximum contaminant levels in § 141.66(d) beginning in the next month after the exceedance occurred. There are many circumstances that may arise from this requirement such as collecting and obtaining the results in two separate months, however, the EPA intended this to require all systems to collect the initial monthly sample no later than 30 days following the collection date of the initial MCL exceedance.

The EPA believes that States have evaluated the vulnerability of systems to potential beta emitting sources under the existing rule. Therefore, States should use the existing vulnerability assessments to notify systems of their status and monitoring requirements if they have not provided that notification previously. The EPA is also encouraging States to reevaluate a systems vulnerability to beta photon emitting sources when conducting a systems source water assessment and provide immediate notification to those systems that have been deemed vulnerable.

3. Sampling Points and Data Grandfathering

Because the current radionuclide NPDWRs have been in effect for almost 25 years, States have much historical distribution system data for the regulated radionuclides at most community water systems and have data regarding occurrence patterns at various scales. The monitoring scheme is an attempt to balance two opposing goals: first, to ensure that every entry point is in compliance, and second, to allow States and drinking water systems to make maximal use of the existing distribution system historical data.

To meet the first goal, today's final rule requires that all new monitoring be at the entry point to the distribution system. This will ensure that all entry points are in compliance with the MCLs from now on. But, rather than narrowly prescribing specific criteria for grandfathering existing distribution system data, today's rule provides flexibility to States to devise a grandfathering plan applicable to their own circumstances. In particular, States may devise a plan for determining which systems will need to analyze new samples from each entry point to establish initial monitoring baselines for the currently regulated radionuclides and which can rely on the existing distribution system data for the same purpose (including existing uranium data). EPA had considered more prescriptive options, such as allowing grandfathering for systems with fewer than three entry points, systems serving fewer than 3,300 persons, systems drawing from aquifers of certain characteristics, etc. However, the many competing variables present at the local level make generalizations impractical at the national level. Since the grandfathering plans will be a part of the primacy packages approved by the EPA Regions, EPA will have oversight over these plans. EPA expects that the plans would allow grandfathering only for situations in which it is to be expected that every entry point is in compliance with the MCLs. For example, if a system with five entry points (all of significant flows) has gross alpha monitoring data from a representative point in the distribution system and the result is 75% of the MCL (11 pCi/L), EPA expects that this data would not be grandfathered, since it can not be ruled out that at least one of the entry points has a contaminant level greater than the MCL. On the other hand, if the distribution system sample baseline result is below the detection limit and the State determines that, based on aquifer and other characteristics, the entry points are expected to have fairly uniform contaminant levels, then a State could reasonably determine that this water system should be able to grandfather its distribution system data. EPA will provide an Implementation Guidance to further explain this issue after today's rule is final.

4. Does the Rule Allow Compositing of Samples?

Compositing allows a system to have combined samples analyzed to reduce the costs of monitoring. Compositing of samples is done in the laboratory. The 1976 rule allowed compositing for gross alpha and allowed (but did not recommend) some compositing for beta/photon emitters. Compositing is essentially an issue for the initial round of monitoring for systems without data to grandfather. Once decreased monitoring is in effect, only a single sample will be required and compositing will not be an issue. In general, there are three kinds of compositing: combining samples taken from the same sampling point from different quarters (temporal compositing), samples taken in the same quarter from different sampling points within a system (spatial compositing), and samples taken from different water systems each having one well (inter-system compositing). Inter-system and spatial compositing are not allowed in today's rule, since this kind of compositing defeats the purpose of monitoring at each entry point to the distribution system.

Because compositing lessens the burden on systems and allows for adequate monitoring reliability in some situations, temporal compositing is allowed under circumstances in which the detection limit is low compared to the MCL. In particular, temporal compositing is allowed for uranium, gross alpha radium-226 (provided a DL of 1 pCi/L is met) and radium-228 (provided a DL of 1 pCi/L is met). While compositing is allowed under these circumstances, compositing of several samples taken at different times provides less information than individual analysis of the samples. For example, if contaminant levels vary appreciably with pumping rates and pumping rates are seasonal, compositing will hide this potentially significant variance. Additionally, if a State allows a system with low contaminant levels to base compliance on two results from different quarters, compositing may not be desirable. If a State wishes to be more stringent and use the highest result of four initial samples to set future monitoring frequency, compositing is not appropriate. However, under some conditions, States may wish to allow water systems to have their samples composited before analysis.

Commenters generally agreed that spatial monitoring was impractical, since it would provide limited information on contaminant levels at individual entry points. Some commenters suggested that the six month holding time for gross alpha would necessitate compositing twice, two samples in the first six months and two in the second six months. Although this type of compositing would be allowed, EPA disagrees that this is necessary, since, for statistical reasons, analysis of four composited samples taken in four different quarters will achieve results of comparable quality (assuming that the analysis is done within the same year that the first sample is taken) to individual analyses of four samples using six month holding times. For this reason, annual compositing at a single entry point is allowed for gross alpha. While several commenters were desirous of maximum compositing flexibility, the technical limitations described rule out some types of compositing, specifically spatial and inter-system compositing.

5. Interpretation of Analytical Results

The Agency recognizes that States have interpreted radionuclide analytical results in a variety of ways, including adding or subtracting standard deviations from the analytical results. The Agency believes that compliance and reduced monitoring frequencies should be calculated based on the ‘‘analytical result(s)’’ as stated in § 141.26(c)(3). It is EPA's interpretation that the analytical result is the number that the laboratory reports, not including (*i.e.* not adding or subtracting) the standard deviation. For example, if a laboratory reports that the gross alpha measurement for a sampling point is 7 ± 2 pCi/L, then compliance and reduced monitoring would be calculated using a value of 7 pCi/L.

K. Can My Water System Use Point-of-Use (POU), Point-of-Entry (POE)[10], or Bottled Water To Comply With This Regulation?

EPA has listed: (1) POU ion exchange and POU reverse osmosis as small system compliance technologies for combined radium-226 and radium-228, and beta particle and photon radioactivity; and (2) POU reverse osmosis as a small systems compliance technology for gross alpha particle activity (63 FR 42032; on August 6, 1998, also see Table I–6 and I–7)). While these POU technologies are not considered BAT for large systems, they may be used as BAT under sections 1412 and 1415 of the Act for systems serving 10,000 persons or fewer. Guidance documents were published to support the small systems compliance technology lists (‘‘Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996,’’ USEPA 1998f). The small system compliance technology list described in section I.H., table I–6, of today's final rule is identical to the 1998 list, with the exception of the addition of small systems compliance technologies for uranium. See section I.H. for details about the lists. POE technologies are not being listed as small systems compliance technologies since they are considered emerging technologies and due to concerns regarding waste disposal and costs. POE technologies (and other technologies) may be added in the future through small system compliance technology updates.

The authority for listing POU technologies as small system compliance technologies comes from section 1412(b)(4)(e)(ii) of the SDWA, which identifies both Point-of-Entry (POE) and Point-of-Use (POU) treatment units as options for compliance technologies. The SDWA identifies requirements that must be met when POU or POE units are used by a water system to comply with an NPDWR. Section 1412(b)(4)(e)(ii) stipulates that ‘‘point-of-entry and point-of-use treatment units shall be owned, controlled, and maintained by the public water system or by a person under contract with the public water system to ensure proper operation and maintenance and compliance with the MCL or treatment technique and equipped with mechanical warnings to ensure that customers are automatically notified of operational problems.’’ Other conditions in this section of the SDWA include the following: ‘‘If the American National Standards Institute has issued product standards applicable to a specific type of POE or POU treatment unit, individual units of that type shall not be accepted for compliance with a MCL or treatment technique unless they are independently certified in accordance with such standards.’’

In order to list POU treatment units as compliance technologies, EPA had to withdraw the part of § 141.101 that prohibited POU devices being used to comply with an MCL. To this end, a final rule was published in the **Federal Register** on June 11, 1998 (EPA 1998g). For more details on POU and POE devices, see the supporting guidance document for the small system compliance technology lists (USEPA 1998f).

Public water systems are not allowed to use bottled water to comply with an MCL (63 FR 31932; June 11, 1998). Bottled water may only be used on a temporary basis to avoid unreasonable risks to health, *e.g.,* as negotiated with the State or other primacy agency as part of the compliance schedule period for an exemption or variance.

L. What Do I Need To Tell My Customers?

1. Consumer Confidence Reports

On August 19, 1998, EPA issued Subpart O, the final rule requiring community water systems to provide annual reports on the quality of water delivered to their customers (63 FR 44512). The first Consumer Confidence Reports (CCRs) were to be made available to customers by October 19, 1999, and now they are due each year by July 1 (§ 141.152(a)). In these reports, systems must provide, among other things, the levels and sources of all detected contaminants and a description of the potential health effects of any contaminant found at levels that violate EPA or State rules, as part of a broader description of the violation and efforts to remedy it. For MCL or treatment technique violations, specific ‘‘health effects language’’ in Appendix A of Subpart O must be included verbatim in the report. Today's rule updates the Appendix to include health effects language and ‘‘likely source’’

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[10] Point-of-entry (POE) treatment units treat all of the water entering a household or other building, with the result being treated water from any tap. Point-of-use (POU) treatment units treat only the water at a particular tap or faucet, with the result being treated water at that one tap, with the other taps serving untreated water. POE and POU treatment units often use the same technological concepts employed in the analogous central treatment processes, the main difference being the much smaller scale of the device itself and the flows being treated.

information for uranium. This language is consistent both with previously published health effects language for other radionuclides and with the language now required by the Public Notification Rule. Table I–10 shows the health effects language required for the radionuclides for the purposes of CCR and public notification.

TABLE I–10.—STANDARD HEALTH EFFECTS LANGUAGE FOR CCR AND PUBLIC NOTIFICATION

Contaminant	Standard health effects language for CCR and public notification
Beta/photon emitters	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta and photon emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha Emitters	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined Radium (–226 & –228)	Some people who drink water containing radium 226 or 228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.

2. Public Notification

Sections 1414(c)(1) and (c)(2) of the SDWA, as amended in 1996, require that public water systems notify their customers when they are in violation of NPDWRs. In the case of the radionuclides NPDWRs, this only applies to community water systems. On May 4, 2000, EPA revised the minimum requirements that public water systems must meet for public notification of violations of EPA's drinking water standards and other situations that pose a risk to public health from the drinking water. These revisions were promulgated under the Public Notification Rule (PNR), under 40 CFR Part 141, Subpart Q. Water systems must begin to comply with the new regulations on October 31, 2000 (if they are in jurisdictions where the program is directly implemented by EPA), or on the date a primacy State adopts the new requirements (but not later than May 6, 2002). Until the effective date of the new requirements, water systems must continue to comply with the requirements under § 141.32. Subsequent EPA drinking water regulations that affect public notification requirements will amend the PNR as a part of each individual rulemaking.

Public notification of drinking water violations is an important part of the ''public right to know'' provisions of the 1996 Amendments to the Safe Drinking Water Act. The PNR sets the requirements that public water systems must follow regarding the form, manner, frequency, and content for public notifications. These requirements apply to owners and operators of, in the case of the radionuclides NPDWRs, community water systems. The PNR requires that any regulated system notify its customers when: (1) A violation of a NPDWR occurs; (2) the system obtains a variance or an exemption from a NPDWR; or (3) the system is facing another situation posing a significant risk to public health.

Depending on the severity of the situation, water suppliers have from 24 hours to one year to notify their customers after a violation occurs. EPA specifies three categories, or tiers, of public notification. Depending under which tier a violation situation falls, water systems have different amounts of time to distribute and ways to deliver the notice:

- Immediate Notice (Tier 1): Any time a situation occurs where there is the potential for human health to be immediately impacted, water suppliers have 24 hours to notify people who may drink the water of the situation. Water suppliers must use media outlets such as television, radio, and newspapers, post their notice in public places, or personally deliver a notice to their customers in these situations.
- Notice ''as soon as possible'' (Tier 2): Any time a water system provides water with levels of a contaminant that exceed EPA or State standards or that hasn't been treated properly, but that does not pose an immediate risk to human health, the water system must notify its customers as soon as possible, but within 30 days of the violation. Notice may be provided via the media, posting, or through the mail.
- Annual Notice (Tier 3): When water systems violate a drinking water standard that does not have a direct impact on human health (for example, failing to take a required sample on time) the water supplier has up to a year to provide a notice of this situation to its customers. The extra time gives water suppliers the opportunity to consolidate these notices and send them with annual water quality reports (consumer confidence reports (CCR)), if the CCR meets the PNR timing, content, and distribution requirements.

The PNR lists the currently regulated radionuclides (combined radium-226 and radium-228, gross alpha, and beta particle and photon radioactivity) as being subject to ''Tier 2'' public notice requirements for MCL violations and ''Tier 3'' public notice requirements for violations of the monitoring and testing procedure requirements. Today's rule does not change this designation for the currently regulated radionuclides and adds uranium to the list of contaminants subject to Tier 2 requirements for MCL violations and Tier 3 requirements for violations of the monitoring and testing procedure requirements.

The elements to be included in each public notice are specified under § 141.205(a). All notices must include:

- A description of the violation that occurred, including the potential health effects (as specified in appendix B to subpart Q for MCL violations and the standard language under § 141.205(d)(2) for monitoring violations);
- The population at risk and if alternate water supplies need to be used;
- What the water system is doing to correct the problem;
- Actions consumers can take;
- When the violation occurred and when the system expects it to be resolved;
- How to contact the water system for more information; and
- Standard language encouraging broader distribution of the notice.

The standard health effects language used for public notification is the same as that for CCR, which is provided in Table I–10.

The public notice requirements under 40 CFR 141.203(b)(1) are such that the public water system must provide a Tier 2 public notice to persons served as soon as practical, but no later than 30 days after the system learns of the violation. Posted notices are required to remain in place for as long as the violation or situation persists, but in no case for less than seven days, even if the violation or situation is resolved. The PNR under § 141.203(b)(2) also requires the public water system to repeat the notice every three months for as long as the violation persists. In contrast, the current rule requires a newspaper notice within 14 days, a notice mailed to all bill-payers within forty-five days, and a repeat notice mailed every three months thereafter until the violation is resolved.

The public notification requirement gives the primacy agency discretion, in appropriate circumstances, to extend the time period allowed for the Tier 2 notice from 30 days to up to three months for the initial notice and to allow repeat notice less frequently than every three months (but no less than once per year). Permission must be granted in writing. Although the discretion given to the primacy agency is fairly broad, the rule specifically disallows extensions of the 30-day deadline for the initial public notice for any unresolved violation. The PNR also does not allow primacy agencies to establish regulations or policies that automatically give ''across-the-board'' extensions or reductions in the repeat notice frequency for all the other violations.

For the most up-to-date version of the CCR and PNR tables that will be published in the July edition of the Code of Federal Regulations (appendix A to subpart O, and appendices A and B to subpart Q of 40 CFR part 141), visit EPA's Office of Ground Water and Drinking Water's website at ''http://www.epa.gov/safewater/tables.html.'' These on-line tables incorporate changes on an on-going basis.

M. Can My Water System Get a Variance or an Exemption From an MCL Under Today's Rule?

There are two kinds of variances applicable to public water systems: ''regular variances,'' which are usually referred to simply as ''variances,'' and ''small systems variances.'' The currently regulated radionuclides are already subject to the provisions for variances and exemptions and nothing in today's rule changes these provisions. The regular variances and exemptions provisions will be discussed later in this section.

As discussed in the NODA, the ''Small Systems Compliance Technology List'' (SSCTL) for combined radium-226 and -228, gross alpha particle activity, and beta particle/photon emitter radioactivity was published in the **Federal Register** on August 6, 1998 (63 FR 42032), as required by the amended SDWA. The SSCTL list for uranium was published for comment in the radionuclides NODA.

The 1996 SDWA identifies three categories of small drinking water systems, those serving populations between 25–500, 501–3,300, and 3,301–10,000. In addition to BAT determinations, the SDWA directs EPA to make technology assessments for each of the three small system size categories in all future regulations establishing an MCL or treatment technique. Two classes of small systems technologies are identified for future NPDWRs: small system compliance technologies and small system variance technologies.

Small system compliance technologies (''compliance technologies'') may be listed for NPDWRs that promulgate MCLs or treatment techniques. In the case of an MCL, ''compliance technology'' refers to a technology or other means that is affordable for the appropriate small systems (if applicable) and that achieves compliance. Possible compliance technologies include packaged or modular systems and point-of-entry (POE) or point-of-use (POU) treatment units, as described previously.

Small system variance technologies (''variance technologies'') are only specified for those system size/source water quality combinations for which no technology meets all of the criteria for listing as a compliance technology (section 1412(b)(15)(A)). Thus, the listing of a compliance technology for a size category/source water combination prohibits the listing of variance technologies for that combination. While variance technologies may not achieve compliance with the MCL or treatment technique requirement, they must achieve the maximum reduction that is affordable considering the size of the system and the quality of the source water. Variance technologies must also achieve a level of contaminant reduction that is ''protective of public health'' (section 1412(b)(15)(B)). The process for determining small system compliance technologies and small system variance technologies is described in more detail in the guidance document, ''Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996'' (USEPA 1998f).

In the case of the currently regulated radionuclides, *i.e.,* combined radium-226 and -228, gross alpha particle activity, and total beta particle and photon radioactivity, there are no variance technologies allowable since the SDWA (section 1415(e)(6)(A)) specifically prohibits small system variances for any MCL or treatment technique which was promulgated prior to January 1, 1986. The Variance and Exemption Rule describes EPA's interpretation of this section in more detail (see 63 FR 19442; April 20, 1998).

Stakeholders provided input regarding the small system compliance technologies for combined radium-226 and -228, gross alpha emitters, and beta particle and photon radioactivity, and uranium that are listed in section I.H. The small system compliance technologies for the radionuclides regulated since 1976 were listed and described in the **Federal Register** on August 6, 1998 (63 FR 42032) and in an accompanying guidance manual (EPA 1998b). Small systems compliance technologies for uranium were evaluated subsequent to the 1998 list, and presented in the Small Systems Compliance Technology List for the Radionuclides Rule (USEPA 1999a). Small systems compliance technologies for uranium were evaluated in terms of each technology's removal capabilities, contaminant concentration applicability ranges, other water quality concerns, treatment costs, and operational/maintenance requirements. This list was published for comment in the April 21, 2000, Notice of Data Availability (USEPA 2000e). No comments were received.

Small system compliance technology lists are technology specific, but not product (manufacturer) specific. Product specific lists were determined to be inappropriate due to the potential resource intensiveness involved. Information on specific products will be available through another mechanism. EPA's Office of Research and Development has a pilot project under the Environmental Technology Verification (ETV) Program to provide treatment system purchasers with performance data from independent third parties.

The currently regulated radionuclides are already subject to the provisions for ''regular variances'' and exemptions. Uranium will be subject to the same provisions. Variances generally allow a system to provide drinking water that may be above the maximum contaminant level on the condition that the quality of the drinking water is still protective of public health. The SDWA (1415(a)) requires that any system obtaining a variance must enter into a compliance schedule with the primacy entity as a condition of the variance. An exemption, on the other hand, is intended to allow a system with compelling circumstances an extension of time before the system must comply with applicable SDWA requirements.

An exemption is limited to three years after the otherwise applicable compliance date, although extensions up to a total of six additional years may be available to small systems under certain conditions.

N. How Were Stakeholders Involved in the Development of This Rule?

EPA has consulted with a broad range of stakeholders and technical experts. EPA held a two-day stakeholders meeting on the radionuclides rule in Washington, DC on December 11–12, 1997. The meeting was announced in the **Federal Register** and open to any one interested in attending in person or by phone. During the meeting, EPA discussed a range of regulation development issues with the stakeholders, including the statutory requirements, the stipulated agreement, MCLs for each of the radionuclides, new scientific information on health effects, occurrence, analytical methods, treatment technologies, and the current and proposed monitoring framework. The presentations generated useful discussion and provided feedback to EPA regarding technical issues, stakeholder concerns and possible regulatory options. Participants in EPA's stakeholder meeting included representatives from the Association of Metropolitan Water Agencies (AMWA), Association of State Drinking Water Administrators (ASDWA), American Water Works Association (AWWA), National Association of Water Companies, State departments of environmental protection, State health department, State drinking water programs, Federal agencies, environmental groups, and local water systems. The public docket for this final rulemaking contains the meeting summary for EPA's stakeholder meeting on radionuclides in drinking water.

In addition, during the regulation development process, EPA gave presentations on the radionuclides regulation at meetings of the AWWA, ASDWA and EPA State/Regional conferences, and met with States from Regions 2, 3, 7, and 8 regarding radionuclides issues and the upcoming final rule. EPA participated in AWWA's Technical Advisory Workgroup (TAW), which meets annually to discuss technical issues including treatment, occurrence, and health risks. State public health departments and drinking water program representatives of both large and small drinking water districts participated in TAW meetings. EPA also held frequent conference calls with interested State drinking water programs about the development of the rule. In addition, EPA made presentations and received input at Tribal meetings in Nevada, Alaska, and California. Finally, EPA held a one-day meeting with associations that represent State, county, and local government elected officials on May 30, 2000, and discussed five upcoming drinking water regulations, including radionuclides. See section V.I ''Executive Order 13132'' for more information about the meeting.

The Agency utilized the feedback received from the stakeholders during all these meetings in developing today's final rule.

O. What Financial Assistance Is Available for Complying With This Rule?

Various Federal programs exist to provide financial assistance to State, local, and Tribal governments to administer and comply with this and other drinking water rules. The Federal government provides funding to States and Tribes that have a primary enforcement responsibility for their drinking water programs through the Public Water Systems Supervision (PWSS) Grants program. Additional funding is available from other programs administered either by EPA or other Federal agencies. These include the Drinking Water State Revolving Fund (DWSRF) and Housing and Urban Development's Community Development Block Grant Program. For example, the SDWA authorizes the Administrator of the EPA to award capitalization grants to States, which in turn can provide low cost loans and other types of assistance to eligible public water systems. The DWSRF assists public water systems with financing the costs of infrastructure needed to achieve or maintain compliance with SDWA requirements. Each State has considerable flexibility to determine the design of its program and to direct funding toward its most pressing compliance and public health protection needs. States may also, on a matching basis, use up to ten percent of their DWSRF allotments for each fiscal year to assist in running the State drinking water program.

Under PWSS Program Assistance Grants, the Administrator may make grants to States to carry out public water system supervision programs. States may use these funds to develop primacy programs. States may ''contract'' with other State agencies to assist in the development or implementation of their primacy program. However, States may not use program assistance grant funds to contract with regulated entities (*i.e.,* water systems). PWSS Grants may be used by States to set-up and administer a State program which includes such activities as: public education, testing, training, technical assistance, developing and administering a remediation grant and loan or incentive program (excludes the actual grant or loan funds), or other regulatory or non-regulatory measures.

P. How Are the Radionuclides MCLs Used Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)?

The framework for the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) includes the expectation that contaminated ground waters will be returned to beneficial uses whenever practicable (see § 300.430(a)(1)(iii)(F)). Section 121(d) of CERCLA requires on-site remedial actions to attain MCLGs and water quality standards under CWA when relevant and appropriate. The NCP (§ 300.430(e)(2)(i)(B) and (C) clarify that MCLs or non-zero MCLGs established under SDWA will typically be considered relevant and appropriate cleanup levels for ground waters that are a current or potential source of drinking water.

EPA's guidance on complying with these requirements are contained in an EPA document entitled ''Presumptive Response Strategy and Ex-Situ Treatment Technologies for Contaminated Ground Water at CERCLA Sites, Final Guidance,'' (October 1996. OSWER Directive 9283.1–12). A discussion of the flexibility of EPA's guidance under CERCLA on the attainment of drinking waters in ground water is contained in section 2.6 ''Areas of Flexibility in Cleanup Approach'' (pp 15–19) of the 1996 OSWER directive. The discussion in the 1996 OSWER directive regarding monitored natural attenuation and determining beneficial uses of groundwater has been updated by the following EPA guidance documents: (1) ''Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites'' (April 1999. Final OSWER Directive 9200.4–17P), and (2) ''The Role of CSGWPPs in EPA Remediation Programs'' (April 4, 1997, OSWER Directive 9283.1–09).

Q. What Is the Effective Date and Compliance Date for the Rule?

Much of today's rule will involve retaining current elements of the radionuclides NPDWR. Those portions of the final rule that are unaffected by the upcoming regulatory changes are already in effect. MCLs for gross alpha, beta particle and photon radioactivity, and combined radium-226 and -228 will be unchanged and are already in effect. Regarding water systems that are currently out of compliance with the existing NPDWRs for gross alpha, combined radium-226 and -228, and/or beta particle and photon radioactivity, States with primacy and EPA will renegotiate, as necessary, enforcement actions that put systems on compliance schedules as expeditiously as possible.

Under the Safe Drinking Water Act, the final rule becomes effective three years after promulgation December 8, 2003. Under the Standard Monitoring Framework (SMF), systems usually have three years to complete the initial monitoring cycle of four consecutive quarterly samples. In order to synchronize the monitoring periods for radionuclides with the Standardized Monitoring Framework and alleviate potential laboratory capacity problems, the end of the initial monitoring period will be December 31, 2007. EPA expects that States will phase-in monitoring over this period and determine compliance upon completion of each water system's initial monitoring schedule. For example, the fraction of water systems that begin monitoring in the first year would have compliance determinations made at the end of the first year, based upon the average results of the four quarterly samples. New monitoring includes initial monitoring for uranium, the new monitoring requirements for radium-228, and new initial monitoring under the requirements for entry points. Data grandfathering discretion for existing monitoring data to determine future monitoring schedules is discussed in sections I.D and I.J. Combined radium-226 and radium-228 MCL violations which result from the new requirement for separate radium-228 monitoring will be treated as ''new violations'' and will be on the same schedule as other new violations (e.g. uranium). Water systems with existing monitoring data for radium-228 and uranium that demonstrate that they are not in compliance with the MCL will be out of compliance on the effective date of the rule.

R. Has EPA Considered Laboratory Approval/Certification and Laboratory Capacity?

The ultimate effectiveness of the approved regulations depends upon the ability of laboratories to reliably analyze contaminants at relatively low levels. The Drinking Water Laboratory Certification Program is intended to ensure that approved drinking water laboratories analyze regulated drinking water contaminants within acceptable limits of performance. The Certification Program is managed through a cooperative effort between EPA's Office of Ground Water and Drinking Water and the Office of Research and Development. The program stipulates that laboratories analyzing drinking water compliance samples must be certified by U.S. EPA or the State. The program also requires that certified laboratories must analyze Proficiency Testing (PT) samples [formerly called Performance Evaluation (PE) samples], use approved methods and pass periodic on-site audits.

1. Laboratory Approval/Certification

As discussed in the April 21, 2000 NODA, EPA recently privatized the PT program, including the Water Supply (WS) studies. The decision to privatize the PT studies programs was announced in the **Federal Register** on June 12, 1997 (62 FR 32112). The notice indicated that in the future the EPA would issue standards for the operation of the program, while the National Institute of Standards and Technology (NIST) would develop standards for private sector PT suppliers and would evaluate and accredit PT suppliers. The private sector would develop and manufacture PT samples and conduct PT studies.

2. Laboratory Capacity: Laboratory Certification and PT Studies

The availability of laboratories is also dependent on laboratory certification efforts in the individual States with regulatory authority for their drinking water programs. Until June of 1999, a major component of many of these certification programs was their continued participation in the current EPA Water Supply (WS) PT program. As discussed previously, NIST is administering the program to accredit a provider for PT samples for radionuclides. States also have the option of approving their own PT sample providers. The extent to which the PT program will affect short-term and long-term laboratory capacity for radionuclides will be assessed after PT providers are approved by NIST or the States. However, EPA anticipates that radionuclide PT samples will be available in time to allow for laboratory certification before compliance monitoring is required.

3. Summary of Major Comments Regarding Laboratory Capacity and EPA Responses

In the April 21, 2000 NODA, the Agency stated that it is difficult to ascertain how and if externalization of the PT program will affect radiochemical laboratory capacity and the cost of radiochemical analyses. In the absence of definitive information, the Agency solicited public comments on this subject. The Agency stated in the NODA that it recognized that PT externalization may be an implementation issue for at least three reasons:

- The externalization of the radionuclides PT studies program may cause short-term disruption in laboratory accreditation;
- Requiring NTNCWSs to monitor under the Standard Monitoring Framework will add approximately 20,000 systems to the universe of systems that are already required to monitor;
- And the radon rule will be implemented at approximately the same time as the radionuclides rule.

To alleviate potential laboratory capacity problems that could result, the Agency solicited comments on whether or not to extend the initial monitoring period to four years (instead of three years). Of the 70 commenters who provided comments on the radionuclides NODA, 15 commented on laboratory externalization and its related issues. The major concerns raised by the commenters and the Agency's responses to them are provided below.

a. Laboratory Certification, Availability of PT Samples and Costs of PT Samples: Several commenters noted there is currently no certification process through which laboratories can receive State certification for radionuclide analyses due to the lack of availability of PT samples. Some commenters noted that only one PT provider has volunteered to provide PT samples for radionuclides and based on their inquiries, PT sample costs are too high. Commenters believe the high costs of PT samples will affect the resulting costs of the radiochemical analyses (by increasing operational costs). Several commenters felt EPA should reconsider the privatization of PT program. Commenters stated that EPA must ensure that an adequate number of laboratories are available to perform accurate measurements and provide data of good quality for compliance and enforcement efforts.

After evaluating public comment, EPA published its final decision about the externalization of the PT Program in the June 12, 1997 final notice (62 FR 32112). Currently, the PT program for radionuclides is being privatized, *i.e.,* operated by an independent third party provider accredited by the National Institute of Standards and Technology (NIST). EPA believes this program will ensure the continued viability of the existing PT programs, with EPA maintaining oversight. NIST is in the process of approving a provider for PT samples for radionuclides. To alleviate concerns about the costs of PT samples, States have the option to approve PT sample provider(s) themselves. The Agency anticipates that radionuclide PT samples will be available in time to allow for laboratory certification before compliance monitoring is required.

b. Laboratory Capacity: Commenters stressed the impact that the externalization of the PT program, this regulation and the radon regulation would have on laboratory capacity and workloads of the laboratories. Some commenters felt the externalization and high costs of PT samples would decrease the number of radiochemical laboratories and in affect decrease laboratory capacity. Also, commenters felt that if EPA required 48–72 hour turn around times for gross alpha (to catch the alpha particle contribution from radium-224) or monitoring of regulated radionuclides by NTNCWSs, radiochemical laboratories would not be able to address the additional demand for analytical services. EPA agrees that laboratory capacity could be effected by the externalization of the PT program. In an effort to alleviate potential laboratory capacity problems, EPA has agreed to extend the initial monitoring period from three to four years. Extending the initial monitoring period will spread the burden on the laboratories as well as the costs associated with the monitoring. In addition, EPA is allowing systems to grandfather existing data on currently regulated radionuclides and composite under certain circumstances (for more information on compositing and grandfathering, see section I.J. In addition, because EPA has decided not to require a 48 to 72 hour turn around time for gross alpha particle activity nor to regulate NTNCWSs, the potential burden on laboratory capacity should be alleviated.

II. Statutory Authority and Regulatory Background

A. What Is the Legal Authority for Setting National Primary Drinking Water Regulations (NPDWRs)?

The SDWA requires EPA to promulgate regulations pertaining to public water systems. Specifically, section 1412(b)(4) requires that EPA set a health-based goal called a maximum contaminant level goal (MCLG) as a target for setting an enforceable standard, the maximum contaminant level (MCL). The MCLG is determined by studies of the health effects of contaminants on animals under laboratory conditions or humans via epidemiological studies. The MCLG is the level at which no known or anticipated adverse effects on the health of persons occur and which allows an adequate margin of safety. The Safe Drinking Water Act requires EPA to set the MCL as close to the MCLG as is ‘‘feasible,’’ which is defined as ‘‘feasible with the use of the best technology, treatment techniques and other means which the Administrator finds, after examination for efficacy under field conditions and not solely under laboratory conditions, are available (taking cost into consideration) * * *’’ [section 1412(b)(4)(D)]. Additionally, section 1412(b)(6) provides that if the Administrator determines that at the feasible level, the benefits do not justify the costs, EPA can set a standard which maximizes the health risk reduction benefits at a cost that is justified by the benefits. In today’s rule, EPA is invoking these authorities with respect to the uranium standard. Section 1412 (b)(9) requires that any revisions to NPDWRs maintain or provide for greater protection of the health of persons.

B. Is EPA Required To Finalize the 1991 Radionuclides Proposal?

The SDWA requires that EPA issue MCLGs for the currently regulated radionuclides in drinking water and establish a NPDWR for uranium. When EPA failed to finalize the 1991 proposal, a citizen group brought suit to establish a schedule for finalizing the appropriate portions of the proposal. Following the 1996 amendments to the SDWA, the plaintiffs and EPA agreed on a schedule for completing the revisions to the radionuclides rulemaking by either finalizing applicable parts of the 1991 proposal or affirming the validity of the current rule with an explanation of why the current rule is preferable. With respect to uranium, EPA has no current rule, and is required to finalize a uranium regulation on the same schedule as gross alpha particle activity, combined radium-226 and -228, and beta particle and photon radioactivity. This agreement was reflected in a stipulation of the parties in litigation in U.S. District Court in Oregon.

III. Rule Implementation

A. What Are the Requirements for Primacy?

This section describes the regulations and other procedures and policies primacy entities have to adopt, or have in place, to implement today’s final rule. States must continue to meet all other conditions of primacy in 40 CFR part 142.

Section 1413 of the SDWA establishes requirements that primacy entities (States or Indian Tribes) must meet to maintain primary enforcement responsibility (primacy) for its public water systems. These include:

(1) Adopting drinking water regulations that are no less stringent than Federal NPDWRs in effect under sections 1412(a) and 1412(b) of the Act,

(2) Adopting and implementing adequate procedures for enforcement,

(3) Keeping records and making reports available on activities that EPA requires by regulation,

(4) Issuing variances and exemptions (if allowed by the State) under conditions no less stringent than allowed by sections 1415 and 1416, and

(5) Adopting and being capable of implementing an adequate plan for the provision of safe drinking water under emergency situations.

40 CFR part 142 sets out the specific program implementation requirements for States to obtain primacy for the Public Water Supply Supervision Program, as authorized under section 1413 of the Act. In addition to adopting the basic primacy requirements, States may be required to adopt special primacy provisions pertaining to a specific regulation. These regulation-specific provisions may be necessary where implementation of the NPDWR involves activities beyond those in the generic rule. States are required by § 142.12 to include these regulation-specific provisions in an application for approval of their program revisions. These State primacy requirements apply to today’s final rule, along with the special primacy requirements discussed below.

To implement today’s final rule, States are required to adopt revisions to § 141.25—Analytical methods for radioactivity; § 141.26—Monitoring frequency and compliance requirements for radioactivity in community water systems; appendix A to subpart O—Regulated contaminants; appendix A to subpart Q—NPDWR violations and other situations requiring public notice; appendix B to subpart Q—Standard health effects language for public notification; § 142.16—Special primacy requirements; and new requirements § 141.55—Maximum contaminant level goals for radionuclides; and § 141.66—Maximum contaminant levels for radionuclides.

B. What Are the Special Primacy Requirements?

In addition to adopting drinking water regulations at least as stringent as the

Federal regulations listed above, EPA requires that States adopt certain additional provisions related to this regulation to have their program revision application approved by EPA.

The State's request for approval must contain the following:

(1) If a State chooses to use grandfathered data in the manner described in § 141.26(a)(2)(ii)(C) of this chapter, then the State must describe the procedures and criteria which it will use to make these determinations (whether distribution system or entry point sampling points are used).

(i) The decision criteria that the State will use to determine that data collected in the distribution system are representative of the drinking water supplied from each entry point to the distribution system. These determinations must consider:

(A) All previous monitoring data.

(B) The variation in reported activity levels.

(C) Other factors affecting the representativeness of the data (*e.g.* geology).

(2) A monitoring plan by which the State will assure all systems complete the required monitoring within the regulatory deadlines. States may update their existing monitoring plan or use the same monitoring plan submitted for the requirements in § 142.16(e)(5) under the National Primary Drinking Water Regulations for the inorganic and organic contaminants (*i.e.* the Phase II/V Rules). States may note in their application any revision to an existing monitoring plan or note that the same monitoring plan will be used. The State must demonstrate that the monitoring plan is enforceable under State law.

There are many ways that a State may satisfy the special primacy requirements. The Agency intends to issue guidance regarding ways to satisfy these requirements, but States have the flexibility to develop individual programs appropriate for the circumstances within each State.

C. What Are the Requirements for Record Keeping?

The current regulations in § 142.14 require States with primacy enforcement responsibility to keep records of analytical results to determine compliance, system inventories, sanitary surveys, State approvals, vulnerability determinations, monitoring requirements, monitoring frequency decisions, enforcement actions, and the issuance of variances and exemptions. These records include:

(1) Any determination of a system's vulnerability to contamination by beta and photon emitters (§ 142.14(d)(4)); and

(2) Any determination that a system can reduce or increase monitoring frequency for gross alpha particle activity, gross beta particle and photon radioactivity, uranium, radium-226 and 228. The records must include the basis for the decision, and the repeat monitoring frequency (§ 142.14(d)(5)).

Since these requirements are generally included in § 142.14(d)(4) and (5), revisions to the rule are not necessary.

D. What Are the Requirements for Reporting?

Currently, States must report to EPA information under § 142.15 regarding violations, variances and exemptions, enforcement actions and general operations of State public water supply programs. These reporting requirements remain unchanged and apply to the radionuclides as with any other regulated contaminant.

E. When Does a State Have To Apply for Primacy?

The State must submit a request for approval of program revisions that adopts the uranium MCL, implementing regulations, and other revisions promulgated in today's final rulemaking within two years of the publication date of today's rule unless EPA approves an extension per § 142.12(b). To maintain primacy for the Public Water Supply Supervision (PWSS) Program and to be eligible for interim primacy enforcement authority for future regulations, States must adopt today's rule. Interim primacy enforcement authority allows States to implement and enforce drinking water regulations once State regulations are effective and the State has submitted a complete and final primacy revision application. To obtain interim primacy, a State must have primacy with respect to each existing NPDWR. Under interim primacy enforcement authority, States are effectively considered to have primacy during the period that EPA is reviewing their primacy revision application.

F. What Are Tribes Required To Do Under This Regulation?

Currently, no federally recognized Indian tribes have primacy to enforce any of the drinking water regulations. EPA Regions implement the rules for all Tribes under section 1451(a)(1) of SDWA. Tribes would need to submit a primacy application in order to have the authority to implement the radionuclides NPDWRs. Tribes with primacy for drinking water programs are eligible for grants and contract assistance (section 1451(a)(3)). Tribes are also eligible for grants under the Drinking Water State Revolving Fund Tribal set aside grant program authorized by SDWA section 1452(i) for public water system expenditures.

IV. Economic Analyses

Under Executive Order 12866, Regulatory Planning and Review, EPA must estimate the costs and benefits of the finalized changes to the Radionuclides NPDWRs and submit the impact analysis to the Office of Management and Budget (OMB) as part of the rulemaking process. EPA has prepared an Economic Analysis (USEPA 2000g) to comply with the requirements of this Order. This section provides a summary of the information from the economic analysis regarding estimates of the costs and benefits related to the changes to the existing radionuclides NPDWRs and the uranium NPDWR being finalized today. The economic analysis is an update to the Health Risk Reduction and Cost Analysis (USEPA 2000f) announced in the NODA (USEPA 2000e) and summarized in the NODA's Technical Support Document (USEPA 2000h). The updates to the economic analysis reflect comments received on the NODA. This section will not repeat all of the material presented in the NODA and in some cases will refer back to that notice. Changes made in response to comments will be highlighted.

A. Estimates of Costs and Benefits for Community Water Systems

Two requirements under today's rule are expected to incur costs and benefits: the adoption of the uranium MCL of 30 μg/L and the requirement for separate monitoring of radium-228, which is expected to result in additional systems in violation of the combined radium-226/-228 MCL of 5 pCi/L. EPA estimates that these requirements will result in annual compliance costs of $81 million in 1999 dollars, with $25 million of this annual cost being due to mitigation of systems newly in violation of the radium-226/-228 standard due to new monitoring requirements, $51 million due to mitigation of systems in violation of a uranium MCL of 30 μg/L, $ 4.9 million due to monitoring and reporting by CWSs, and $ 0.06 million due to new implementation costs for States. While these represent new compliance costs, most water systems will experience reduced compliance costs in the long-term because of reduced monitoring frequency for systems with low contaminant levels under the Standardized Monitoring Framework. The basis for these estimates, and alternate cost estimates using different assumptions are described later in this section.

State implementation and CWS start up costs are estimated to be $10 million annually for the first three years. Of this $10 million, approximately $ 0.25 million are State start up costs with the remainder being comprised by CWS start up costs (USEPA 2000d). Over the first twenty-three year period, the implementation costs for States and CWSs are estimated to be $ 4.9 million annually (included in the annual compliance costs reported previously). These costs include preparation of the primacy application, training, planning, and other compliance preparations, and monitoring and reporting costs for PWSs.

The treatment/non-treatment compliance unit costs and national costing assumptions used in the Economic Analysis (USEPA 2000g) are standard and are consistent with those used for estimating the costs of compliance the other recently proposed drinking water rules. The updated Technologies and Costs document (USEPA 2000i) provides unit capital and ''operations & maintenance'' costs for water treatment plants, including residuals disposal costs. Typical model small system treatment costs ranged from $ 0.25 to $ 3 per kilogallon of water treated, with associated annual per household costs ranging from $20 to $250, with the value depending upon water system size and water quality. Large system model unit costs ranged from $0.17 to $ 0.28 per kilogallon treated, with associated annual per household costs ranging from $14 to $23.

For various reasons (see the NODA's Technical Support Document for details, USEPA 2000h), the estimate of monetized benefits associated with compliance of today's rule are more uncertain than the costs estimates. In the case of the requirement for separate monitoring for radium-228, cancer risk reduction benefits of $1.7 million annually are expected. While the net benefits for this monitoring change are expected to be negative, this monitoring change is essential for enforcing the combined radium-226/-228 standard. In the case of the uranium standard, the benefits are difficult to monetize, since the number of kidney toxicity cases avoided cannot be estimated using current risk models. For this reason, the uranium kidney toxicity benefits are considered to be ''non-quantified benefits'' for this rule. As discussed in detail in part D of section I (''Rationale for the Final Uranium MCL''), we consider these non-quantified kidney benefits to be a significant part of this assessment of costs and benefits.

The uranium cancer risk reduction benefits are estimated to be $3 million annually, which, we reiterate, do not include the non-quantified kidney toxicity risk reduction benefits. As discussed in the NODA, there are significant uncertainties associated with any estimate of drinking water benefits, including uncertainties in the unit risks used to estimate risk reductions and the various health endpoints that cannot yet be fully quantifitied.

Other non-quantified benefits include those related to the technologies used to remove radium and uranium from ground water (*e.g.,* water softening technologies like ion exchange, lime softening, and membrane softening and iron removal technologies like green sand filtration and oxidation/filtration). EPA does not have enough information to estimate these benefits, but believes that they could be significant. Examples of benefits related to water softening include reductions in excessive calcium and manganese carbonate scaling in distribution systems, water heaters, and boilers and reductions in soap and detergent use. Examples of benefits related to iron removal include improvements in color and taste and reduction in staining of clothes, sinks, and basins.

B. Background

1. Overview of the 1991 Economic Analysis

Many of the options proposed in 1991 economic analysis are not being finalized today. Today's discussion will focus on the analysis of costs and benefits of the options that are being finalized: a final uranium standard and separate monitoring for radium-228. The 1991 economic analysis (USEPA 1991) estimated the annual cost of compliance with a uranium MCL of 20 μg/L to be $55 million, affecting approximately 1,500 systems, the vast majority of them being small systems. The 1991 estimate of the annual cost of compliance with a uranium MCL of 40 μg/L was $23 million. The current estimate of the cost of compliance with a uranium MCL of 20 μg/L is $93 million, impacting 900 systems, most of them small.

2. Summary of the Current Estimates of Risk Reductions, Benefits, and Costs

Table IV–1 shows the summarized results for EPA's analysis of risk reductions, benefits valuations, and costs of compliance (see USEPA 2000g for more detailed break-downs of the risk reductions, costs, and benefits by system size). The risk reductions and cost estimates are based on the estimated range of numbers of community water systems predicted to be out of compliance with the uranium MCL of 30 μg/L and the systems that are predicted to be out of compliance with the current combined radium-226/-228 standard of 5 pCi/L because of the new requirement for separate radium-228 monitoring. The best estimate values shown are the midpoints from ranges that are based on the two occurrence model methodologies described in the NODA (USEPA 2000e), the ''direct proportions'' and ''lognormal model'' approaches. As described in the NODA, these two approaches are expected to serve as ''low-end'' and ''high-end'' occurrence estimates, respectively.

Eliminating the combined radium-226/-228 monitoring deficiency [11] is predicted to lead to 295 (range of 270 to 320) systems out of compliance with an MCL of 5 pCi/L, affecting 420,000 persons (range 380,000 to 460,000). A uranium MCL of 30 μg/L is predicted to impact 500 systems (range 400 to 590), affecting 620,000 persons (range 130,000 to 1,100,000). The estimates of occurrence and risk reductions for a uranium MCL of 30 μg/L are based on the assumption that the activity-to-mass ratio in drinking water is 0.9 μg/pCi. Based on the available information, the average activity-to-mass ratio for the various uranium isotopes in drinking water typically varies from 0.7 to 1.5 pCi/μg.

The estimated cancer morbidity risk reduction for the option addressing the combined radium monitoring deficiency is 0.4 (0.3 to 0.5) cancer cases avoided annually, with an associated annual monetized benefit of $1.7 million (range of $1.2 to $2.2 million). The annual cancer morbidity risk reduction estimated for a uranium MCL of 30 μg/L is 0.9 cases/year (range 0.1 to 1.6). The associated annual monetized benefit related to uranium cancer risk reduction is $3 million (range from $0.2 to $6 million) [12]. The risk reductions and

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[11] The monitoring deficiency is corrected by requiring the separate analysis of radium-228 for systems with gross alpha levels below 5 pCi/L and radium-226 levels below 3 pCi/L.

[12] The Agency has agreed to consider the July 27, 2000 recommendations of its Science Advisory Board (SAB) concerning discounting of benefits in future drinking water regulations. In particular, the SAB recommended that quantitative adjustments to benefits be considered with respect to timing of risk (*e.g.,* consideration of a lag or latency period before the resulting cancer fatality) and income growth. The SAB also recommended that other possible adjustments to benefits estimates be considered in a qualitative manner. We have not made any such adjustments to the benefits associated with today's rule since the principal benefits are non-quantifiable (avoidance of kidney toxicity due to reductions in exposure to uranium). We do not

benefits shown for uranium do not include those related to kidney toxicity, which are non-quantifiable (cases avoided cannot be estimated). As discussed in section I.D.2 of today's final rule, these non-quantifiable benefits are projected to be preventing a series of adverse affects on the functioning of the kidney such as proteinuria (*e.g.,* reabsorption deficiency or leakage of albumin), that could ultimately lead to a more widespread breakdown in kidney tubular function. Such effects on tubular function would be manifested by an impaired ability of the kidneys to filter and reabsorb nutrients and to excrete urine.

Annual compliance costs are estimated to be $25 million (range $16 to $35 million) for the option addressing the combined radium monitoring deficiencies. Annual compliance costs for the uranium NPDWR are predicted to be $51 million (range from $9 to $92 million). In addition to these mitigation related compliance costs, water systems are expected to incur $4.9 million annually in monitoring and reporting costs. As demonstrated by this analysis the estimated range of central-tendency annual compliance costs exceed the ranges of central-tendency annual monetized benefits for both provisions finalized today.

TABLE IV–1.—SUMMARY OF COSTS AND BENEFITS FOR COMMUNITY WATER SYSTEMS PREDICTED TO BE IMPACTED BY THE REGULATORY OPTIONS BEING CONSIDERED FOR FINALIZATION

Options	Numbers of systems impacted [1] (population exposed above MCL)	Estimated lifetime radiogenic cancer morbidity risk at MCL [2, 3, 4]	Total cancer cases avoided annually (fatal cases)	Best-estimate value of avoided cancer cases, in millions of $/year)	Best-estimate of annual compliance costs, in millions of $/year)
Systems predicted to be impacted by corrections to the monitoring deficiencies for combined radium-226 and -228					
Eliminate combined radium monitoring deficiency.	295 systems (420 K persons).	1×10^{-4}	0.4 (0.3)	1.7	25
Systems predicted to be out of compliance with proposed options for uranium MCL					
Uranium at 30 μg/L	500 systems (620 K persons).	1×10^{-4} (assumes 30 pCi/).	0.9 (0.6) (Total Number of kidney toxicity cases cannot be accurately estimated, but expected to be substantial)	3.0 Kidney toxicity benefits range from prevention of mild proteinurea to possible more serious impaired kidney tubular function	51

Notes: Compliance costs do not include monitoring and reporting costs, which comprise an additional $5 million annually. Ranges based on directly proportional versus lognormal distribution approach.

[1] Compared to the initial baseline (*i.e.,* occurrence data are adjusted to eliminate existing MCL violations) for combined radium. Occurrence data is unadjusted for uranium options.

[2] 1×10 is equivalent to "one in ten thousand", EPA's usual upper limit of acceptable cancer incidence (morbidity) risk for contaminants in drinking water.

[3] These risk estimates are based on several simplifying assumptions and are only meant to be illustrative. The reported combined radium risk is based on an "occurrence weighted average" for radium-226 and radium-228 (2.3×10^{-5} per pCi/L). The "best-estimate" for a particular situation would depend on the actual levels of Radium226 and Radium228 that comprise the combined level of 5 pCi/L. Regarding uranium risks, since the individual uranium isotopes that make up naturally-occurring uranium have cancer morbidity risks that are similar in magnitude (6.4 to 7.1×10^{-11} per pCi), the assumptions about isotopic prevalence are not important. Here, we assumed that the simple average applied (3.83×10^{-6} per pCi/L).

[4] Kidney toxicity is not considered in this estimate of risk or monetized benefits.

3. Uncertainties in the Estimates of Benefits and Cost

The models used to estimate costs and benefits related to regulatory measures have uncertainty associated with the model inputs. The types and uncertainties of the various inputs and the uncertainty analyses for risks, benefits, and costs are qualitatively discussed in this section.

a. Uncertainties in Risk Reduction and Benefits Estimates

For each individual radionuclide, EPA developed a central-tendency risk coefficient that expresses the estimated probability that cancer will result in an exposed individual per unit of radionuclide activity (*e.g.,* per pCi/L) over the individual's lifetime (assumed to be 70 years). Two types of risks are considered, cancer morbidity, which refers to any incidence of cancer (fatal or non-fatal), and cancer mortality, which refers to a fatal cancer illness. For this analysis, we used the draft September 1999 risk coefficients developed as part of EPA's revisions to Federal Guidance Report 13 (FGR–13, EPA 1999e). FGR–13 compiled the results of several models predicting the cancer risks associated with radioactivity. The cancer sites considered in these models include the esophagus, stomach, colon, liver, lung, bone, skin, breast, ovary, bladder, kidney, thyroid, red marrow (leukemia), as well as residual impacts on all remaining cancer sites combined.

There are substantial uncertainties associated with the risk coefficients in FGR–13 (EPA 1999e): researchers estimate that some of the coefficients may change by a factor of more than 10 if plausible alternative models are used to predict risks. While the report does not bound the uncertainty for all radionuclides, it estimates that the central-tendency risk coefficients for uranium-234 and radium-226 may change by a factor of seven depending on the models employed to estimate

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believe that adjustments to these monetized cancer avoidance benefits estimates for either timing or income growth would materially affect our benefits assessment or decisions resulting from overall consideration of the benefits and costs of the regulatory standard.

risk.[13] Ranges that reflect uncertainty and variability in the risk coefficients have been used to conduct a sensitivity analysis of risk reductions and benefits, the results of which are reported in Economics Analysis (USEPA 2000g).

Since the available occurrence data do not provide information on the contribution of individual radionuclides or isotopes to the total activities of gross alpha or uranium, there is uncertainty involved in the assumptions about isotopic ratios. These and other uncertainties related to occurrence information (*e.g.,* uncertainty in extending the NIRS database results to the national level) also contribute to uncertainty in the estimates of impacts. Other inputs that were used in the sensitivity analysis of risk reductions and benefits are the age- and gender-dependent distributions of water ingestion, which are used in estimating lifetime exposure, and the credible range for the ''value of a statistical life.''

b. Uncertainty in Compliance Cost Estimates

Regarding uncertainty in the compliance cost estimates, these estimates assume that most systems will install treatment to comply with the MCLs, while recent research suggests that water systems usually select compliance options like blending (combining water from multiple sources), developing new ground water wells, and purchasing water (USEPA 2000g). As discussed in the NODA, preliminary data (202 compliance actions from 14 States) on nitrate violations suggest that only around a quarter (25%) of those systems taking action in response to a nitrate violation installed treatment, while roughly a third developed a new well or wells. The remainder either modified the existing operations (10–15%), blended (15%), or purchased water (15–20%). Similar data for radium violations from the State of Illinois (77 compliance actions) indicate that around a quarter of systems taking action installed treatment, while the majority (50–55%) purchased water, with the remainder (20–25%) either installing a new well, blending, or stopping production from the contaminated well or wells. EPA will continue to gather information regarding the prevalence of treatment versus non-treatment options for compliance for other contaminants. At this time, this data is considered preliminary and will be used for comparisons only.

To evaluate the potential variability in the compliance cost estimates, EPA has performed a sensitivity analysis for uncertainties in the decision tree by varying the assumed percentages for the modeled compliance options. Since per system costs are much higher for very large systems, the assumptions used in the large water system size categories can be expected to dominate the variability in national costs. The sensitivity analysis results are reported in the Economic Analysis (USEPA 2000g).

4. Major Comments

Following is a summary of the major comments received on the analysis of costs and benefits for the finalization of the radionuclides rule.

a. Retention of radium-226/-228 MCL of 5 pCi/L: Several commenters suggested that the costs and benefits of compliance with the existing radium-226/-228 MCL should be included in the analysis of the costs and benefits of the finalization of today's rule, because ''systems currently in non-compliance with the combined radium MCL are in that situation because of EPA's proposed rule changes in 1991.'' EPA disagrees with this comment since all of MCLs for the currently regulated radionuclides, including radium-226/-228 have been fully enforceable since 1976. While some may argue that the radionuclides rules were ''National Interim Primary Drinking Water Regulations'' (NIPDWRs) between 1976 and 1986, NIPDWRs were fully enforceable. In addition, six years elapsed between the re-authorization of the Safe Drinking Water Act (1986), which finalized all NIPDWRs, and the 1991 proposal. Given the fact that 25 years have elapsed since this MCL became an enforceable standard, EPA believes that it is appropriate to consider only the costs and benefits of the changes that are being made in the current standards. In view of the fact that 25 years have elapsed since this MCL became an enforceable standard, EPA believes that is appropriate to consider only the costs and benefits of the changes that are made to the current radium standards as a cost of today's rule. EPA further believes that any costs incurred by facilities that are required to comply with the 1976 rule represent deferred costs that those facilities elected not to expend until now.[14]

b. Cost/Benefit Analysis Requirements: One commenter suggested that the analysis of costs and benefits, as presented in the Notice of Data Availability (USEPA 2000e) omitted some information required under section 1412(b)(4)(C) of the 1996 SDWA. EPA disagrees with this comment. All of the required information relevant to the analysis of costs and benefits for the options considered are found in the draft Health Risk Reduction and Cost Analysis (HRRCA, USEPA 2000f), which was announced by and described in the NODA. In the HRRCA, EPA did meet the requirements of the Safe Drinking Water Act for performing analyses of costs and benefits. For compliance with each regulatory option being considered, EPA updated the analysis supporting the 1991 radionuclides proposal, including estimates of quantifiable and non-quantifiable health risk reduction benefits, quantifiable and non-quantifiable health risk reduction benefits likely to occur from reductions in co-occurring contaminants (excluding those associated with compliance with other proposed or promulgated regulations), quantifiable and non-quantifiable costs, the incremental costs and benefits for the uranium options, the effects of the contaminant on the general population and on sensitive groups within the population (*e.g.,* children), and other relevant factors. In addition to the HRRCA, EPA is supporting today's final actions with a Economic Analysis (USEPA 2000g) that builds on the HRRCA, including some changes made in response to comments received.

c. Cumulative Affordability: Several commenters suggested that EPA consider the cumulative impact of its regulations on the affordability of water service, as opposed to looking at affordability one regulation at a time. EPA agrees that it would be best to look at ''cumulative affordability,'' since this is the only realistic indicator of affordability. For this reason, EPA includes a ''water bill baseline'' in its affordability assessments, which includes cumulative impacts from existing regulations. When a rule is promulgated, the water bill baseline increases and the estimate of affordability decreases, the details of which depend on the percentages of systems impacted and the estimates of the annual per household costs associated with the regulation. The affordability assessment supporting the uranium small systems compliance

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[13] Table 2.4, Uncertainty Categories for Selected Risk Coefficients. Federal Guidance Report 13 (1999).

[14] It is difficult to estimate these costs due to recent efforts by many CWSs to comply with the current radium rule, however, we would expect approximately 200–400 systems would spend in the range of $18–36 million annually to comply with the current standard. (Low estimate in range is based on recent SDWIS data; high estimate is based on 1984 NIRS occurrence database.)

technology list is based on the current baseline, which is described in ''Variance Technology Findings for Contaminants Regulated Before 1996'', which can be downloaded at ''http://www.epa.gov/OGWDW/standard/varfd.pdf.'' As future rules are promulgated that impact small water systems (including this one), this baseline will be revised.

d. Disposal costs: One commenter suggested that EPA ''did not adequately address the disposal of waste stream residuals'' in the NODA and that waste disposal costs are a ''significant factor'' in estimating costs. EPA agrees that waste disposal considerations are very important when considering the implementation of this rule. Since the only MCL that EPA is finalizing today is the uranium MCL (the others are existing regulations), this is the only MCL that could be impacted by this consideration. In estimating the compliance costs for today's actions, EPA did include waste disposal costs in its estimate of treatment costs, including estimated waste-related capital costs, operations and maintenance costs, and residuals disposal. EPA believes that its estimate of residuals disposal are adequate and are based on the best available information.

e. Discounting of Costs and Benefits: One commenter stated that it is ''appropriate and standard practice to ensure that costs and benefits be evaluated on the same basis to avoid apples and oranges comparison,'' further stating that EPA should discount both or neither. EPA agrees that costs and benefits should be evaluated in such a way that they can be compared.

One approach to accomplish this is to annualize the costs and benefits of the regulation. In such instances, the capital costs, paid up front, need to be spread out across the life of the equipment. To do that, one needs to reflect the time value of resources. The analyst must ask the question: What is the annual payment that could finance the capital investment? Such a calculation would reflect the social discount rate. Annual operations and maintenance (O&M) costs would not have to be annualized, since these costs are assumed to be accrued on a continual basis each year.

Ideally, the analysis would also annualize the benefits using the same techniques. As noted previously, we have not made any such adjustments to the benefits associated with today's rule for uranium since the principal benefits are non-quantifiable (avoidance of kidney toxicity due to reductions in exposure to uranium). We do not believe that adjustments to these benefits estimates for either timing or income growth would materially affect our benefits assessment or decisions resulting from overall consideration of the benefits and costs of the regulatory standard.

f. Use of MCLs for Ground Water Protection Needs to be Evaluated as Part of this Rulemaking: One commenter stated that, since linkages are made between drinking water standards and ''clean-up standards'' for radioactively contaminated sites, the costs and benefits of applying drinking water standards to clean-up efforts should be evaluated as part of this rulemaking. EPA disagrees that clean-up costs and benefits should be used to influence the setting of drinking water MCLs. EPA does, however, agree that cross-program costs and benefits should be considered when appropriate. In this case, it is inappropriate to consider clean-up and ground water protection costs since MCLs are set specifically and solely with drinking water exposures in mind. If another program or Agency applies these MCLs for other purposes (*e.g.,* clean-up standards), then the costs and benefits of that application should be considered when evaluating that application.

V. Other Required Analyses and Consultations

A. Regulatory Flexibility Act (RFA)

The RFA, as amended by the Small Business Regulatory Enforcement Fairness Act of 1996 (SBREFA), 5 USC 601 *et seq.,* generally requires an agency to prepare a regulatory flexibility analysis of any rule subject to notice and comment rulemaking requirements under the Administrative Procedure Act or any other statute unless the agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. Small entities include small businesses, small organizations, and small governmental jurisdictions.

The RFA provides default definitions for each type of small entity. It also authorizes an agency to use alternative definitions for each category of small entity, ''which are appropriate to the activities of the agency'' after proposing the alternative definition(s) in the **Federal Register** and taking comment. 5 U.S.C. sec. 601(3)–(5). In addition to the above, to establish an alternative small business definition, agencies must consult with SBA's Chief Counsel for Advocacy.

For purposes of assessing the impacts of today's rule on small entities, EPA considered small entities to be CWSs serving fewer than 10,000 persons. This is the cut-off level specified by Congress in the 1996 Amendments to the Safe Drinking Water Act for small system flexibility provisions. Because this definition does not correspond to the definitions of ''small'' for small businesses, governments, and non-profit organizations, EPA requested comment on an alternative definition of ''small entity'' in the preamble to the proposed Consumer Confidence Report (CCR) regulation (63 FR 7620, February 13, 1998). Comments showed that stakeholders support the proposed alternative definition. EPA also consulted with the Small Business Administration's Office of Advocacy on the definition as it relates to small business analysis. In the preamble to the final CCR regulation (63 FR 4511, August 19, 1998), EPA expressed its intention to use this alternative definition for regulatory flexibility assessments under the RFA for all drinking water regulations and has thus used it in this final rulemaking.

In accordance with section 603 of the RFA, EPA prepared an initial regulatory flexibility analysis (IRFA) for the 1991 proposed rule (see 56 FR 33050). Since the proposed rule (July 18, 1991) pre-dated the 1996 Amendments to the RFA, EPA did not convene a Small Business Advocacy Review Panel for this rule.

We also prepared a final regulatory flexibility analysis (FRFA) for today's final rule. The FRFA addresses the issues raised by public comments on the IRFA, which was part of the proposal of this rule. The FRFA is available for review in the docket and is summarized below.

The RFA requires EPA to include the following when completing an FRFA:

(1) A succinct statement of the need for, and objectives of the rule;

(2) A summary of the significant issues raised by the public comments on the IRFA, and a summary of the assessment of those issues, and a statement of any changes made to the proposed rule as a result of those comments;

(3) A description of the types and number of small entities to which the rule will apply and the impact they will experience, or an explanation why no estimate is available;

(4) A description of reporting, record keeping, and other compliance requirements of the rule, including an estimate of the classes of small entities which will be subject to the rule and the type of professional skills necessary for preparation of reports or records; and

(5) A description of the steps the Agency has taken to minimize the significant impact on small entities consistent with the stated objectives of

the applicable statutes, including a statement of the factual, policy, and legal reasons why we selected the chosen alternative in the final rule and why the other significant alternatives to the rule were rejected.

EPA has considered and addressed all of the requirements. The following is a summary of the FRFA. The need for and objectives for the rule are discussed in sections I.A, I.B, I.C and II.A of this preamble. Requirements ''2'' through ''4'' are addressed in the subsections that follow. The fifth requirement is discussed in sections I.D and I.J., which provide information about steps EPA has taken that will lessen impacts on small systems, including: (1) The selection of the less stringent uranium MCL, (2) overall reduced monitoring frequencies for systems with radionuclides levels less than the MCL, (3) allowance of grandfathering of data and State monitoring discretion for determining initial monitoring baseline, and (4) exclusion of NTNCWS from the regulation. Sections I.C. and I.B provide the rationale for the retention of the MCLs for radium-226 and -228, gross alpha, and photon/beta emitters.

The significant issues raised in public comments were the high cost of compliance for small systems and high cumulative costs for water contaminant testing. EPA understands these concerns and has made several changes to the proposed rule that will reduce cost impacts to small systems. In addition, commenters disagreed with the proposal to include NTNC water systems in the rule. Based on several factors, including these comments and the analyses of risks faced by NTNC customers, risk reductions, benefits, and costs, EPA has decided that additional future analyses and reevaluation, together with any new data that can be obtained is needed before regulating radionuclides at NTNC drinking water systems (see section I.D.8. for further discussion). This information will be collected and future regulatory action will be assessed under the regulatory review process. A complete summary of comments received and EPA's responses can be obtained from the docket (USEPA 2000a).

For many small entities, today's final rule will reduce long-term monitoring costs because the rule provides for less frequent follow-up monitoring (relative to the 1976 rule) for systems if they have radionuclides levels (e.g., gross alpha and radium-226 and -228) below the MCLs (most small systems). For example, under the 1976 rule, a system with a gross alpha level less than the MCL but greater than ½ MCL is required to monitor four times in a four year period. The revised monitoring scheme will allow this system to reduce the monitoring frequency to one sample every three years or less. In addition, EPA is giving States discretion in using historical monitoring data (grandfathering) to determine the initial monitoring baseline for systems. Therefore, systems with sufficient data may not be required to take four quarterly samples for the initial monitoring period and may immediately begin reduced monitoring (*e.g.,* one sample per three years, six years, or nine years) after the rule is effective (*e.g.,* three years after the rule is promulgated). See sections I.D ''How has this new information impacted the regulatory decisions being promulgated today?'' and I.J ''Where and how often must a water system test for radionuclides?'' for additional information about monitoring. A small percentage (<1.5%) of systems are expected to exceed the radium-226 and-228 and uranium MCLs and will be required to take action to come into compliance.

The number of small entities subject to today's rule is shown in Table V–1.

TABLE V–1.—SUMMARY OF ANALYSIS RESULTS

From the ''Economic Analysis of the Radionuclides NPDWR'' (USEPA 2000g)

Community water system size class (25 to 10,00)	Ground water systems						Surface water systems			
	Combined radium loophole		Uranium (20µg/L)		Uranium (40 µg/L)		Uranium (20 µg/L)		Uranium (40 µg/L)	
	Number of systems	Cost/Revenue[1]	Number of systems	Cost/Revenue[1]	Number of systems	Cost/Revenue[1]	Number of systems	Cost/Revenue[1]	Number of systems	Cost/Revenue[1]
Total	270–310	[2]1–2	820–900	[2]1–3	300–400	[2]1–3	< 10–40	[2]1–3	0–20	[2]0–3

Notes:

[1] As reported in the economic analysis support document (USEPA 2000g), the revenue portion of the cost per revenue estimates are based on data collected the 1992 Census of Governments. The Agency then estimated average revenues for small governments.

The reported ranges represent results using the directly proportional approach followed by results using the lognormal distribution approach.

''0'' indicates that no systems in this category are expected to be out of compliance with the MCL.

Revenue estimates are taken from Exhibit 6–3 of the economic analysis support document (USEPA 2000g).

See Appendix G of the economic analysis support document (USEPA 2000g) for information regarding the number of affected for the 25 to 10,000 size class and the associated costs. Detail does not add to totals due to rounding.

[2] Percent.

Small systems are also required to provide information in the Consumer Confidence Report or other public notification if the system exceeds one of the MCLs. As is the case for other contaminants, required information on radionuclides levels must be provided by affected systems and is not considered to be confidential. The professional skills necessary for preparing reports are the same skill level required by small systems for current reporting and monitoring requirements for other drinking water standards.

In addition to the public comments on the proposal, the Agency considered comments received through an outreach process that obtained input from small entities, including a Stakeholders meeting, Tribal consultations, and other consultations. After considering all the input from stakeholders as well as its own analyses, the Agency has included several measures in today's rule that should reduce the burden on small drinking water systems: (1) A revised monitoring scheme with long-term monitoring reduction for most small systems; (2) State discretion for grandfathering existing monitoring data; (3) the decision not to regulate non-transient, non-community water systems, which are generally very small water systems; and (4) the selection of a uranium MCL that is less stringent than the 1991 proposed feasible level. The uranium MCL is still protective of public health with an adequate margin of safety, but will impact fewer small systems, reducing the number of systems that may face waste disposal issues, and increasing the likelihood that non-treatment options for achieving compliance may be used. These items are discussed in more detail in sections I.D and I.J.

EPA also is preparing a small entity compliance guide to help small entities comply with this rule. Small entities will be able to access a copy of this guide at: *http://www.epa.gov/sbrefa/* (to be available within 60 days of the publication of the rule in the **Federal Register**).

B. Paperwork Reduction Act

The Office of Management and Budget (OMB) has approved the information collection requirements contained in this rule under the provisions of the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.* and has assigned OMB control number—2040–0228

Under this rule, respondents to the monitoring, reporting, and recordkeeping requirements include the owners and operators of community water systems and State officials that must report data to the Agency. Monitoring for radium-228, uranium, and beta and photon emitters will be required at each entry point to the distribution system under the final radionuclides rule. States will have discretion in grandfathering existing data for determining initial monitoring baselines for the currently regulated contaminants, combined radium-226/-228, gross alpha particle activity, and beta particle and photon radioactivity.

EPA has estimated the burden associated with the specific information collection, record keeping and reporting requirements of the proposed rule in the accompanying Information Collection Request (ICR). The ICR for today's final rule compares the current requirements to the revised requirements for information collection, reporting and record-keeping. There are several activities that the State and the CWSs must perform in preparing to comply with the revised Radionuclides Rule. Start-up activities include reading the final rule to become familiar with the requirements and training staff to perform the required activities.

For PWSs, the number of hours required to perform each activity may vary by system size. This rule only applies to community water systems. As shown in Table V–2, there are approximately 53,121 CWSs and 56 States and territories considered in this ICR (a total of 53,177 respondents). During the first three years after promulgation of this rule, the average burden hours per respondent per year is estimated to be 6 hours for PWSs and 115 hours for States. During this period, the total burden hour per year for the approximately 53,177 respondents covered by this rule is estimated to be 342,873 hours to prepare to comply with this revised Radionuclide Rule. There are no new monitoring, record-keeping, reporting or equipment costs for CWSs during the first three-year period, hence no responses are expected from the CWSs. The average number of responses for the States is expected to be 37 per year during the first three year period. Total annual labor costs during this first 3 year period are expected to be about $10 million per year for CWS.

TABLE V–2.—AVERAGE BURDEN, RESPONDENTS, AND RESPONSES DURING THE THREE-YEAR ICR APPROVAL PERIOD

	CWSs	States	Total (each year)
Average Burden Hours per Year	336,433	6,440	342,873
Average Respondents per Year	53,121	56	53,177
Average Burden Hours per Respondent per Year	6	115	121
Average Responses per Year	[1] 0	33	33
Average Burden Hours per Response per Year	[1] 0	17	17
Average Responses per Respondent per Year	[1] 0	[2] .66	.66

[1] Preparation only.
[2] Two over 3-year period.

TABLE V–3.—SUMMARY OF BURDEN AND COSTS FOR THE RADIONUCLIDES RULE FOR THE ICR APPROVAL PERIOD

Respondent Category	Number of respondents annually	Number of responses annually	Total annual burden (hours)	Total annual labor costs ($ dollars)	Total annual capital cost	Total annual O&M cost
CWSs	53,121	(1)	336,433	$9,925,042	0	0
States	56	[2] 37 (2 per respondent over 3 year period)	6,440	247,905	0	0
Total	53,177	33	342,873	10,172,947	0	0

[1] Preparation only.
[2] Two per respondent over 3-year period.

Three years after the promulgation date, community water systems will begin collecting mandatory monitoring data as described earlier in this section. As reported in the ICR (using a 7% discount rate over a 23 year period), EPA estimates that today's revisions to monitoring will result in a national annual monitoring, reporting and record keeping burden of $ 4.85 million (25,197 hours) for all CWSs and an average annual programmatic burden of $63,723 (4,170 hours) for States (total for all 56 jurisdictions) over the first 23 years after promulgation of this rule (see Table V–4).

TABLE V–4.—SUMMARY OF BURDEN AND COSTS FOR THE RADIONUCLIDES RULE FOR THE POST-ICR APPROVAL PERIOD

Respondent category	Number of respondents annually	Number of responses annually	Total annual burden (hours)	Total annual labor costs	Total annual capital cost	Total annual O&M cost (monitoring)
CWSs	53,121	50,394	25,197	$537,574	0	$4,855,439
States	56	224	4,170	63,723	0	63,723
Total	53,177	50,618	29,367	601,297	0	4,919,162

Burden means the total time, effort, or financial resources expended by persons to generate, maintain, retain, or disclose or provide information to or for a Federal agency. This includes the time needed to review instructions; develop, acquire, install, and utilize technology and systems for the purposes of collecting, validating, and verifying information, processing and maintaining information, and disclosing and providing information; adjust the existing procedures to comply with any previously applicable instructions and requirements; train personnel to be able to respond to a collection of information; search data sources; complete and review the collection of information; and transmit or otherwise disclose the information.

An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number. The OMB control numbers for EPA's regulations are listed in 40 CFR part 9 and 48 CFR chapter 15. EPA is amending the table in 40 CFR part 9 of the currently approved ICR control numbers issued by OMB for various regulations to list the information requirements contained in this final rule.

C. Unfunded Mandates Reform Act

1. Summary of UMRA Requirements

Title II of the Unfunded Mandates Reform Act of 1995 (UMRA), Pub.L. 104–4, establishes requirements for Federal agencies to assess the effects of their regulatory actions on State, local, and tribal governments and the private sector. Under UMRA section 202, EPA generally must prepare a written statement, including a cost-benefit analysis, for proposed and final rules with "Federal mandates" that may result in expenditures to State, local, and tribal governments, in the aggregate, or to the private sector, of $100 million or more in any one year. Before promulgating an EPA rule, for which a written statement is needed, section 205 of the UMRA generally requires EPA to identify and consider a reasonable number of regulatory alternatives and adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule. The provisions of section 205 do not apply when they are inconsistent with applicable law. Moreover, section 205 allows EPA to adopt an alternative other than the least costly, most cost-effective or least burdensome alternative if the Administrator publishes with the final rule an explanation of why that alternative was not adopted.

Before EPA establishes any regulatory requirements that may significantly or uniquely affect small governments, including tribal governments, it must have developed, under section 203 of the UMRA, a small government agency plan. The plan must provide for notifying potentially affected small governments, enabling officials of affected small governments to have meaningful and timely input in the development of EPA regulatory proposals with significant Federal intergovernmental mandates and informing, educating, and advising small governments on compliance with the regulatory requirements.

EPA has determined that this rule does not contain a Federal mandate that may result in expenditures of $100 million or more for State, local, and tribal governments, in the aggregate, or the private sector in any one year. The estimated total annual compliance costs of the final rule is 83 million (See section IV. Economic Analyses for additional information). Thus, today's rule is not subject to the requirements of sections 202 and 205 of the UMRA. This rule will establish requirements that affect small community water systems. EPA has determined that this rule may contain regulatory requirements that significantly or uniquely affect small governments. As described in part A of this section, EPA has provided all public water systems (including small systems) with opportunities to provide input into the development of this rule and to be informed about the requirements for compliance.

D. National Technology Transfer and Advancement Act

Section 12(d) of the National Technology Transfer and Advancement Act of 1995 (NTTAA), (Pub. L. 104–113, section 12(d), 15 U.S.C. 272 note), directs EPA to use voluntary consensus standards in its regulatory activities unless to do so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.*, material specifications, test methods, sampling procedures, business practices) that are developed or adopted by voluntary consensus standard bodies. The NTTAA directs EPA to provide to Congress, through OMB, explanations when the Agency decides not to use available and applicable voluntary consensus standards.

Today's rule does not establish any technical standards, thus, NTTAA does not apply to this rule. It should be noted, however, that systems complying with this rule need to use previously approved technical standards already included in § 141.25. Currently, a total of 89 radiochemical methods are approved for compliance monitoring of radionuclides in drinking water. Of these methods, twenty-four (24) are approved by the Standard Methods Committee and are described in the "Standard Methods for the Examination of Waste and Wastewater (13th, 17th, 18th, and 19th editions)," which was prepared and published by the American Public Health Association. In addition, twelve of the approved radiochemistry methods are from the American Society for Testing and Materials (ASTM) and are described in the Annual Book of ASTM Standards. These methods and their references are provided in Table I–8 (shown in section I of this preamble).

E. Executive Order 12866: Regulatory Planning and Review

Under Executive Order 12866, [58 FR 51735 (October 4, 1993)] the Agency must determine whether the regulatory action is "significant" and therefore subject to OMB review and the requirements of the Executive Order. The Order defines "significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.''

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action.'' As such, this action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

F. Executive Order 12898: Environmental Justice

Executive Order 12898 ''Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations,'' (59 FR 7629, February 16, 1994) establishes a Federal policy for incorporating environmental justice into Federal agency missions by directing agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations. The Agency has considered environmental justice-related issues concerning the potential impacts of this action and has consulted with minority and low-income stakeholders by convening a stakeholder meeting via video conference specifically to address environmental justice issues.

As part of EPA's responsibilities to comply with E.O. 12898, the Agency held a stakeholder meeting via video conference on March 12, 1998, to highlight components of pending drinking water regulations and how they may impact sensitive sub-populations, minority populations, and low-income populations. Topics discussed included treatment techniques, costs and benefits, data quality, health effects, and the regulatory process. Participants included national, State, tribal, municipal, and individual stakeholders. EPA conducted the meeting by video conference call between eleven cities. This meeting was a continuation of stakeholder meetings that started in 1995 to obtain input on the Agency's Drinking Water programs. The major objectives for the 1998 meeting were:

(1) Solicit ideas from Environmental Justice (EJ) stakeholders on known issues concerning current drinking water regulatory efforts;

(2) Identify key issues of concern to EJ stakeholders; and

(3) Receive suggestions from EJ stakeholders concerning ways to increase representation of EJ communities in OGWDW regulatory efforts.

In addition, EPA developed a plain-English guide specifically for this meeting to assist stakeholders in understanding the multiple and sometimes complex issues surrounding drinking water regulations. A meeting summary for the March 12, 1998 Environmental Justice stakeholders meeting (USEPA 1998J) is available in the public docket for this final rulemaking.

The radionuclides rule applies to all community water systems, which will provide equal health protection for all minority and low-income populations served by systems regulated under this rule from exposure to radionuclides.

G. Executive Order 13045: Protection of Children From Environmental Health Risks and Safety Risks

Executive Order 13045: ''Protection of Children from Environmental Health Risks and Safety Risks'' (62 FR 19885, April 23, 1997) applies to any rule that: (1) Was initiated after April 21, 1997, or for which a Notice of Proposed Rulemaking was published after April 21, 1998; (2) is determined to be ''economically significant'' as defined under E.O. 12866, and (3) concerns an environmental health or safety risk that EPA has reason to believe may have a disproportionate effect on children. If the regulatory action meets all three criteria, the Agency must evaluate the environmental health or safety effects of the planned rule on children, and explain why the planned regulation is preferable to other potentially effective and reasonably feasible alternatives considered by the Agency.

This final rule is not subject to the Executive Order because EPA published a notice of proposed rulemaking before April 21, 1998. However, EPA's policy since November 1, 1995 is to consistently and explicitly consider risks to infants and children in all risk assessments generated during its decision making process including the setting of standards to protect public health and the environment.

Today's action primarily involves retaining the current MCLs for the regulated radionuclides, rather than adopting the less stringent 1991 proposed MCLs for the regulated radionuclides. In addition, an MCL for uranium, currently unregulated, is promulgated in today's rule. Since today's rule involves the decision to retain the more stringent current MCLs and to adopt a uranium MCL that is protective of both kidney toxicity and radiological carcinogenicity, today's action is consistent with greater protection of children's health.

The cancer risks estimated and presented in today's final rule explicitly account for differential cancer risks to children. In the case of uranium kidney toxicity, there is no information that suggests that children are a sensitive subpopulation. However, as discussed in the Notice of Data Availability (USEPA 2000e), the Agency does have reason to believe that radionuclides in drinking water present higher unit risks to children than to adults, since there is evidence that children are more sensitive to radiation than adults. Because of this, we have explicitly considered the risks to children in evaluating the lifetime risks associated with the current MCLs and 1991 proposed MCLs. In other words, the lifetime risks that are reported for each MCL are integrated over the entire lifetime of the individual and include the risks incurred during childhood.

In more detail, the per unit dose risk coefficients used to estimate lifetime risks are age-specific and organ-specific and are used in a lifetime risk model that applies the appropriate age-specific sensitivities throughout the calculation. The model also includes age-specific changes in organ mass and metabolism, which further incorporates age-specific effects pertinent to age sensitivity. The risk estimate at any age is the best estimate of risk for an individual of that age, so the summation of these age-specific risk estimates over all ages is best estimate of the lifetime risk for an individual. In developing the lifetime risks, the model calculates the risks over an age distribution for a stationary population to simulate the lifetime risk of an individual. The model also accounts for competing causes of death and age-specific survival rates. These adjustments make the lifetime risk estimate more realistic. At the same time, consumption rates of food, water and air are different between adults and children. The lifetime risk estimates for radionuclides in water use age-specific water intake rates derived from average national consumption rates when calculating the risk per unit intake.

While radiation protection organizations have developed the concept of committed dose, the dose to an organ or tissue from time of intake to end of life, there is no equivalent for risk. If we define ''committed risk'' as the lifetime risk from a given intake, then it will be easier to compare the risks of intakes at different times of life. In Table V–5, the ''committed risk'' is given for 5 isotopes and 5 periods of life and continuous lifetime exposure. If the radionuclide concentration in the water is kept constant, the fraction of the lifetime risk committed during any age interval will also remain constant. Unless the intake is restricted in an age-specific manner, the fraction of the lifetime risk contributed by any age interval is a constant.

TABLE V–5.—LIFETIME RISKS AND FRACTIONS OF LIFETIME RISK PER AGE GROUP

Age (yrs)	0–6	6–18	18–30	30–70	70–110	0–110
Lifetime risk for intake of water containing 1 Bq/L during several different age intervals						
Ra-224	2.3e–05	3.3e–05	1.1e–05	1.5e–05	9.8e–07	8.4e–05
Ra-226	2.9e–05	8.6e–05	5.0e–05	5.1e–05	2.9e–06	2.2e–04
Ra-228	1.1e–04	2.6e–04	1.2e–04	1.1e–04	5.1e–06	6.1e–04
U-238	6.7e–06	1.2e–05	6.1e–06	9.8e–06	3.7e–07	3.4e–05
H-3	3.9e–09	8.5e–09	6.2e–09	9.6e–09	6.7e–10	2.9e–08
Percentage of lifetime risk committed for water intake during the age interval						
Ra-224	28	40	13	18	1	100
Ra-226	13	39	23	23	1	100
Ra-228	17	43	20	19	1	100
U-238	19	33	18	28	1	100
H-3	13	29	21	33	2	100

In summary, today's decision to retain the current more stringent MCLs for radionuclides and to establish an MCL for uranium in drinking water is consistent with the protection of children's health. In making this decision, EPA evaluated the lifetime radiogenic cancer risks associated with the current and final MCLs, which are based on age-specific cancer risk models that explicitly consider children's higher per unit dose risks.

H. Executive Order 13084: Consultation and Coordination With Indian Tribal Governments

Under Executive Order 13084, EPA may not issue a regulation that is not required by statute if it significantly or uniquely affects the communities of Indian tribal governments and imposes substantial direct compliance costs on those communities, unless the Federal government provides the funds necessary to pay the direct compliance costs incurred by the tribal governments or if EPA consults with those governments. If EPA complies by consulting, Executive Order 13084 requires EPA to provide to the Office of Management and Budget, in a separately identified section of the preamble to the rule, a description of the extent of EPA's prior consultation with representatives of affected tribal governments, a summary of the nature of their concerns, and a statement supporting the need to issue the regulation. In addition, Executive Order 13084 requires EPA to develop an effective process permitting elected officials and other representatives of Indian tribal governments ''to provide meaningful and timely input in the development of regulatory policies on matters that significantly or uniquely affect their communities.''

EPA does not believe that today's rule significantly or uniquely affect the communities of Indian tribal governments nor does it impose substantial direct compliance costs on these communities. The provisions of today's rules apply to all community water systems. Tribal governments may be owners or operators of such systems, however, nothing in today's provisions uniquely affects them. EPA believes that the final rule will not significantly burdens most Tribal systems, and in some cases, will be less burdensome than the current radionuclides rule. Accordingly, the requirements of section 3(b) of Executive Order 13084 do not apply to this rule.

Nonetheless, EPA did inform and involve Tribal governments in the rulemaking process. EPA staff attended the 16th Annual Consumer Conference of the National Indian Health Board on October 6–8, 1998 in Anchorage, Alaska. Over nine hundred attendees representing Tribes from across the country were in attendance. During the conference, EPA conducted two workshops for meeting participants. The objectives of the workshops were to present an overview of EPA's drinking water program, solicit comments on key issues of potential interest in upcoming drinking water regulations, and to solicit advice in identifying an effective consultative process with Tribes for the future.

EPA, in conjunction with the Inter Tribal Council of Arizona (ITCA), also convened a Tribal consultation meeting on February 24–25, 1999, in Las Vegas, Nevada to discuss ways to involve Tribal representatives, both Tribal council members and tribal water utility operators, in the stakeholder process. Approximately twenty-five representatives from a diverse group of Tribes attended the two-day meeting. Meeting participants included representatives from the following Tribes: Cherokee Nation, Nezperce Tribe, Jicarilla Apache Tribe, Blackfeet Tribe, Seminole Tribe of Florida, Hopi Tribe, Cheyenne River Sioux Tribe, Menominee Indian Tribe, Tulalip Tribes, Mississippi Band of Choctaw Indians, Narragansett Indian Tribe, and Yakama Nation.

The major meeting objectives were to:

(1) Identify key issues of concern to Tribal representatives;

(2) Solicit input on issues concerning current OGWDW regulatory efforts;

(3) Solicit input and information that should be included in support of future drinking water regulations; and

(4) Provide an effective format for Tribal involvement in EPA's regulatory development process.

EPA staff also provided an overview on the forthcoming radionuclides rule at the meeting. The presentation included the health concerns associated with radionuclides, EPA's current position on radionuclides in drinking water, and specific issues for Tribes. The following questions were posed to the Tribal representatives to begin discussion on radionuclides in drinking water:

(1) What are the current radionuclides levels in your water systems?

(2) Are you treating for radionuclides if they exceed the MCL? Is it effective and affordable?

(3) What are Tribal water systems affordability issues in regard to radionuclides?

(4) Would in home treatment units be an acceptable alternative to central treatment?

(5) What level of monitoring is reasonable?

The summary for the February 24–25, 1999 meeting was sent to all 565 Federally recognized Tribes in the United States.

EPA also conducted a series of workshops at the Annual Conference of the National Tribal Environmental Council which was held on May 18–20, 1999 in Eureka, California. Representatives from over 50 Tribes attended all, or part, of these sessions. The objectives of the workshops were to provide an overview of forthcoming EPA regulations affecting water systems; discuss changes to operator certification requirements; discuss funding for Tribal water systems; and to discuss innovative approaches to regulatory cost reduction. Meeting summaries for EPA's Tribal consultations are available in the public docket for this rulemaking (USEPA 1999c, USEPA 1999d).

I. Executive Order 13132

Executive Order 13132, entitled ''Federalism'' (64 FR 43255, August 10, 1999), requires EPA to develop an accountable process to ensure ''meaningful and timely input by State and local officials in the development of regulatory policies that have federalism implications.'' ''Policies that have federalism implications'are defined in the Executive Order to include regulations that have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.''

This final rule does not have federalism implications. It will not have substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government, as specified in Executive Order 13132. Thus, Executive Order 13132 does not apply to this rule

Although Executive Order 13132 does not apply to this rule, EPA did consult with representatives of State and local elected officials in the process of developing this final regulation. On May 30, 2000, EPA held a one-day meeting in Washington, DC with representatives of elected State and local officials to discuss how upcoming drinking water regulations may affect State, county, and local governments. The rules discussed were: Arsenic, Radon, Radionuclides, Long Term 1 Enhanced Surface Water Treatment and Filter Backwash Rule, and the Ground Water Rule. EPA invited associations which represent elected officials, including National Governors' Association (NGA), National League of Cities (NLC), Council of State Governments (CSG), U.S. Conference of Mayors, International City/County Management Association (ICMA), National Association of Counties (NACO), National Association of Towns and Townships, and National Conference of State Legislators (NCSL). EPA also invited the National Association of Attorneys General (NAAG), the Association of State and Territorial Health Officials (ASTHO), the Environmental Council of States (ECOS), and the Southern Govenors' Association (SGO). With the invitation letter, EPA provided an agenda and background information about the five upcoming drinking water rules, including today's rule.

Ten representatives of elected officials participated in the one-day meeting, which included State of Florida—Governor Bush's Office, State of Ohio-Governor Taft's Office, NGA, NACO, NAAG, NLC, ECOS, ICMA, SGO, and ASTHO. The meeting encompassed presentation and discussion about each of the five rules. The purpose of the meeting was to:

- Provide information about the five upcoming drinking water regulations;
- Consult on the expected compliance and implementation costs of these rules for State, county, and local governments; and
- Gain a better understanding of State, county, and local governments' and their elected officials' views.

Following the meeting, EPA sent the materials presented and distributed at the meeting to the organizations that were not able to attend, in order to provide them additional information about the upcoming regulations. EPA has prepared a meeting summary which provides in more detail the participants' concerns and questions regarding each rule. This summary is available in the public docket supporting this rulemaking (USEPA 2000c).

This meeting was not held sooner due to the relatively recently signed Executive Order and the need to consider how to best comply with its terms and conditions. Thus, many of the issues associated with today's rulemaking were in relatively advanced stages of development by the time of the May 30, 2000 meeting. Nevertheless, we endeavored to accommodate each of the comments received from elected officials or their representatives to the maximum extent possible, within the constraints imposed by our statutory mandate to protect public health through the promulgation of drinking water standards.

The principal concerns of these officials were the overall burden of the rule and the potentially high costs of compliance with its provisions. In particular, they expressed concerns about the affordability for the rule for small systems and costs for disposal of treatment residues that may be considered hazardous due to radioactivity. In response, we took several steps to address these particular concerns as well as actions in response to the generalized concern about the overall burden of the rule.

EPA believes that today's regulatory action is necessary to reduce kidney toxicity and cancer health risks from uranium, as well as to maintain public health protection resulting from the current radionuclide National Primary Drinking Water Regulations. The Agency understands the officials' concerns about regulatory burden and have addressed them in several ways. First, EPA selected a less stringent MCL for uranium of 30 μg/L by invoking the discretionary authority for the Administrator to set an MCL less stringent than the feasible level if the benefits of an MCL set at the feasible level would not justify the costs (section 1412(b)(6)). As a result, fewer water systems will be in violation of the uranium MCL, reducing the number of systems that may face radioactive waste disposal issues, and resulting in the ability of a higher percentage of water systems to use non-treatment options for achieving compliance (*e.g.,* new wells, blending of water sources, modifying existing operations, etc.).

To further mitigate impacts on water systems and State drinking water programs, EPA is allowing State discretion in grandfathering data for determining initial monitoring frequency. Since the data grandfathering plan will be a part of a State's primacy package, EPA will have oversight over the data grandfathering process. EPA believes that this approach provides flexibility for States to consider their particular circumstances, while allowing EPA to ensure that goals are met. Under this approach, many systems will be able to use existing monitoring data to establish initial monitoring baselines, which will be used to determine future monitoring frequency under the Standardized Monitoring Framework. Water systems that do not have adequate data to grandfather will be required to follow the requirements for new monitoring. The details of these requirements can be found in part J of section I, ''Where and how often must a water system test for radionuclides?'' EPA expects that there will be overall reduced monitoring burden in the long-term, with monitoring relief being targeted towards those water systems that have low radionuclide levels. Today's final rule will not apply to non-transient, non-community water systems (*e.g.,* schools, state parks, nursing homes), which are primarily small ground water systems.

EPA will provide guidance to small water systems on complying with today's rule. This will include information on monitoring, treatment technology and other compliance options, including information on the disposal of water treatment residuals. Regarding the cost of treatment, EPA agrees that treatment technologies can be expensive for small water systems. However, EPA expects that many small water systems will rely on other compliance options, *e.g.,* alternate source, purchasing water, and point-of-use devices. In cases in which small water systems have no other option and cannot afford to install treatment, they may apply to the State for exemptions (see part M of section I, ''Can my water system get a variance or an exemption?''), which gives them extra time. An exemption is limited to three years after the otherwise applicable compliance date, although extensions up to a total of six additional years may be available to small systems under certain conditions. If a water system has very high contaminant levels and no compliance options other than treatment, the water system can apply for a variance, under the requirements described in part M of section I. In addition, there are various sources of funding for State and local governments, including the Drinking Water State Revolving Fund, which is described in part M of section I, ''What financial assistance is available for complying with the rule?''

J. Consultation With the Science Advisory Board and the National Drinking Water Advisory Council

In accordance with section 1412(d) and (e) of SDWA, EPA consulted with the Science Advisory Board and National Drinking Water Advisory Council and considered their comments in developing this rule. See the OW Docket for additional information.

K. Congressional Review Act

The Congressional Review Act, 5 U.S.C. 801 *et seq.*, as added by the Small Business Regulatory Enforcement Fairness Act of 1996, generally provides that before a rule may take effect, the agency promulgating the rule must submit a rule report, which includes a copy of the rule, to each House of the Congress and to the Comptroller General of the United States. EPA will submit a report containing this rule and other required information to the U.S. Senate, the U.S. House of Representatives, and the Comptroller General of the United States prior to publication of the rule in the **Federal Register**. A major rule cannot take effect until 60 days after it is published in the **Federal Register**. This rule is not a ''major rule'' as defined by 5 U.S.C. 804(2). This rule will be effective December 8, 2003.

VI. References

NIH 2000a. ''Kidney Diseases: Publications On-Line.'' National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK). June 2000. National Institutes of Health.

NIH 2000b. ''Proteinuria.'' National Kidney and Urologic Diseases Information Clearinghouse. June 2000. National Institutes of Health.

NIH 2000c. ''Your Kidneys and How They Work.'' National Kidney and Urologic Diseases Information Clearinghouse. June 2000. National Institutes of Health.

USEPA 1991. ''Regulatory Impact Analysis of Proposed National Primary Drinking Water Regulations for Radionuclides (Draft dated June 14, 1991). Prepared by Wade Miller Associates.

USEPA 1994. Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, 59 FR 7629, February 16, 1994.

USEPA 1998a. ''A Fact Sheet on the Health Effects from Ionizing Radiation.'' Prepared by the Office of Radiation & Indoor Air, Radiation Protection Division. EPA 402–F–98–010. May 1998.

USEPA 1998b. Announcement of Small System Compliance Technology Lists for Existing National Primary Drinking Water Regulations and Findings Concerning Variance Technologies, 63 FR 42032, August 6, 1998.

USEPA 1998c. ''Ionizing Radiation Series No. 1.'' Prepared by the Office of Radiation & Indoor Air, Radiation Protection Division. EPA 402–F–98–009. May 1998.

USEPA 1998d. National Primary Drinking Water Regulations: Consumer Confidence; Proposed Rule 63 FR 7605, February 13, 1998.

USEPA 1998e. National Primary Drinking Water Regulation: Consumer Confidence Reports; Final Rule, 63 FR 44511, August 19, 1998.

USEPA 1998f. ''Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996.'' EPA–815–R–98–002. September 1998.

USEPA 1999a. ''Small Systems Compliance Technology List for the Radionuclides Rule.'' Prepared by International Consultants, Inc. Draft. April 1999.

USEPA 1999b. Cancer Risk Coefficients for Environmental Exposure to Radionuclides, Federal Guidance Report No. 13. US Environmental Protection Agency, Washington, DC, 1999.

USEPA 1999c. ''Inter Tribal Council of Arizona, Inc.: Ground Water and Drinking Water Tribal Consultation Meeting.'' Executive Summary. February 24–25, 1999.

USEPA 1999d. ''OGWDW Tribal Consultations: Workshops at the Annual Conference of the National Tribal Environmental Council.'' May 18–20, 1999.

USEPA 2000a. ''Comment/Response Document for the Radionuclides Notice of Data Availability and 1991 Proposed Rule.'' Prepared by Industrial Economics, Inc. for EPA. November 2000.

USEPA 2000b. ''Draft Toxicological Review of Uranium.'' Prepared by the Office of Science and Technology. Draft. June 6, 2000.

USEPA 2000c. Government Dialogue on U.S. EPA's Upcoming Drinking Water Regulations. Meeting Summary. May 30, 2000.

USEPA 2000d. ''Information Collection Request for National Primary Drinking Water Regulations: Radionuclides''. Prepared by ISSI Consulting Group, for EPA. September 22, 2000.

USEPA 2000e. National Primary Drinking Water Regulations; Radionuclides; Notice of Data Availability; Proposed Rule. 65 FR 21577. April 21, 2000.

USEPA 2000f. ''Preliminary Health Risk Reduction and Cost Analysis: Revised National Primary Drinking Water Standards for Radionuclides.'' Prepared by Industrial Economics, Inc. for EPA. Draft. January 2000.

USEPA 2000g. ''Economic Analysis of the Radionuclides National Primary Drinking Water Regulations.'' Prepared by Industrial Economics, Inc. for EPA. November 2000.

USEPA 2000h. ''Technical Support Document for the Radionuclides Notice of Data Availability.'' Draft. March, 2000.

USEPA 2000i. ''Technologies and Costs for the Removal of Radionuclides from Potable Water Supplies.'' Draft. Prepared by Malcolm Pirnie, Inc. June, 2000.

List of Subjects

40 CFR Part 9

Reporting and recordkeeping requirements.

40 CFR Part 141

Environmental protection, Chemicals, Indians-lands, Incorporation by reference, Intergovernmental relations, Radiation protection, Reporting and recordkeeping requirements, Water supply.

40 CFR Part 142

Environmental protection, Administrative practice and procedure, Chemicals, Indians-lands, Intergovernmental relations, Radiation protection, Reporting and recordkeeping requirements, Water supply.

Dated: November 21, 2000.

Carol M. Browner,

Administrator.

For reasons set out in the preamble, 40 CFR parts 9, 141, and 142 are amended as follows:

1. The authority citation for part 9 continues to read as follows:

Authority: 7 U.S.C. 135 *et seq.*, 136–136y; 15 U.S.C. 2001, 2003, 2005, 2006, 2601–2671; 21 U.S.C. 331j, 346a, 348; 31 U.S.C. 9701; 33 U.S.C. 1251 *et seq.*, 1311, 1313d, 1314, 1318, 1321, 1326–1330, 1324, 1344, 1345 (d) and (e), 1361; E.O. 11735, 38 FR 21243, 3 CFR, 1971–1975 Comp. p. 973; 42 U.S.C. 241, 242b, 243, 246, 300f, 300g, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–1, 300j–2, 300j–3, 300j–4, 300j–9, 1857 *et seq.*, 6901–6992k, 7401–7671q, 7542, 9601–9657, 11023, 11048.

2. In § 9.1 the table is amended by:

(a) Removing the entry for 141.25–141.30 and adding new entries for 141.25(a)–(e), 141.26 (a)–(b), and 141.27–141.30;

(b) Removing the entry for 142.14(a)–(d)(7) and adding new entries for 142.14(a)–(d)(3), 142.14(d)(4)–(5), and 142.14(d)(6)–(7); and

(c) Removing the entry for 142.15(c)(5)–(d) and adding new entries for 142.15(c)(5), 142.15(c)(6)–(7), and 142.15(d).

The additions read as follows:

§ 9.1 OMB approvals under the Paperwork Reduction Act.

* * * * *

40 CFR citation	OMB control No.
* * * * *	
National Primary Drinking Water Regulations	
* * * * *	
141.25(a)–(e)	2040–0090
141.26(a)–(b)	2040–0228
141.27–141.30	2040–0090
* * * * *	
National Primary Drinking Water Regulations Implementation	
* * * *	
142.14(a)–(d)(3)	2040–0090
142.14(d)(4)–(5)	2040–0228
142.14(d)(6)–(7)	2040–0090
* * * * *	
142.15(c)(5)	2040–0090
142.15(c)(6)–(7)	2040–0228
142.15(d)	2040–0090

* * * * *

PART 141—NATIONAL PRIMARY DRINKING WATER REGULATIONS

1. The authority citation for part 141 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

Subpart B—[Amended]

§§ 141.15 and 141.16 [Removed]

2. Sections 141.15 and 141.16 are removed.

Subpart C—[Amended]

3. Section 141.25 is amended by:

a. Revising paragraph (a) introductory text (the table remains unchanged),

b. Revising paragraph (c)(1),

c. Revising paragraph (c)(2) and redisgnating Table B in paragraph (c)(2) as Table C and

d. Revising paragraph (d).

The revisions read as follows:

§ 141.25 Analytical methods for radioactivity.

(a) Analysis for the following contaminants shall be conducted to determine compliance with § 141.66 (radioactivity) in accordance with the methods in the following table, or their equivalent determined by EPA in accordance with § 141.27.

* * * * *

(c) * * *

(1) To determine compliance with § 141.66(b), (c), and (e) the detection limit shall not exceed the concentrations in Table B to this paragraph.

TABLE B.—DETECTION LIMITS FOR GROSS ALPHA PARTICLE ACTIVITY, RADIUM 226, RADIUM 228, AND URANIUM

Contaminant	Detection limit
Gross alpha particle activity	3 pCi/L.
Radium 226	1 pCi/L.
Radium 228	1 pCi/L.
Uranium	Reserve

(2) To determine compliance with § 141.66(d) the detection limits shall not exceed the concentrations listed in Table C to this paragraph.

* * * * *

(d) To judge compliance with the maximum contaminant levels listed in § 141.66, averages of data shall be used and shall be rounded to the same number of significant figures as the maximum contaminant level for the substance in question.

* * * * *

4. Section 141.26 is revised to read as follows:

§ 141.26 Monitoring frequency and compliance requirements for radionuclides in community water systems

(a) Monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.

(1) Community water systems (CWSs) must conduct initial monitoring to determine compliance with § 141.66(b), (c), and (e) by December 31, 2007. For the purposes of monitoring for gross alpha particle activity, radium-226, radium-228, uranium, and beta particle and photon radioactivity in drinking water, ''detection limit'' is defined as in § 141.25(c).

(i) Applicability and sampling location for existing community water systems or sources. All existing CWSs using ground water, surface water or systems using both ground and surface water (for the purpose of this section hereafter referred to as systems) must sample at every entry point to the distribution system that is representative of all sources being used (hereafter called a sampling point) under normal operating conditions. The system must take each sample at the same sampling point unless conditions make another sampling point more representative of each source or the State has designated a distribution system location, in accordance with paragraph (a)(2)(ii)(C) of this section.

(ii) Applicability and sampling location for new community water systems or sources. All new CWSs or CWSs that use a new source of water must begin to conduct initial monitoring for the new source within the first quarter after initiating use of the source. CWSs must conduct more frequent monitoring when ordered by the State in the event of possible contamination or when changes in the distribution system or treatment processes occur which may increase the concentration of radioactivity in finished water.

(2) Initial monitoring: Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:

(i) Systems without acceptable historical data, as defined below, must collect four consecutive quarterly samples at all sampling points before December 31, 2007.

(ii) Grandfathering of data: States may allow historical monitoring data collected at a sampling point to satisfy the initial monitoring requirements for that sampling point, for the following situations.

(A) To satisfy initial monitoring requirements, a community water system having only one entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(B) To satisfy initial monitoring requirements, a community water system with multiple entry points and having appropriate historical monitoring data for each entry point to the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003.

(C) To satisfy initial monitoring requirements, a community water system with appropriate historical data for a representative point in the distribution system may use the monitoring data from the last compliance monitoring period that began between June 2000 and December 8, 2003, provided that the State finds that the historical data satisfactorily demonstrate that each entry point to the distribution system is expected to be in compliance based upon the historical data and reasonable assumptions about the variability of contaminant levels between entry points. The State must make a written finding indicating how the data conforms to the these requirements.

(iii) For gross alpha particle activity, uranium, radium-226, and radium-228 monitoring, the State may waive the final two quarters of initial monitoring for a sampling point if the results of the samples from the previous two quarters are below the detection limit.

(iv) If the average of the initial monitoring results for a sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are at or below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.

(3) Reduced monitoring: States may allow community water systems to reduce the future frequency of monitoring from once every three years to once every six or nine years at each sampling point, based on the following criteria.

(i) If the average of the initial monitoring results for each contaminant (*i.e.,* gross alpha particle activity, uranium, radium-226, or radium-228) is below the detection limit specified in Table B, in § 141.25(c)(1), the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.

(ii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is at or above the detection limit but at or below ½ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below ½ the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.

(iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above ½ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above ½ the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.

(iv) Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (*e.g.,* if a system's sampling point is on a nine year monitoring period, and the sample result is above ½ MCL, then the next monitoring period for that sampling point is three years).

(v) If a system has a monitoring result that exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until the system has results from four consecutive quarters that are below the MCL, unless the system enters into another schedule as part of a formal compliance agreement with the State.

(4) Compositing: To fulfill quarterly monitoring requirements for gross alpha particle activity, radium-226, radium-228, or uranium, a system may composite up to four consecutive quarterly samples from a single entry point if analysis is done within a year of the first sample. States will treat analytical results from the composited as the average analytical result to determine compliance with the MCLs and the future monitoring frequency. If the analytical result from the composited sample is greater than ½ MCL, the State may direct the system to take additional quarterly samples before allowing the system to sample under a reduced monitoring schedule.

(5) A gross alpha particle activity measurement may be substituted for the required radium-226 measurement provided that the measured gross alpha particle activity does not exceed 5 pCi/l. A gross alpha particle activity measurement may be substituted for the required uranium measurement provided that the measured gross alpha particle activity does not exceed 15 pCi/l.

The gross alpha measurement shall have a confidence interval of 95% (1.65σ, where σ is the standard deviation of the net counting rate of the sample) for radium-226 and uranium. When a system uses a gross alpha particle activity measurement in lieu of a radium-226 and/or uranium measurement, the gross alpha particle activity analytical result will be used to determine the future monitoring frequency for radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, ½ the detection limit will be used to determine compliance and the future monitoring frequency.

(b) *Monitoring and compliance requirements for beta particle and photon radioactivity.*

To determine compliance with the maximum contaminant levels in § 141.66(d) for beta particle and photon radioactivity, a system must monitor at a frequency as follows:

(1) Community water systems (both surface and ground water) designated by the State as vulnerable must sample for beta particle and photon radioactivity. Systems must collect quarterly samples

for beta emitters and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State must continue to sample until the State reviews and either reaffirms or removes the designation.

(i) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 50 pCi/L (screening level), the State may reduce the frequency of monitoring at that sampling point to once every 3 years. Systems must collect all samples required in paragraph (b)(1) of this section during the reduced monitoring period.

(ii) For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(1) of this section.

(2) Community water systems (both surface and ground water) designated by the State as utilizing waters contaminated by effluents from nuclear facilities must sample for beta particle and photon radioactivity. Systems must collect quarterly samples for beta emitters and iodine-131 and annual samples for tritium and strontium-90 at each entry point to the distribution system (hereafter called a sampling point), beginning within one quarter after being notified by the State. Systems already designated by the State as systems using waters contaminated by effluents from nuclear facilities must continue to sample until the State reviews and either reaffirms or removes the designation.

(i) Quarterly monitoring for gross beta particle activity shall be based on the analysis of monthly samples or the analysis of a composite of three monthly samples. The former is recommended.

(ii) For iodine-131, a composite of five consecutive daily samples shall be analyzed once each quarter. As ordered by the State, more frequent monitoring shall be conducted when iodine-131 is identified in the finished water.

(iii) Annual monitoring for strontium-90 and tritium shall be conducted by means of the analysis of a composite of four consecutive quarterly samples or analysis of four quarterly samples. The latter procedure is recommended.

(iv) If the gross beta particle activity beta minus the naturally occurring potassium-40 beta particle activity at a sampling point has a running annual average (computed quarterly) less than or equal to 15 pCi/L, the State may reduce the frequency of monitoring at that sampling point to every 3 years. Systems must collect all samples required in paragraph (b)(2) of this section during the reduced monitoring period.

(v) For systems in the vicinity of a nuclear facility, the State may allow the CWS to utilize environmental surveillance data collected by the nuclear facility in lieu of monitoring at the system's entry point(s), where the State determines if such data is applicable to a particular water system. In the event that there is a release from a nuclear facility, systems which are using surveillance data must begin monitoring at the community water system's entry point(s) in accordance with paragraph (b)(2) of this section.

(3) Community water systems designated by the State to monitor for beta particle and photon radioactivity can not apply to the State for a waiver from the monitoring frequencies specified in paragraph (b)(1) or (b)(2) of this section.

(4) Community water systems may analyze for naturally occurring potassium-40 beta particle activity from the same or equivalent sample used for the gross beta particle activity analysis. Systems are allowed to subtract the potassium-40 beta particle activity value from the total gross beta particle activity value to determine if the screening level is exceeded. The potassium-40 beta particle activity must be calculated by multiplying elemental potassium concentrations (in mg/L) by a factor of 0.82.

(5) If the gross beta particle activity minus the naturally occurring potassium-40 beta particle activity exceeds the screening level, an analysis of the sample must be performed to identify the major radioactive constituents present in the sample and the appropriate doses must be calculated and summed to determine compliance with § 141.66(d)(1), using the formula in § 141.66(d)(2). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.

(6) Systems must monitor monthly at the sampling point(s) which exceed the maximum contaminant level in § 141.66(d) beginning the month after the exceedance occurs. Systems must continue monthly monitoring until the system has established, by a rolling average of 3 monthly samples, that the MCL is being met. Systems who establish that the MCL is being met must return to quarterly monitoring until they meet the requirements set forth in paragraph (b)(1)(ii) or (b)(2)(i) of this section.

(c) General monitoring and compliance requirements for radionuclides.

(1) The State may require more frequent monitoring than specified in paragraphs (a) and (b) of this section, or may require confirmation samples at its discretion. The results of the initial and confirmation samples will be averaged for use in compliance determinations.

(2) Each public water systems shall monitor at the time designated by the State during each compliance period.

(3) Compliance: Compliance with § 141.66 (b) through (e) will be determined based on the analytical result(s) obtained at each sampling point. If one sampling point is in violation of an MCL, the system is in violation of the MCL.

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

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

(iii) Systems must include all samples taken and analyzed under the provisions of this section in determining compliance, even if that number is greater than the minimum required.

(iv) If a system does not collect all required samples when compliance is based on a running annual average of quarterly samples, compliance will be based on the running average of the samples collected.

(v) If a sample result is less than the detection limit, zero will be used to calculate the annual average, unless a gross alpha particle activity is being used in lieu of radium-226 and/or uranium. If the gross alpha particle activity result is less than detection, ½ the detection limit will be used to calculate the annual average.

(4) States have the discretion to delete results of obvious sampling or analytic errors.

(5) If the MCL for radioactivity set forth in § 141.66 (b) through (e) is exceeded, the operator of a community water system must give notice to the

State pursuant to § 141.31 and to the public as required by subpart Q of this part.

Subpart F—[Amended]

5. A new § 141.55 is added to subpart F to read as follows:

§ 141.55 Maximum contaminant level goals for radionuclides.

MCLGs for radionuclides are as indicated in the following table:

Contaminant	MCLG
1. Combined radium-226 and radium-228.	Zero.
2. Gross alpha particle activity (excluding radon and uranium).	Zero.
3. Beta particle and photon radioactivity.	Zero.
4. Uranium	Zero.

Subpart G—National Primary Drinking Water Regulations: Maximum Contaminant Levels and Maximum Residual Disinfectant Levels

6. The heading of subpart G is revised as set out above.

7. A new § 141.66 is added to subpart G to read as follows:

§ 141.66 Maximum contaminant levels for radionuclides.

(a) [Reserved]

(b) *MCL for combined radium-226 and -228.* The maximum contaminant level for combined radium-226 and radium-228 is 5 pCi/L. The combined radium-226 and radium-228 value is determined by the addition of the results of the analysis for radium-226 and the analysis for radium-228.

(c) *MCL for gross alpha particle activity (excluding radon and uranium).* The maximum contaminant level for gross alpha particle activity (including radium-226 but excluding radon and uranium) is 15 pCi/L.

(d) *MCL for beta particle and photon radioactivity.* (1) The average annual concentration of beta particle and photon radioactivity from man-made radionuclides in drinking water must not produce an annual dose equivalent to the total body or any internal organ greater than 4 millirem/year (mrem/year).

(2) Except for the radionuclides listed in table A, the concentration of man-made radionuclides causing 4 mrem total body or organ dose equivalents must be calculated on the basis of 2 liter per day drinking water intake using the 168 hour data list in ''Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure,'' NBS (National Bureau of Standards) Handbook 69 as amended August 1963, U.S. Department of Commerce. This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of this document are available from the National Technical Information Service, NTIS ADA 280 282, U.S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia 22161. The toll-free number is 800–553–6847. Copies may be inspected at EPA's Drinking Water Docket, 401 M Street, SW., Washington, DC 20460; or at the Office of the Federal Register, 800 North Capitol Street, NW., Suite 700, Washington, DC. If two or more radionuclides are present, the sum of their annual dose equivalent to the total body or to any organ shall not exceed 4 mrem/year.

TABLE A.—AVERAGE ANNUAL CONCENTRATIONS ASSUMED TO PRODUCE: A TOTAL BODY OR ORGAN DOSE OF 4 MREM/YR

1. Radionuclide	Critical organ	pCi per liter
2. Tritium	Total body	20,000
3. Strontium-90	Bone Marrow	8

(e) *MCL for uranium.* The maximum contaminant level for uranium is 30 µg/L.

(f) *Compliance dates.* (1) Compliance dates for combined radium-226 and -228, gross alpha particle activity, gross beta particle and photon radioactivity, and uranium: Community water systems must comply with the MCLs listed in paragraphs (b), (c), (d), and (e) of this section beginning December 8, 2003 and compliance shall be determined in accordance with the requirements of §§ 141.25 and 141.26. Compliance with reporting requirements for the radionuclides under appendix A to subpart O and appendices A and B to subpart Q is required on December 8, 2003.

(g) *Best available technologies (BATs) for radionuclides.* The Administrator, pursuant to section 1412 of the Act, hereby identifies as indicated in the following table the best technology available for achieving compliance with the maximum contaminant levels for combined radium-226 and -228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.

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

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

(h) *Small systems compliance technologies list for radionuclides.*

TABLE C.—LIST OF SMALL SYSTEMS COMPLIANCE TECHNOLOGIES FOR RADIONUCLIDES AND LIMITATIONS TO USE

Unit technologies	Limitations (see footnotes)	Operator skill level required[1]	Raw water quality range and considerations.[1]
1. Ion exchange (IE)	(a)	Intermediate	All ground waters.
2. Point of use (POU[2]) IE	(b)	Basic	All ground waters.
3. Reverse osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration.
4. POU[2] RO	(b)	Basic	Surface waters usually require pre-filtration.
5. Lime softening	(d)	Advanced	All waters.
6. Green sand filtration	(e)	Basic.	
7. Co-precipitation with Barium sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/electrodialysis reversal		Basic to Intermediate	All ground waters.
9. Pre-formed hydrous Manganese oxide filtration.	(g)	Intermediate	All ground waters.
10. Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11. Enhanced coagulation/filtration	(i)	Advanced	Can treat a wide range of water qualities.

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

[2] A POU, or ''point-of-use'' technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

[a] The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

[b] When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

[c] Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR Compliance Technologies Table.

[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

[e] Removal efficiencies can vary depending on water quality.

[f] This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

[g] This technology is most applicable to small systems that already have filtration in place.

[h] Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

[i] Assumes modification to a coagulation/filtration process already in place.

TABLE D.—COMPLIANCE TECHNOLOGIES BY SYSTEM SIZE CATEGORY FOR RADIONUCLIDE NPDWR'S

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

Note: [1] Numbers correspond to those technologies found listed in the table C of 141.66(h).

Subpart O—[Amended]

8. The table in appendix A to subpart O is amended under the heading ''Radioactive contaminants'' by revising the entries for ''Beta/photon emitters (mrem/yr)'', ''Alpha emitters (pCi/l)'', and ''Combined radium (pCi/l)'' and adding a new entry for ''Uranium (pCi/L)'' to read as follows:

Appendix A to Subpart O—Regulated Contaminants

Contaminant units	Traditional MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
*	*	*		*	*	*
Radioactive contaminants:						
Beta/photon emitters (mrem/yr).	4 mrem/yr	–	4	0	Decay of natural and man-made deposits.	Certain minerals are radioactive and may emit forms of radiation known as photons and beta radiation. Some people who drink water containing beta particle and photon radioactivity in excess of the MCL over many years may have an increased risk of getting cancer.
Alpha emitters (pCi/L).	15 pCi/L	–	15	0	Erosion of natural deposits.	Certain minerals are radioactive and may emit a form of radiation known as alpha radiation. Some people who drink water containing alpha emitters in excess of the MCL over many years may have an increased risk of getting cancer.
Combined radium (pCi/L).	5 pCi/L	–	5	0	Erosion of natural deposits.	Some people who drink water containing radium-226 or -228 in excess of the MCL over many years may have an increased risk of getting cancer.
Uranium (pCi/L)	30 µg/L	–	30	0	Erosion of natural deposits.	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
*	*	*		*	*	*

Subpart Q—[Amended]

9. Appendix A to subpart Q under I.F. ‘‘Radioactive contaminants’’ is amended by:

a. Revising entries 1, 2, and 3;

b. Adding entry 4;

c. Redesignating endnotes 9 through 17 as endnotes 11 through 19; and

d. Adding new endnotes 9 and 10.

Appendix A to Subpart Q—NPDWR Violations and Other Situations Requiring Public Notice [1]

Contaminant	MCL/MRDL/TT Violations [2]		Monitoring and testing procedure violations	
	Tier of public notice required	Citation	Tier of public notice required	Citation
I. Violations of National Primary Drinking Water Regulations (NPDWR) [3]				
* * *	*	*	*	*
F. Radioactive contaminants				
1. Beta/photon emitters	2	141.66(d)	3	141.25(a) 141.26(b)
2. Alpha emitters	2	141.66(c)	3	141.25(a) 141.26(a)
3. Combined radium (226 and 228)	2	141.66(b)	3	141.25(a) 141.26(a)
4. Uranium	[9] 2	141.66(e)	[10] 3	141.25(a) 141.26(a)
* * *	*	*	*	*

Appendix A—Endnotes

* * * * *

1. Violations and other situations not listed in this table (*e.g.*, reporting violations and failure to prepare Consumer Confidence Reports), do not require notice, unless otherwise determined by the primary agency. Primacy agencies may, at their option, also

require a more stringent public notice tier (*e.g.*, Tier 1 instead of Tier 2 or Tier 2 instead of Tier 3) for specific violations and situations listed in this Appendix, as authorized under Sec. 141.202(a) and Sec. 141.203(a).

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

3. The term Violations of National Primary Drinking Water Regulations (NPDWR) is used here to include violations of MCL, MRDL, treatment technique, monitoring, and testing procedure requirements.

* * * * *

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

10. The uranium Tier 3 violation citations are effective December 8, 2000 for all community water systems.

* * * * *

10. Appendix B to Subpart Q is amended by:

a. Redesignating entries 79 through 84 and 86 through 88 as 80 through 85 and 87 through 89, respectively, and entries 85a and 85b as 86a and 86b, respectively;

b. Adding a new entry 79 for uranium under "G. Radioactive contaminants";

c. Redesignating endnote entries 16 through 21 as 17 through 22; and

d. adding a new endnote 16.

Appendix B to Subpart Q—Standard Health Effects Language for Public Notification

Contaminant	MCLG[1] mg/L	MCL[2] mg/L	Standard health effects language for public notification
National Primary Drinking Water Regulations (NPDWR)			
* * * * * * *			
G. Radioactive contaminants			
* * * * * * *			
79. Uranium[16]	Zero	30 µg/L	Some people who drink water containing uranium in excess of the MCL over many years may have an increased risk of getting cancer and kidney toxicity.
* * * * * * *			

Appendix B—Endnotes

1. MCLG—Maximum contaminant level goal

2. MCL—Maximum contaminant level

* * * * *

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

* * * * *

PART 142—NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION

1. The authority citation for part 142 continues to read as follows:

Authority: 42 U.S.C. 300f, 300g–1, 300g–2, 300g–3, 300g–4, 300g–5, 300g–6, 300j–4, 300j–9, and 300j–11.

Subpart B—Primary Enforcement Responsibility

2. Section 142.16 is amended by adding and reserving paragraphs (i), (j), and (k) and adding a new paragraph (l) to read as follows:

§ 142.16 Special primacy requirements.

* * * * *

(i)–(k) [Reserved]

(l) An application for approval of a State program revision for radionuclides which adopts the requirements specified in § 141.26(a)(2)(ii)(C) of this chapter must contain the following (in addition to the general primacy requirements enumerated in this part, including that State regulations be at least as stringent as the Federal requirements):

(1) If a State chooses to use grandfathered data in the manner described in § 141.26(a)(2)(ii)(C) of this chapter, then the State must describe the procedures and criteria which it will use to make these determinations (whether distribution system or entry point sampling points are used).

(i) The decision criteria that the State will use to determine that data collected in the distribution system are representative of the drinking water supplied from each entry point to the distribution system. These determinations must consider:

(A) All previous monitoring data.

(B) The variation in reported activity levels.

(C) Other factors affecting the representativeness of the data (*e.g.* geology).

(ii) [Reserved]

(2) A monitoring plan by which the State will assure all systems complete the required monitoring within the regulatory deadlines. States may update their existing monitoring plan or use the same monitoring plan submitted for the requirements in § 142.16(e)(5) under the national primary drinking water regulations for the inorganic and organic contaminants (*i.e.* the phase II/V rules). States may note in their application any revision to an existing monitoring plan or note that the same monitoring plan will be used. The State must demonstrate that the monitoring plan is enforceable under State law.

Subpart G—[Amended]

3. Section 142.65 is added to read as follows:

§ 142.65 Variances and exemptions from the maximum contaminant levels for radionuclides.

(a)(1) Variances and exemptions from the maximum contaminant levels for combined radium-226 and radium-228, uranium, gross alpha particle activity (excluding Radon and Uranium), and beta particle and photon radioactivity. (i) The Administrator, pursuant to section 1415(a)(1)(A) of the Act, hereby identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the radionuclides listed in § 141.66(b), (c), (d), and (e) of this chapter, for the purposes of issuing variances and exemptions, as shown in Table A to this paragraph.

TABLE A.—BAT FOR RADIONUCLIDES LISTED IN § 141.66

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

(ii) In addition, the Administrator hereby identifies the following as the best available technology, treatment techniques, or other means available for achieving compliance with the maximum contaminant levels for the radionuclides listed in § 141.66(b), (c), (d), and (e) of this chapter, for the purposes of issuing variances and exemptions to small drinking water systems, defined here as those serving 10,000 persons or fewer, as shown in Table C to this paragraph.

TABLE B.—LIST OF SMALL SYSTEMS COMPLIANCE TECHNOLOGIES FOR RADIONUCLIDES AND LIMITATIONS TO USE

Unit technologies	Limitations (see footnotes)	Operator skill level required [1]	Raw water quality range & considerations [1]
1. Ion exchange (IE)	(a)	Intermediate	All ground waters.
2. Point of use (POU [2]) IE	(b)	Basic	All ground waters.
3. Reverse osmosis (RO)	(c)	Advanced	Surface waters usually require pre-filtration.
4. POU [2] RO	(b)	Basic	Surface waters usually require pre-filtration.
5. Lime softening	(d)	Advanced	All waters.
6. Green sand filtration	(e)	Basic.	
7. Co-precipitation with barium sulfate	(f)	Intermediate to Advanced	Ground waters with suitable water quality.
8. Electrodialysis/electrodialysis reversal		Basic to Intermediate	All ground waters.
9. Pre-formed hydrous manganese oxide filtration.	(g)	Intermediate	All ground waters.
10. Activated alumina	(a), (h)	Advanced	All ground waters; competing anion concentrations may affect regeneration frequency.
11. Enhanced coagulation/filtration	(i)	Advanced	Can treat a wide range of water qualities.

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

[2] A POU, or "point-of-use" technology is a treatment device installed at a single tap used for the purpose of reducing contaminants in drinking water at that one tap. POU devices are typically installed at the kitchen tap. See the April 21, 2000 NODA for more details.

Limitations Footnotes: Technologies for Radionuclides:

[a] The regeneration solution contains high concentrations of the contaminant ions. Disposal options should be carefully considered before choosing this technology.

[b] When POU devices are used for compliance, programs for long-term operation, maintenance, and monitoring must be provided by water utility to ensure proper performance.

[c] Reject water disposal options should be carefully considered before choosing this technology. See other RO limitations described in the SWTR compliance technologies table.

[d] The combination of variable source water quality and the complexity of the water chemistry involved may make this technology too complex for small surface water systems.

[e] Removal efficiencies can vary depending on water quality.

[f] This technology may be very limited in application to small systems. Since the process requires static mixing, detention basins, and filtration, it is most applicable to systems with sufficiently high sulfate levels that already have a suitable filtration treatment train in place.

[g] This technology is most applicable to small systems that already have filtration in place.

[h] Handling of chemicals required during regeneration and pH adjustment may be too difficult for small systems without an adequately trained operator.

[i] Assumes modification to a coagulation/filtration process already in place.

TABLE C.—BAT FOR SMALL COMMUNITY WATER SYSTEMS FOR THE RADIONUCLIDES LISTED IN § 141.66

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

[1] **Note:** Numbers correspond to those technologies found listed in the table B to this paragraph.

(2) A State shall require community water systems to install and/or use any treatment technology identified in Table A to this section, or in the case of small water systems (those serving 10,000 persons or fewer), Table B and Table C

of this section, as a condition for granting a variance except as provided in paragraph (a)(3) of this section. If, after the system's installation of the treatment technology, the system cannot meet the MCL, that system shall be eligible for a variance under the provisions of section 1415(a)(1)(A) of the Act.

(3) If a community water system can demonstrate through comprehensive engineering assessments, which may include pilot plant studies, that the treatment technologies identified in this section would only achieve a de minimus reduction in the contaminant level, the State may issue a schedule of compliance that requires the system being granted the variance to examine other treatment technologies as a condition of obtaining the variance.

(4) If the State determines that a treatment technology identified under paragraph (a)(3) of this section is technically feasible, the Administrator or primacy State may require the system to install and/or use that treatment technology in connection with a compliance schedule issued under the provisions of section 1415(a)(1)(A) of the Act. The State's determination shall be based upon studies by the system and other relevant information.

(5) The State may require a community water system to use bottled water, point-of-use devices, point-of-entry devices or other means as a condition of granting a variance or an exemption from the requirements of § 141.66 of this chapter, to avoid an unreasonable risk to health.

(6) Community water systems that use bottled water as a condition for receiving a variance or an exemption from the requirements of § 141.66 of this chapter must meet the requirements specified in either § 142.62(g)(1) or § 142.62(g)(2) and (g)(3).

(7) Community water systems that use point-of-use or point-of-entry devices as a condition for obtaining a variance or an exemption from the radionuclides NPDWRs must meet the conditions in § 142.62(h)(1) through (h)(6).

[FR Doc. 00–30421 Filed 12–6–00; 8:45 am]

BILLING CODE 6560–50–U