United States
Environmental
Protection Agency

Implementation Guidance for Radionuclides

Appendices A - J

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

Disclaimer

This document provides guidance to State Directors, Tribes, and U.S. Environmental Protection Agency (EPA) Regions and States exercising primary enforcement responsibility under the Safe Drinking Water Act (SDWA).

SDWA provisions and EPA regulations described in this document contain legally binding requirements. This document does not substitute for those provisions or regulations, nor is it a regulation itself. Thus, it does not impose legally binding requirements on EPA, States, or the regulated community, and may not apply to a particular situation based upon the circumstances. 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 made 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 or not the recommendations or interpretations in the guidance are appropriate in that situation. EPA may change this guidance in the future.

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Appendix A

Monitoring Scenario Figures

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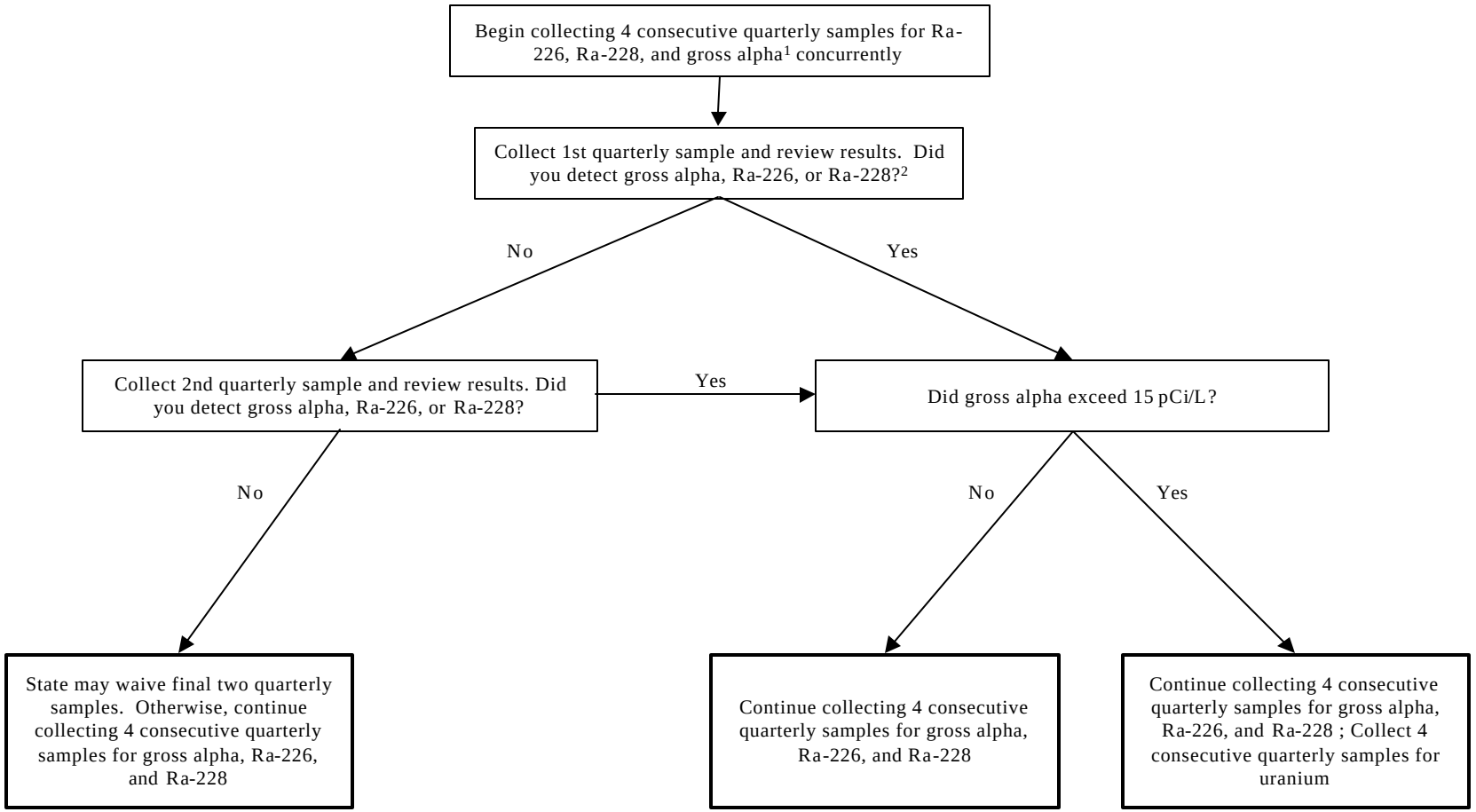
Initial Monitoring Scenario for New System or Sources, or Existing Systems Without Data That Can Be Grandfathered

Initial Monitoring Scenario for New System or Sources, or Existing Systems Without Data That Can Be Grandfathered

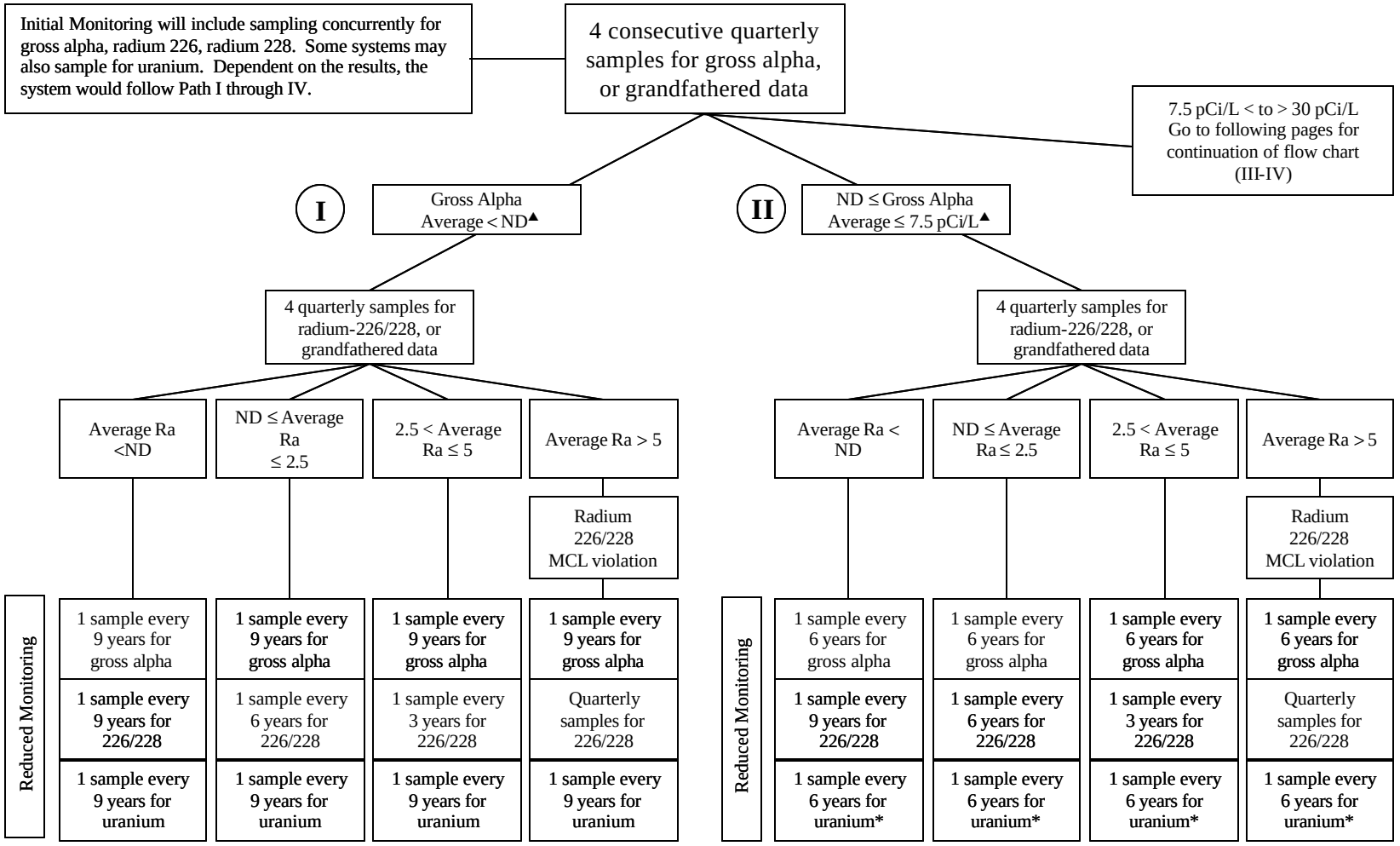


The analytical results from these samples can be used to direct the system into the decision path for repeat monitoring, outlined in Figure 2, paths I through IV.

[1] Note that systems may also choose to monitor for gross alpha and uranium separately.

[2] If gross alpha results are less than 5 pCi/L, then gross alpha may be substituted for Ra-226 (40 CFR 141.26(a)(5)). However, EPA is recommending only substituting gross alpha for Ra-226 when the gross alpha is less than non-detect. See Section I.C.4.e for more information.

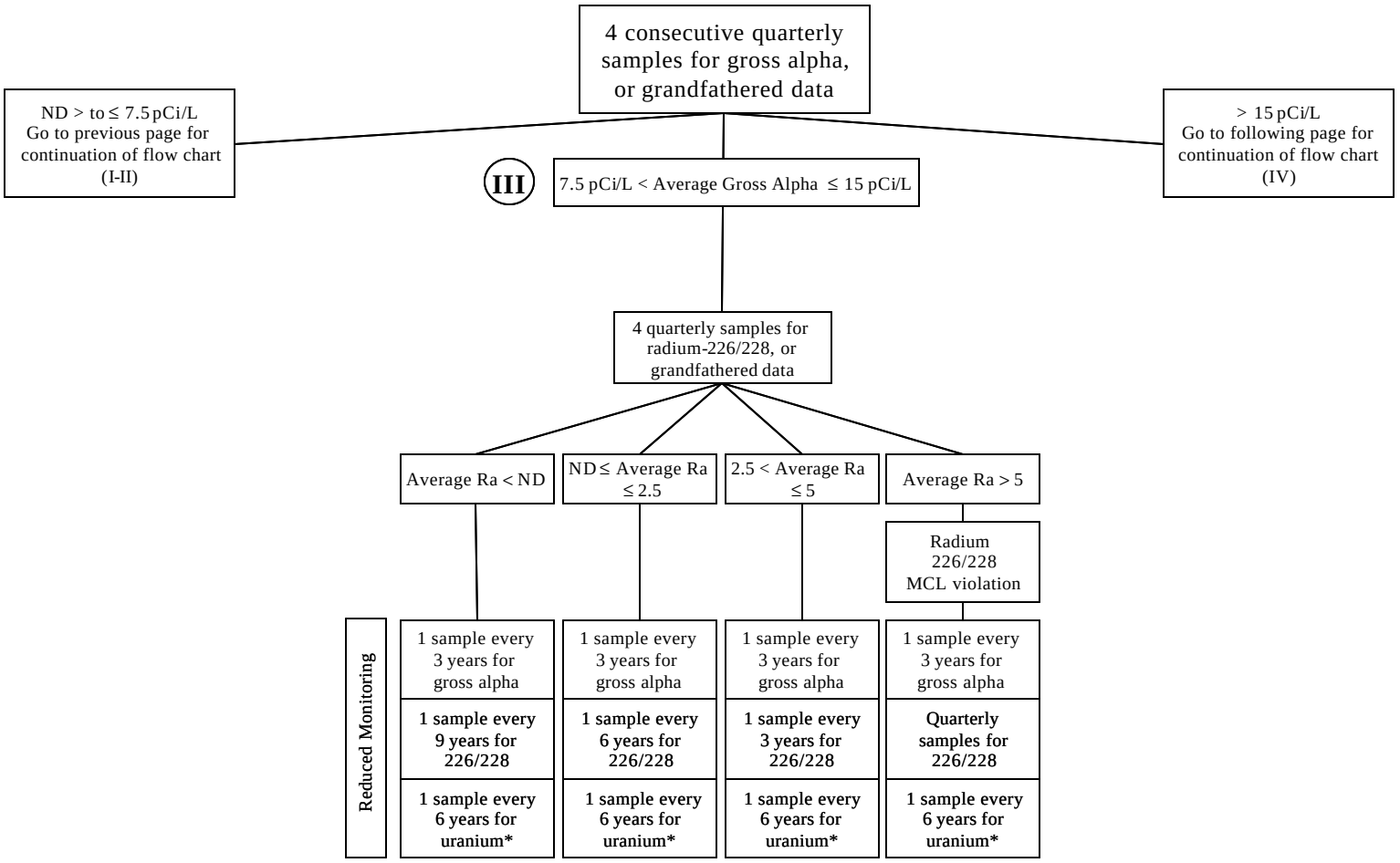
Initial and Reduced Monitoring Requirements for Gross Alpha, Radium 228, Combined Radium 226/228, and Uranium



* Assumes system does not collect quarterly samples for uranium to determine the actual concentration of uranium. Sampling points that exceed 15 pCi/L for gross alpha must collect samples for uranium to determine compliance with the gross alpha and uranium MCLs.

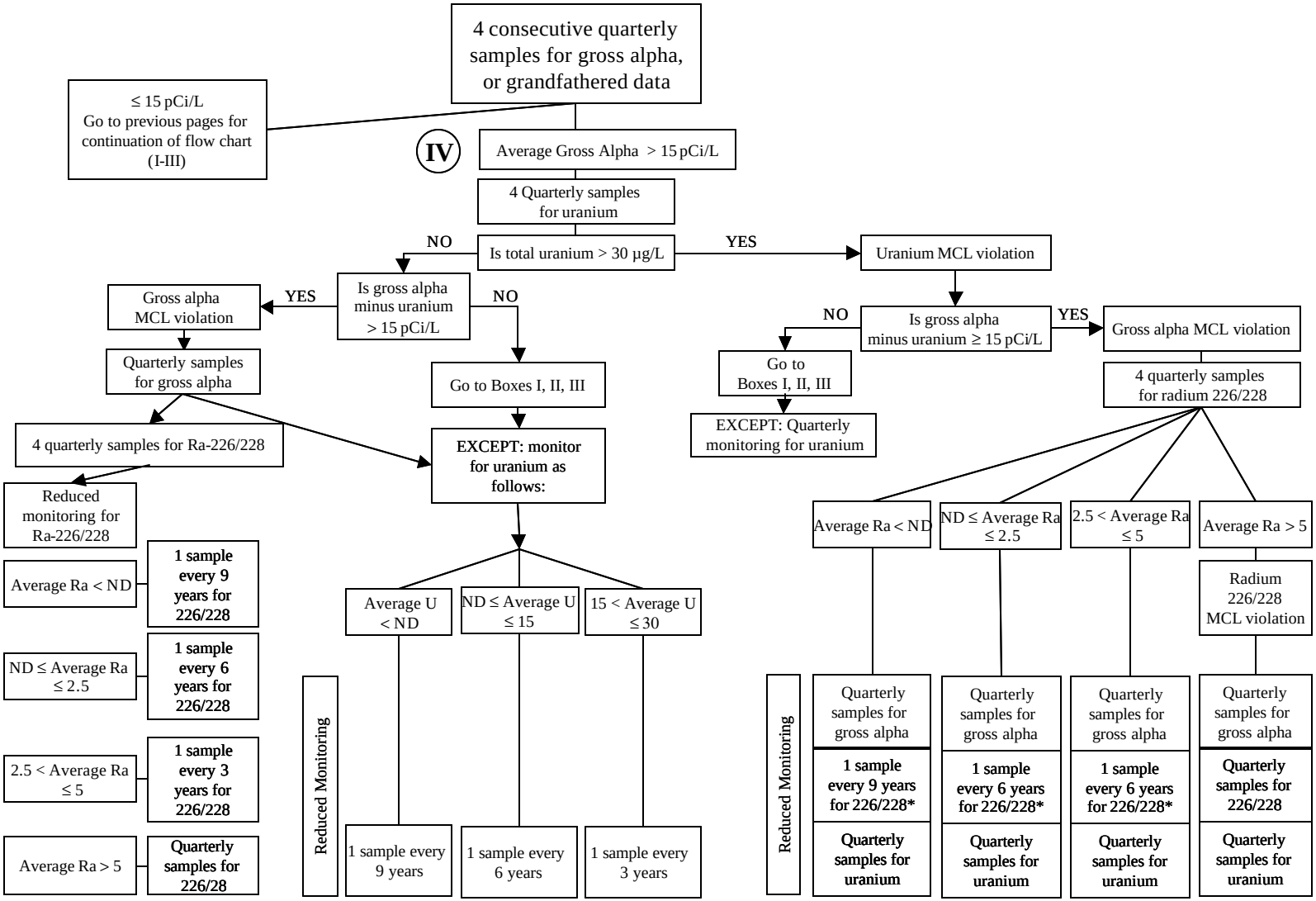
▲Gross alpha may be substituted for Ra-226 if the result does not exceed 5 pCi/L. However, EPA is recommending only substituting gross alpha for Ra-226 when the gross alpha is less than non-detect. See Section I.C.4.e for more information.

cont.: Initial and Reduced Monitoring Requirements for Gross Alpha, Radium 228, Combined Radium 226/228, and Uranium



* Assumes system does not collect quarterly samples for uranium to determine the actual concentration of uranium. Sampling points that exceed 15 pCi/L for gross alpha must collect samples for uranium to determine compliance with the gross alpha and uranium MCLs.

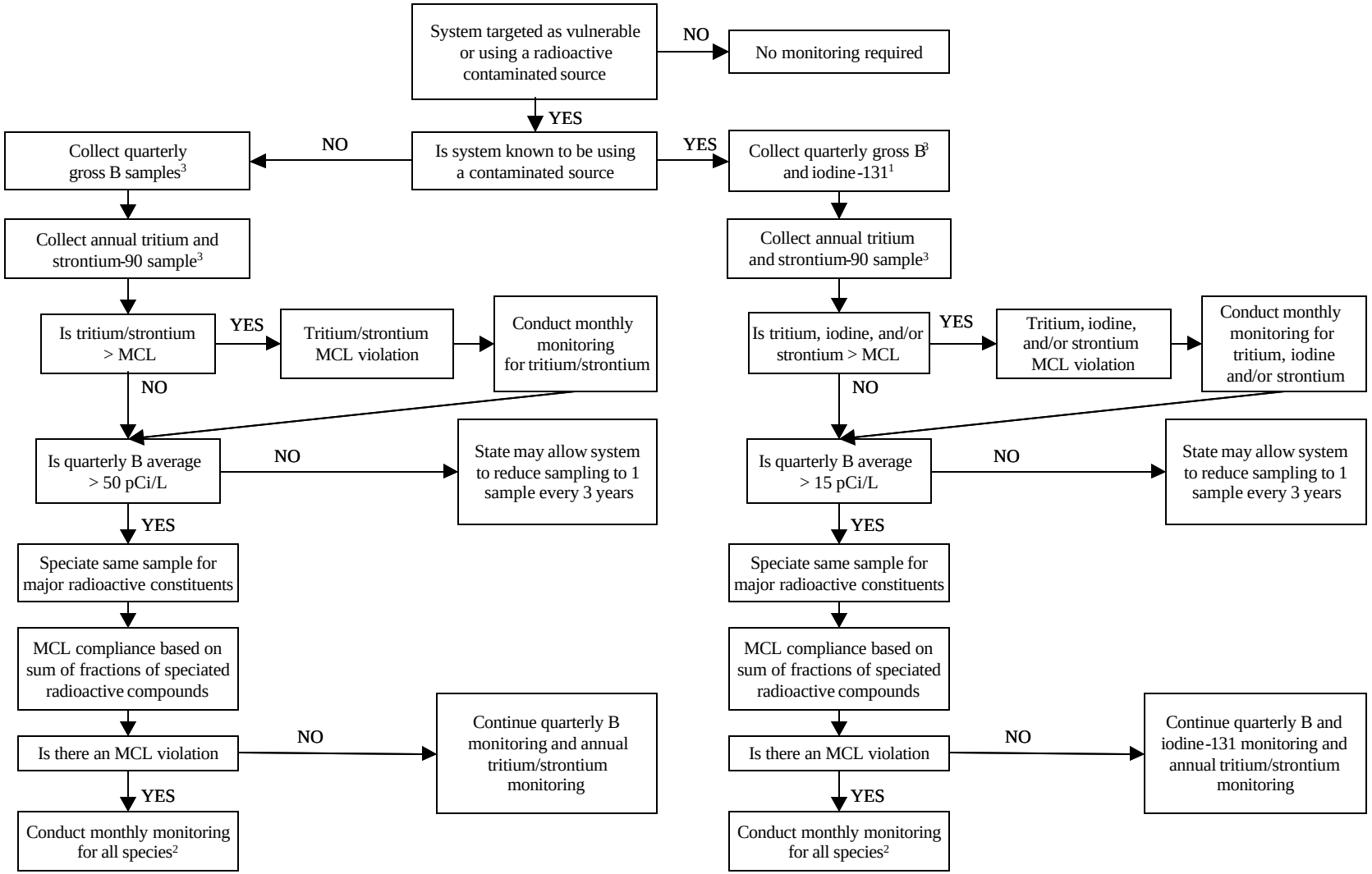
cont.: Initial and Reduced Monitoring Requirements for Gross Alpha, Radium 228, Combined Radium 226/228, and Uranium



* Sampling points that exceed 15 pCi/L for gross alpha must collect samples for uranium to determine compliance with the gross alpha and uranium MCLs.

Gross Beta Monitoring Scenario

Gross Beta Monitoring Requirements



[1] A composite of five consecutive daily samples for iodine-131 must be analyzed each quarter. 40 CFR 141.26(b)(2)(ii).
[2] Typically, a State will require a system to speciate the sample for the most likely emitters associated with the nearby source.
[3] For the quarterly monitoring requirements for gross beta particle activity, samples must be collected monthly and analyzed or composited and analyzed. For the annual monitoring requirements for tritium and strontium-90, samples must be collected quarterly and analyzed or composited and analyzed.

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Appendix B

Violation Tables for Data Management and Enforcement Purposes

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For information on violation tables for data management and enforcement purposes, please contact:

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Appendix C

Sample Extension Agreement

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Under 40 CFR 142.12, States must adopt the requirements of the Radionuclides Rule within 2 years of the new Rule's publication or by December 8, 2002.

An extension agreement will be necessary **only** when States have not submitted a complete and final primacy revision application package by December 8, 2002. For further detail, please refer to Section III-B.

A sample extension agreement is presented on the following pages.

EXTENSION AGREEMENT

On December 7, 2000, the U.S. Environmental Protection Agency (EPA) published the final Radionuclides Rule. This Rule amends the National Primary Drinking Water Regulations, 40 CFR Part 141, and the regulations for implementation of the National Primary Drinking Water Regulations, 40 CFR Part 142. Provisions of the Rule take effect on December 8, 2003.

The April 28, 1998, revisions to the Primacy Rule extend the time allowed for States and Tribes to adopt new Federal regulations from 18 months to 2 years. Therefore, the State or Tribe must adopt regulations pertaining to the Radionuclides Rule and submit a complete and final primacy revision application by December 8, 2002, unless it requests an extension of up to 2 years to adopt the new or revised regulations.

Until the State/Tribal Primacy Revision Application has been submitted, the State or Tribe and appropriate EPA Regional office will share responsibility for implementing the primary program elements as indicated in the extension agreement. The State or Tribe and the EPA Regional office should discuss these elements and address terms of responsibility in the agreement. The State, Tribe, and EPA should be viewed as partners in this effort, working toward two very specific public health-related goals. The first goal is to achieve a high level of compliance with the regulation. The second goal is to facilitate successful implementation of the regulation during the transition period before the State or Tribe has interim primacy for the Rule. In order to accomplish these goals, education, training, and technical assistance will need to be provided to water suppliers on their responsibilities under the Radionuclides Rule.

This document will record the terms of a Primacy Extension Agreement between the State or Tribe and EPA for the Radionuclides Rule and shall remain effective from the date this agreement is signed until either December 8, 2002, or the date the State's or Tribe's primacy application is submitted under 40 CFR 142.12. To retain primacy the State or Tribe must submit a final and approvable Primacy Revision Application incorporating the above-referenced provisions of the Federal Register to EPA by December 8, 2002, or no later than December 8, 2004, if the State or Tribe has been granted an extension.

{Date}

{Regional Administrator}
Regional Administrator
U.S. EPA Region **{Region}**
{Street Address}
{City, State, Zip}

RE: Request/approval for an Extension Agreement

Dear **{Regional Administrator}:**

The State of **{State}** / **{Tribe}** Tribe is requesting an extension to the date that final primacy revisions are due to EPA for the Radionuclides Rule until **{insert date - no later than December 8, 2004}**, as allowed by 40 CFR 142.12 and would appreciate your approval. Staff of the **{State Department/Agency}** have conferred with your staff and has agreed to the requirements listed below for this extension. This extension is being requested because the State of **{State}** / **{Tribe}** Tribe:

❑ Is planning to group two or more program revisions into a single legislative or regulatory action.

❑ Currently lacks the legislative or regulatory authority to enforce the new or revised requirements.

❑ Currently lacks adequate program capability to implement the new or revised requirements.

{State Department/Agency/Tribal Organization} will be implementing the Radionuclides Rule within the scope of its current authority and capability as outlined in the six areas identified in 142.12(b)(3)(i-vi):

i) Informing PWSs of the new EPA (and upcoming State/Tribal) requirements and that EPA will be overseeing implementation of the requirements until EPA approves the State/Tribal revision.

State/ Tribe	EPA	
____	____	Provide copies of regulation and guidance to other State agencies, PWSs, technical assistance providers, associations, or other interested parties.
____	____	Educate and coordinate with State staff, public water supplies (PWSs), the public, and other water associations about the requirements of this regulation
____	____	Notify affected systems of their requirements under the Radionuclides Rule.
____	____	Other

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

State/ Tribe	EPA	
____	____	Devise a tracking system for PWS reporting pursuant to the Radionuclides Rule.
____	____	Keep States informed of SDWIS reporting requirements during development and implementation.
____	____	Report Radionuclides Rule violations and enforcement information to SDWIS as required.
____	____	Other

iii) Assisting EPA in the development of the technical aspects of the enforcement actions and conducting informal follow-up and violations (telephones calls, letters, etc.).

State/ Tribe	EPA	
____	____	Issue notices of violation (NOVs) for treatment technique and monitoring/reporting violations of the Radionuclides Rule
____	____	Provide immediate technical assistance to PWSs with treatment technique and/or monitoring/reporting violations to try to bring them into compliance.
____	____	Refer all violations to EPA for enforcement if they have not been resolved within 60 days of the period that triggered the violation. Provide information as requested to conduct and complete any enforcement action referred to EPA.
____	____	Other

iv) Providing technical assistance to public water systems.

State/ Tribe	EPA	
____	____	Conduct training within the State/Tribe for PWSs on Radionuclides Rule requirements.
____	____	Provide technical assistance through written and/or verbal correspondence to PWSs.
____	____	Provide on-site technical assistance to PWSs as requested and needed to ensure compliance with this regulation.
____	____	Evaluate requests for variances in an expedient manner.
____	____	Coordinate with other technical assistance providers and organizations to provide accurate information and aid in a timely manner.
____	____	Other

v) Providing EPA with all information prescribed by the State Reporting Requirements in 142.15.

State/ Tribe	EPA	
____	____	Report any violations incurred by PWSs for these regulations each quarter.
____	____	Report any enforcement actions taken against PWSs for these regulations each quarter.
____	____	Report any variances or exemptions granted for PWSs for these regulations each quarter.
____	____	Other

vi) For States/Tribes whose request for an extension is based on a current lack of program capability to implement the new or revised requirements agrees to take the following steps to remedy the capability deficiency.

State/ Tribe	EPA	
____	____	Acquire additional resources to implement these regulations (List of specific steps being taken attached as {Appendix A}).
____	____	Provide quarterly updates describing the status of acquiring additional resources.
____	____	Other

I affirm that the **{State Department/Agency/Tribal Organization}** will implement provisions of the Radionuclides Rule as outlined above.

_____

{Agency Director or Secretary} Date

_____

{Name of State Agency/Tribe }

I have consulted with my staff and approve your extension for the aforementioned regulation. I affirm that EPA Region **{Region}** will implement provisions of the Radionuclides Rule as outlined above.

_____

Regional Administrator Date
EPA Region **{Region}**

This Extension Agreement will take effect upon the date of the last signature.

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Appendix D

Primacy Revision Crosswalks

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Primacy Revision Crosswalk for the Radionuclides Rule

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
SUBPART B - MAXIMUM CONTAMINANT LEVELS			
§141.25 ANALYTICAL METHODS FOR RADIOACTIVITY			
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.	§141.25 (a)		
To determine compliance with §141.66(b)(c) and (e) the detection limit shall not exceed the concentrations in Table B.	§141.25 (c)(1)		
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	§141.25 (c)(1) Table B		
To determine compliance with §141.66 (d) the detection limits shall not exceed the concentrations listed in Table C.	§141.25 (c)(2)		
Table C–Detection Limits for Man-Made Beta Particle and Photon Emitters [Note: name revised]	§141.25 (c)(2) Table C		
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.	§141.25 (d)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
SUBPART C - MONITORING AND ANALYTICAL REQUIREMENTS			
§141.26 MONITORING FREQUENCY AND COMPLIANCE REQUIREMENTS FOR RADIONUCLIDES IN COMMUNITY WATER SYSTEMS			
Monitoring and compliance requirements for gross alpha particle activity, radium-226, radium-228, and uranium.	§141.26 (a)		
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).	§141.26 (a)(1)		
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 ("systems") must sample at every entry point to the distribution system that is representative of all sources being used ("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 §141.26(a)(2)(ii)(C).	§141.26 (a)(1)(i)		
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.	§141.26 (a)(1)(ii)		
Initial monitoring: Systems must conduct initial monitoring for gross alpha particle activity, radium-226, radium-228, and uranium as follows:	§141.26 (a)(2)		

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Systems without acceptable historical data (defined below) must collect four consecutive quarterly samples at all sampling points before December 31, 2007.	§141.26 (a)(2)(i)		
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:	§141.26 (a)(2)(ii)		
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.	§141.26 (a)(2)(ii)(A)		
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.	§141.26 (a)(2)(ii)(B)		
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.	§141.26 (a)(2)(ii)(C)		
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.	§141.26 (a)(2)(iii)		

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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.	§141.26 (a)(2)(iv)		
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:	§141.26 (a)(3)		
If the average of the initial monitoring results for each contaminant is below the detection limit specified in §141.25 (c)(1) (Table B), the system must collect and analyze for that contaminant using at least one sample at that sampling point every nine years.	§141.26 (a)(3)(i)		
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.	§141.26 (a)(3)(ii)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§141.26 (a)(3)(iii)		
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).	§141.26 (a)(3)(iv)		
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.	§141.26 (a)(3)(v)		
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.	§141.26 (a)(4)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§141.26 (a)(5)		
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:	§141.26 (b)		
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.	§141.26 (b)(1)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§141.26 (b)(1)(i)		
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).	§141.26 (b)(1)(ii)		
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.	§141.26 (b)(2)		
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.	§141.26 (b)(2)(i)		

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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.	§141.26 (b)(2)(ii)		
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.	§141.26 (b)(2)(iii)		
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.	§141.26 (b)(2)(iv)		
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).	§141.26 (b)(2)(v)		
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 paragraphs (b)(1) or (b)(2) of this section.	§141.26 (b)(3)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§141.26 (b)(4)		
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 (d)(2). Doses must also be calculated and combined for measured levels of tritium and strontium to determine compliance.	§141.26 (b)(5)		
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 paragraphs (b)(1)(ii) or (b)(2)(i) of this section.	§141.26 (b)(6)		
General monitoring and compliance requirements for radionuclides.	§141.26 (c)		
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.	§141.26 (c)(1)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
Each public water system shall monitor at the time designated by the State during each compliance period.	§141.26 (c)(2)		
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.	§141.26 (c)(3)		
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.	§141.26 (c)(3)(i)		
For systems monitoring more than once a 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.	§141.26 (c)(3)(ii)		
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.	§141.26 (c)(3)(iii)		
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.	§141.26 (c)(3)(iv)		
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.	§141.26 (c)(3)(v)		
States have the discretion to delete results of obvious sampling or analytic errors.	§141.26 (c)(4)		

FEDERAL REQUIREMENT		FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.		§141.26 (c)(5)		
SUBPART F - MAXIMUM CONTAMINANT LEVEL GOALS AND MAXIMUM RESIDUAL DISINFECTANT LEVEL GOALS				
§ 141.55	**MAXIMUM CONTAMINANT LEVEL GOALS FOR RADIONUCLIDES**			
Contaminant	MCLG	§ 141.55		
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			

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
SUBPART G - NRPDWR: MAXIMUM CONTAMINANT LEVELS AND MAXIMUM RESIDUAL DISINFECTANT LEVELS			
§ 141.66 MAXIMUM CONTAMINANT LEVELS FOR RADIONUCLIDES			
[reserved]	§ 141.66 (a)		
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.	§ 141.66 (b)		
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.	§ 141.66 (c)		
MCL for beta particle and photon radioactivity.	§ 141.66 (d)		
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).	§ 141.66 (d)(1)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§ 141.66 (d)(2)		
Table A - Average Annual Concentrations Assumed to Produce A Total Body or Organ Dose of 4 mrem/yr Radionuclide — Critical Organ — pCi per Liter Tritium — Total body — 20,000 Strontium-90 — Bone marrow — 8	§ 141.66 (d)(2) Table A		
MCL for uranium. The maximum contaminant level for uranium is 30 µg/L.	§ 141.66 (e)		
Compliance dates	§ 141.66 (f)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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 Appendix A and B to Subpart Q is required on December 8, 2003.	§ 141.66 (f)(1)		
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 and radium-228, uranium, gross alpha particle activity, and beta particle and photon radioactivity.	§ 141.66 (g)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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	§ 141.66 (g) Table B		
List of Small Systems Compliance Technologies for Radionuclides and Limitations to Use Limitations (see footnotes) — Operator Skill Level Required — Raw Water Quality Range and Considerations 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	§ 141.66 (h) Table C		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
Limitations (see footnotes) / Operator Skill Level Required / Raw Water Quality Range and Considerations 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	§ 141.66 (h) Table C continued		
See § 141.66 (h) Table C for footnotes.	§ 141.66 (h) Table C, Footnotes		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
Compliance Technologies by System Size Category for Radionuclide NPDWRs 1. Combined radium-226 and radium-228 25-500 / 501-3,300 / 3,300-10,000 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 25-500 / 501-3,300 / 3,300-10,000 3,4 / 3,4 / 3,4 3. Beta particle activity and photon activity 25-500 / 501-3,300 / 3,300-10,000 1,2,3,4 / 1,2,3,4 / 1,2,3,4 4. Uranium 25-500 / 501-3,300 / 3,300-10,000 1,2,4,10,11 / 1,2,3,4,5,10,11 / 1,2,3,4,5,10,11	§ 141.66 (h) Table D		
Note: (1) Numbers correspond to those technologies found listed in the table C of 141.66(h).	§ 141.66 (h) Table D		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
SUBPART O - CONSUMER CONFIDENCE REPORTS			
APPENDIX A TO SUBPART O OF PART 141			
Regulated Contaminants Table	Appendix A to Subpart O		
Beta/photon emitters (mrem/yr) MCL in mg/L: 4 mrem/yr MCL in CCR units: 4 MCLG: 0 Major sources in drinking water: Decay of natural and man-made deposits Health effects: 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) MCL in mg/L: 15 pCi/L MCL in CCR units: 15 MCLG: 0 Major sources in drinking water: Erosion of natural deposits Health effects: 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.			

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
Combined radium (pCi/L) MCL in mg/L: 5 pCi/L MCL in CCR units: 5 MCLG: 0 Major sources in drinking water: Erosion of natural deposits Health effects: 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) MCL in mg/L: 30 µg/L MCL in CCR units: 30 MCLG: 0 Major sources in drinking water: Erosion of natural deposits Health effects: 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.			

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
SUBPART Q - PUBLIC NOTIFICATION OF DRINKING WATER VIOLATIONS			
APPENDIX A TO SUBPART Q OF PART 141 - NPDWR VIOLATIONS AND OTHER SITUATIONS REQUIRING PUBLIC NOTICE[1]			
I. Violations of National Primary Drinking Water Regulations(NPDWR)[3]:	I		
1. Beta/photon emitters: MCL/MRDL/TT violations[2] Tier of Public Notice Required — Citation 2 — 141.66 (d) Monitoring and testing procedure violations Tier of Public Notice Required — Citation 3 — 141.25 (a), 141.26 (b)	I.F.1.		
2. Alpha emitters: MCL/MRDL/TT violations[2] Tier of Public Notice Required — Citation 2 — 141.66 (c) Monitoring and testing procedure violations Tier of Public Notice Required — Citation 3 — 141.25 (a), 141.26 (a)	I.F.2.		
3. Combined radium (226 & 228): MCL/MRDL/TT violations[2] Tier of Public Notice Required — Citation 2 — 141.66 (b) Monitoring and testing procedure violations Tier of Public Notice Required — Citation 3 — 141.25 (a), 141.26 (a)	I.F.3.		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
4. Uranium: MCL/MRDL/TT violations[2] Tier of Public Notice Required — Citation 2[9] — 141.66 (e) Monitoring and testing procedure violations Tier of Public Notice Required — Citation 3[10] — 141.25 (a), 141.26 (a)	I.F.4.		
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	Appendix A, Endnotes		
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.	Appendix A, Endnotes		
9. The uranium MCL Tier 2 violation citations are effective December 8, 2003 for all community water systems. 10. The uranium Tier 3 violation citations are effective December 8, 2003 for all community water systems.	Appendix A, Endnotes		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
APPENDIX B TO SUBPART Q OF PART 141 - STANDARD HEALTH EFFECTS LANGUAGE FOR PUBLIC NOTIFICATION			
B. Standard Health Effects Language for Surface Water Treatment Rule (SWTR), Interim Enhanced Surface Water Treatment Rule (IESWTR) and Filter Backwash Recycling Rule (FBRR) violations: Contaminant — MCLG[1] mg/L — MCL[2] mg/L — Standard Health Effects Language for PN 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.	G.79.		
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.	Appendix B Endnotes		
PART 142-NATIONAL PRIMARY DRINKING WATER REGULATIONS IMPLEMENTATION			
SUBPART B - PRIMARY ENFORCEMENT RESPONSIBILITY			
§ 142.16 SPECIAL PRIMACY REQUIREMENTS			
[reserved]	§ 142.16 (i)		
[reserved]	§ 142.16 (j)		
[reserved]	§ 142.16 (k)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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):	§ 142.16 (l)		
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).	§ 142.16 (l)(1)		
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:	§ 142.16 (l)(1)(i)		
All previous monitoring data.	§ 142.16 (l)(1)(i)(A)		
The variation in reported activity levels.	§ 142.16 (l)(1)(i)(B)		
Other factors affecting the representativeness of the data (e.g. geology)	§ 142.16 (l)(1)(i)(C)		
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.	§ 142.16 (l)(2)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
§ 142.65 VARIANCES AND EXEMPTIONS FROM THE MAXIMUM CONTAMINANT LEVELS FOR RADIONUCLIDES **(OPTIONAL - STATES THAT PLAN TO ALLOW VARIANCES AND EXEMPTIONS MUST COMPLETE THIS SECTION)**			
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. 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 § 141.66 (g) Table B. 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 § 141.66 (h) Table D.	§ 142.65(a)(1)		
A State shall require community water systems to install and/or use any treatment technology identified in Table A of this section, paragraph (1), or in the case of small water systems (those serving 10,000 persons or fewer), § 141.66 (h) Tables C and D, 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.	§ 142.65(a)(2)		

FEDERAL REQUIREMENT	FEDERAL CITATION	STATE CITATION (DOCUMENT TITLE, PAGE NUMBER, SECTION/PARAGRAPH)	DIFFERENT FROM FED. REQUIREMENT? EXPLAIN ON SEPARATE SHEET
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.	§ 142.65(a)(3)		
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.	§ 142.65(a)(4)		
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.	§ 142.65(a)(5)		
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 paragraph (g)(1) or (g)(2) and (g)(3) of §142.62.	§ 142.65(a)(6)		
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).	§ 142.65(a)(7)		

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Appendix E

SDWIS/FED DTF Reporting Requirements Guidance

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State Reporting Guidance for Radionuclides

United States
Environmental
Protection Agency

Office of Ground Water and
Drinking Water (4606M)
EPA 816-R-02-012
www.epa.gov/safewater
March 2002

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Contents

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Introduction

The purpose of this document is to define the reporting requirements and related Safe Drinking Water Information System/Federal Version (SDWIS/FED) Data Transfer Format (DTF) record layout for information required under the Radionuclides Rule published in the Federal Register on December 7, 2000 (65 FR 76 708). This document addresses the requirements for State reporting to EPA and the definitions of monitoring, reporting, violations and Return to Compliance (RTC) data applicable to community water systems (CWSs), under the Radionuclides Rule. Such reporting is required under Section 1445 of the Safe Drinking Water Act (SDWA) (codified at Section 142.15 of Title 40 of the *Code of Federal Regulations*). The Radionuclides Rule currently does not apply to nontransient noncommunity water systems, nor to transient noncommunity water systems.

This guidance document is designed for use by State program officials; however, States may at their discretion share components of this guidance with water systems, drinking water laboratories, and others in the drinking water community.

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 made 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 or not the recommendations or interpretations in the guidance are appropriate in that situation. EPA may change this guidance in the future.

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GLOSSARY OF SPECIAL TERMS USED IN THIS GUIDANCE DOCUMENT

Term	Definition
1976 Rule	MCLs and National Interim Primary Drinking Water Regulations for Radiologicals, promulgated on July 9, 1976 (41 FR 28404). This Rule was modified by technical amendments published on August 27, 1980 (45 FR 57346). *(Note: The National Interim Primary Drinking Water Regulations became the National Primary Drinking Water Regulations with the passage of the June 19, 1986, Amendments to SDWA.)*
CWS	An acronym for Community Water Systems.
DL	An acronym for Method Detection Limit. The DL is the concentration which can be counted with a precision of ± 100 percent at the 95 percent confidence level (1.96σ or 1.65σ, where σ is the standard deviation of the net counting rate of the sample).
DTF	An acronym for Data Transfer Format, which is the format used to report data to SDWIS/FED.
EPTDS	Acronyms for an Entry Point To the Distribution System for a water system.
Exemption	Allows a system with compelling circumstances an extension of time before the system must comply with applicable requirements. Only exemptions for the uranium MCL may be granted.
Grandfathered data	At State discretion, data collected between June 2000 and December 8, 2003, may be used to comply with the initial monitoring requirements for gross alpha, combined radium (-226 & -228), and uranium.
GW	An acronym for Ground Water
M/R	An acronym for Monitoring and/or Reporting.
MCL	An acronym for Maximum Contaminant Level.
OECA	An acronym for EPA's Office of Enforcement Compliance Assurance.
PN	An acronym for Public Notice. PN is required for MCL and M/R violations, or failure to comply with the conditions of a variance or exemption. If PN is not properly performed, a PN violation is required to be reported to SDWIS/FED.
RTC	An acronym for Return to Compliance. This designation indicates that a system that was previously in violation for a requirement is now considered as being in compliance, either because it corrected the violation or is no longer required to do so.
Sampling point	An entry point to the distribution system at where the State has designated that sampling should occur. A system must sample at every entry point to the distribution system that the State considers to be representative, such that samples taken are representative of all sources of water being used under normal operating conditions.
SDWA	An acronym for the Safe Drinking Water Act.
SDWIS/FED	An acronym for EPA's Safe Drinking Water Information System/Federal Version, the national repository for drinking water information.

GLOSSARY OF SPECIAL TERMS USED IN THIS GUIDANCE DOCUMENT

Term	Definition
Small system	A system that serves 10,000 or fewer people.
SNC	An acronym for Significant Noncomplier. A designation by EPA for those systems that are considered to pose the most serious threats to public health.
State	Refers to the government agency that is responsible for reporting the State's drinking information to SDWIS/FED.
SW	An acronym for Surface Water.
Variance	Allows a system to provide drinking water that contains contaminant levels exceeding the MCL, if it can demonstrate that it is still protective of public health. As a condition of the variance, the system must adhere to a State-specific schedule.
Waiver	At State discretion, allows a system to waive (not sample for) 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 DL (40 CFR141.26 (a)(2)(iii)).

I. Federal Reporting Requirements for the Radionuclides Rule

This section discusses the Safe Drinking Water Information System/ Federal Version (SDWIS/FED) Radionuclides Rule reporting requirements for community water system (CWS) monitoring programs under the Safe Drinking Water Act (SDWA). Compliance, violations, follow-up and enforcement actions, and Return to Compliance (RTC) reporting requirements are defined.

A. Summary of Requirements

The Radionuclides Rule still applies to CWSs only. It sets 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 frequency for monitoring was changed to make it more similar to that for Phase II/V. The Rule retains the existing MCL for combined radium (-226 & -228), gross alpha particle radioactivity, and beta particle and photon radioactivity.

B. Key Dates

The Radionuclides Rule becomes effective on December 8, 2003. The 1976 Rule remains in effect through December 7, 2003. All CWSs must complete initial monitoring by December 31, 2007. A CWS must conduct initial monitoring according to a State-specified plan between December 8, 2003 and December 31, 2007, unless the State allows the system to grandfather data. At State discretion, results from samples collected between June 2000 and December 8, 2003, may be used to satisfy initial monitoring requirements for gross alpha, combined radium (-226 & -228), and uranium.

C. Maximum Contaminant Levels (MCLs)

The following table summarizes the contaminants for the Radionuclides Rule and their respective MCLs. The Radionuclides Rule sets a new MCL for uranium, which was not previously regulated, and retains the existing MCLs for combined radium (-226 & -228), gross alpha particle radioactivity, and beta particle and photon radioactivity.

SDWIS/FED Radionuclides Contaminants		
Contaminant Name	**SDWIS/FED Contaminant Code**	**Maximum Contaminant Level (MCL)**
Gross Alpha, Excluding Radon & Uranium	4000	15 pCi/L
Combined Uranium	4006	30 µg/L
Combined Radium (-226 & -228)	4010	5 pCi/L
Man-Made Beta Particle & Photon Emitters	4101	4 mrem/year
Tritium	4102	n/a
Strontium-90	4174	n/a
Iodine-131	4264	n/a

D. Method Detection Limits (DLs)

The following table contains the method detection limits (DLs) used to determine compliance applicable to radionuclides reporting (40 CFR 141.25(c)(1)(Table B)). The Agency will propose a DL for uranium in a future rule before the effective date of the Radionuclides Rule (December 8, 2003).

Contaminant Name	DL
Gross Alpha Particle Activity	3 pCi/L
Radium-226	1 pCi/L
Radium-228	1 pCi/L
Uranium	Reserved

E. Monitoring Period

In SDWIS/FED, a monitoring period refers to the period of time during which monitoring was to have been performed, such as a quarter, a year, etc. For example, assume a system is required to monitor for contaminant X each calendar quarter. If this system fails to conduct the required monitoring for contaminant X for the first calendar quarter of 2004, a Monitoring and/or Reporting (M/R) violation is incurred. When this M/R violation is reported to SDWIS/FED, the State must supply the beginning date of the monitoring period, and the ending date of the monitoring period. The beginning date of the

monitoring period in this example would be 01/01/2004; the ending date of the monitoring period would be 03/31/2004.

1. Initial Monitoring for Gross Alpha, Radium -226/-228, and Uranium

A CWS must collect four consecutive quarterly samples for gross alpha, radium-226, radium-228, and uranium at all sampling points (40 CFR 141.26(a)(2)). If the annual average of the initial monitoring results for each contaminant at a specific sampling point is above the MCL, the system must collect and analyze quarterly samples at that sampling point until it has results from four consecutive quarters that are at or below the MCL as defined in 40 CFR 141.26(a)(2)(iv).

Criteria for Determining Frequency of Subsequent Monitoring for Gross Alpha, Combined Radium (-226 & -228), and Uranium*	
If the results from initial monitoring are:	Then the subsequent monitoring cycle is:
< DL	one sampling event every nine years
≥ DL but ≤ ½ MCL	one sampling event every six years
> ½ MCL but ≤ MCL	one sampling event every three years
> MCL	until the annual averages from each of four consecutive quarters are at or below the MCL

*Note: The DL has not been set for uranium but will be by December 8, 2003. Until the DL is set, if a system is allowed to grandfather data for uranium, it may reduce monitoring frequency to a minimum of one sample every six years (but not nine years).

2. Initial Monitoring for Beta Particle and Photon Emitters

Systems designated by the State as vulnerable CWSs must collect quarterly samples for gross beta and collect annual samples for tritium and strontium-90 (40 CFR 141.26(b)(1)). CWSs using waters contaminated by effluents from nuclear facilities must collect quarterly samples for gross beta and iodine-131 and annual samples for tritium and strontium-90 (40 CFR 141.26(b)(2)). 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)). In addition, for the quarterly iodine-131 monitoring requirements, samples must be collected for five consecutive days, composited, and analyzed.

For the annual monitoring requirements for strontium-90 and tritium, samples must be collected quarterly and analyzed or composited and analyzed (40 CFR 141.26(b)(2)(iii)).

3. Reduced Monitoring for Gross Alpha, Radium -226/-228, and Uranium

If the average of the monitoring results for each contaminant is below the DL, CWSs must collect and analyze for that contaminant using at least one sample at that sampling point every nine years as defined in 40 CFR 141.26(a)(3)(i). A CWS may reduce the future monitoring frequency to once every six years at each sampling point if the average of the monitoring results for each contaminant is at or above the DL but at or below ½ the MCL (40 CFR 141.26(a)(3)(ii)). If the average of the monitoring results for each contaminant is above ½ the MCL, but at or below the MCL, a CWS must collect and analyze for that contaminant using at least one sample at that sampling point every three years (40 CFR 141.26(a)(3)(iii)). Systems must use the samples collected during the reduced monitoring period to determine the monitoring frequency for subsequent monitoring periods (40 CFR 141.26(a)(3)(iv)).

4. Reduced Monitoring for Beta Particle and Photon Emitters

For systems using waters contaminated by effluents from nuclear facilities, if the gross beta minus the naturally occurring potassium-40 activity is less than or equal to 15 pCi/L, the system must collect one gross beta sample every three years (40 CFR 141.26(b)(2)(iv)). In a vulnerable system, if the gross beta minus the naturally occurring potassium-40 activity is less than or equal to 50 pCi/L, the system must collect one gross beta sample every three years (40 CFR 141.26(b)(1)(i)).

5. Increased Monitoring for Gross Alpha, Radium -226/-228, and Uranium

If a CWS on reduced monitoring has a monitoring result that exceeds the MCL for any contaminant, 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 as defined in 40 CFR 141.26(a)(3)(v). Note: If the annual averages from four consecutive quarters are at the MCL, the system must continue to monitor quarterly.

6. Increased Monitoring for Beta Particle and Photon Emitters

If the gross beta minus the naturally occurring potassium-40 activity exceeds 15 pCi/L (for systems using waters contaminated by effluents from nuclear facilities) or 50 pCi/L (for systems determined by the State to be vulnerable), the system must speciate as required by the State, and collect gross beta samples at the initial monitoring frequency (40 CFR 141.26(b)).

II. Violation Determination, SNCs, & Enforcement

A. Violation Determination Based on Monitoring Period

The violation compliance period reflects the actual monitoring period for which the samples were taken. As long as samples are taken within the specified monitoring period, the system will be considered in compliance, even if the elapsed time between sample dates is greater than the specified sampling frequency (e.g., every three years).

B. Reporting of Violations by System Versus Sampling Point

States have the option of reporting violations to SDWIS/FED by sampling point, or by system. States choosing to report on a sampling point specific basis would report every violation that a system incurs, even if a system has multiple violations of the same type and for the same contaminant and monitoring period at multiple sampling points. Each would be reported to SDWIS/FED. States choosing to report on a system specific basis would only report one violation per contaminant per monitoring period even if the system violated the same MCL or monitoring requirement during a given period at more than one sampling point. In choosing which of the sampling points to report a same type violation for, always report the more severe violation.

Regardless of the option a State chooses for reporting violations to SDWIS/FED, EPA views violations on a system-specific basis. For EPA purposes, each system can be in violation only one time for each type of violation for each contaminant for each monitoring period -- even though the CWS may have had multiple violations of the same type and for the same contaminant and monitoring period at multiple sampling points.

CWSs can have both MCL and monitoring violations during the same period. As one example, consider a system in a State which chooses to report violations by system rather than by sampling point. A system which has multiple sampling points may have a MCL violation for a specific contaminant at one point and fail to monitor for that contaminant at another point. The CWS has both an MCL violation and an M/R violation for the contaminant for the same monitoring period. Both violations are to be reported to SDWIS/FED.

C. Types of Violations

Types of violations for the Radionuclides Rule are as follows:

SDWIS/FED Violation Type Code	Violation Name	SDWIS/FED Violation Description
02	MCL, Average	At a sampling point, the computed running annual average exceeds the MCL or any one sample causes the running annual average to exceed the MCL (e.g. one sample result exceeds four times the MCL).
03	M/R	At a sampling point, when required, failure to: conduct any sampling, properly analyze any sample, or accurately report the running annual average analytical result of samples to the State.
06	Public Notice (PN)	Failure to properly provide PN according to 40 CFR 141 Subpart Q.
08	Variance/Exemption	Failure to adhere to the schedules and conditions of a variance or exemption.

For each violation listed above, the State reports the following data to SDWIS/FED. Section III - SDWIS/FED Data Transmittal explains these data elements in more detail.

- A unique PWS-ID.
- A unique violation ID.
- A code identifying the contaminant for which the violation applies.
- A code describing the type of violation.
- Calendar date of the beginning of the monitoring period.
- Calendar date of the end of the monitoring period.

- Analysis result (running annual average) causing the violation. Reported using the same unit as the MCL for the contaminant in question. **(For MCL violations only.)**

- A numeric value that represents the MCL which was exceeded that led to the identification of an MCL violation for a public water system. **(Where the MCL violated is other than the Federal MCL only.)**

- A code designating whether the violation is of major or minor severity. **(For M/R violations only.)**

- A source/entity ID at which the violation was incurred. **(Enter the five-character Source/Entity ID if reporting by sampling point; leave blank to report by system.)**

D. Maximum Contaminant Level (MCL) Violation Determination

States must determine compliance based on the analytical result(s) obtained at each Entry Point to the Distribution System (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)); or,
- 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).

For systems monitoring more than once per year, compliance with the MCL is determined by a running annual average at each sampling point.[1] 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)).

Individual analytical results should never be reported to SDWIS/FED as the analytical result of a MCL violation. A State should always report the annual average regardless of whether a single result would cause the system to exceed the MCL.

Data reported to SDWIS/FED should be in a form containing the same number of significant digits as the MCL. The last significant digit should be increased by one unit if the next digit is 5, 6, 7, 8,

[1]The first year, the running annual average would be calculated by averaging the results of quarters 1-4. Starting with quarter 5, the average is determined using the previous four quarters (e.g., quarter 5 results encompass quarters 2, 3, 4, and 5; quarter 6 results encompass quarters 3, 4, and 6, etc.).

or 9. The last significant digit should not be increased if the next digit is 0, 1, 2, 3, or 4. Please refer to the *Water Supply Guidance #21* for additional instruction.

Several examples of reporting MCL violations are contained in Appendix A.

E. Monitoring and/or Reporting (M/R) Violation Determination

In accordance with 40 CFR 141.26(a)(1)(i), CWSs must collect compliance samples at every EPTDS. Systems are required to conduct initial monitoring between December 8, 2003, and December 31, 2007 (40 CFR 141.26(a)(1)). An M/R violation occurs and must be reported for any system that fails to:

- collect the required number of samples during the specified time frame, in accordance with 40 CFR 141.26;
- ensure samples are analyzed properly in accordance with 40 CFR 141.25; or,
- submit all required monitoring information on time in accordance with 40 CFR 141.31 and 40 CFR 142.15.

Radionuclide M/R violations are expressed with severity indicators of **major** or **minor**. A major M/R radionuclide violation is defined as a monitoring or reporting violation in which no samples were collected and/or reported. A minor radionuclide violation is defined as a monitoring or reporting violation in which some, but not all, of the required samples were collected and/or reported. For States electing to report by sampling point, any violation during a monitoring period will be a "major" violation, since in this case it would be impossible for a CWS to conduct some but not all of the required monitoring. If reporting at the system level, systems with multiple sampling points may conduct monitoring at some points but not all points; such violations would be coded as "minor" violations. Systems that do not conduct monitoring at any of the points will have violations coded as "major."

The beginning date of an M/R violation would be the first day of the monitoring period during which the system was to have taken the sample. For reduced monitoring, violations would occur during that (three-year, six-year, or nine-year) span. Initial and quarterly monitoring violations would occur in a three-month (January to March, April to June, July to August, or October to December) span, and would continue to occur each quarter, as long as the system has not completed the initial monitoring. Refer to the *Implementation Guidance for Radionuclides* for more detailed information on initial, reduced, and increased monitoring requirements and the use of grandfathered data.

Several examples of reporting monitoring violations are contained in Appendix A.

F. Variance/Exemption/Other Compliance Schedule (V/E) Violation Determination

A variance generally allows a system to provide drinking water that may be above the MCL on the condition that the quality of the drinking water is still protective of public health. 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.

Small system variances are not available for any contaminant regulated under the Radionuclides Rule. However, all systems are eligible for general variances from the MCLs for gross alpha, combined radium (-226 & -228), uranium, and gross beta particle activity.

An exemption for the uranium MCL may be granted, allowing a system with compelling circumstances an extension of time before the system must comply with applicable SDWA § 1416 requirements. Gross alpha, combined radium (-226 & -228), and gross beta particle activity are ineligible for exemptions.

When a CWS does not adhere to the Variances, Exemptions and Other Compliance Schedules stated under 40 CFR 141.26 and 142.65, a violation must be reported to SDWIS/FED.

Section III - SDWIS/FED Data Transmittal explains in more detail how to report these data elements.

Refer to the *Implementation Guidance for Radionuclides* for more detailed information on small system compliance technologies, general variance requirements, and exemption criteria.

G. Return to Compliance (RTC) and Enforcement Actions

When a violation for the Radionuclides Rule is incurred, it must be reported to SDWIS/FED. When the State has determined that the system is no longer in violation and meets the criteria for RTC as specified below, it must report to SDWIS/FED an RTC properly linked to the respective violation(s).

Definitions for Compliance Achieved by Violation Type		
Violation Type	**Criteria for Violations**	**Criteria for Return to Compliance (RTC)**
	If...	***Then a system will be considered RTC when...***
MCL	*Initial Monitoring.* If the average of four quarters of initial monitoring exceeded the MCL	four consecutive quarterly samples are at or below the MCL.
	Reduced Monitoring. If the results of reduced monitoring exceeded the MCL	four consecutive quarterly samples are below the MCL.*
M/R	If a system failed to properly monitor or report	the system properly monitors and reports according to the requirements in 40 CFR 141.26 and 40 CFR 141.31.
Public Notice	If a system fails to properly deliver public notice	the system properly delivers public notice according to the requirements in 40 CFR 141.32.
Variance/Exemption/ Other Schedule	If a system fails to meet the conditions or schedules of a variance, exemption, or other compliance schedule	the system corrects the problem that caused the failure to meet the schedule, to the satisfaction of the State.
* The criteria for RTC for MCLs differs slightly, depending on whether the MCL was incurred during initial or reduced monitoring. This is a change from the 1976 Rule.		

As part of the Enforcement Action Escalation Policy, a State must state an escalating response to violations, consisting of informal follow-up and formal enforcement actions. That continues until the system either returns to compliance or is on a compliance schedule as part of a formal enforcement action taken by the State. Specific enforcement actions taken against violations for this Rule must be reported to SDWIS/FED, properly linked to the violations that caused the need for enforcement. Actions in bold and prefaced by an asterisk are required to be reported to SDWIS.

Follow-up Activities and Enforcement Actions			
St Violation/Reminder Notice	SIA	Fed Violation/Reminder Notice	EIA
St Compliance Meeting Conducted	SIB	Fed Compliance Meeting Conducted	EIB
St Tech Assistance Visit	SIC	Fed Tech Assistance Visit	EIC
St Site Visit (enforcement)	SID	Fed Site Visit (enforcement)	EID
St Public Notif Requested	SIE	Fed Public Notif Requested	EIE
St Public Notif Received	SIF	Fed Public Notif Received	EIF
St Public Notif issued	SFG	Fed Public Notif issued	EFG
St Boil Water Order	SFH	Fed Boil Water Order	EFH
***St Formal NOV issued SFJ**	**SFJ**	***Fed Formal NOV issued**	**EFJ**
St Show-cause Hearing	SFN	Fed Show-cause Hearing	EFN
***St BCA signed**	**SFK**	***Fed BCA signed**	**EFK**
***St AO (w/o penalty) issued**	**SFL**	***Fed PAO issued**	**EF!**
***St AO (w/penalty) issued**	**SFO**	***Fed FAO issued**	**EFL**
***St Admin Penalty assessed**	**SFM**	***Fed 1431 (Emergency) Order**	**EF/**
		***Fed CFP issued**	**EF<**
St Civil Case under development	SFP	***Fed CFP Consent Order/Decree w/penalty**	**EF-**
		***Fed CFP Default Judgement**	**EF=**
***St Civil Case Referred to AG**	**SF9**	***Fed Civil Case Referred to DOJ**	**EF9**
***St Civil Case filed SFQ**	**SFQ**	***Fed Civil Case filed**	**EFQ**
***St Civil Case concluded**	**SF%**	***Fed Civil Case concluded**	**EF%**
St Consent Decree/Judgement	SFR	Fed Consent Decree/Judgement	EFR
St Default Judgement	SFS	Fed Default Judgement	EFS
St Injunction	SFT	Fed Injunction	EFT
St Temp Restrain Order/Prelim Injunc	SFU	Fed Temp Restrain Order/Prelim Injunc	EFU
***St Crim Case referred to AG**	**SF&**	***Fed Crim Case referred to DOJ**	**EF&**
***St Crim Case filed**	**SFV**	***Fed Crim Case filed EFV**	**EFV**
***St Crim Case concluded**	**SFW**	***Fed Crim Case concluded EFW**	**EFW**
St Case appealed	SF3		
St Case dropped	SF4		
St Hook-up/Extension Ban	SF5		
***St Compliance achieved**	**SOX**	***Fed Compliance achieved**	**EOX**
***St Variance/Exemption issued**	**SOY**	***Fed Variance/Exemption issued**	**EOY**
St turbidity Waiver issued	SOZ	Fed Turbidity Waiver issued	EOZ
***St No addtl Formal Action needed**	**SO+**	***Fed No addtl Formal Action needed**	**EO+**
***St Intentional no-action**	**SO6**	***Fed Intentional no-action**	**EO6**
St Unresolved	SO7	Fed Unresolved	EO7
St Other	SO8	Fed Other	EO8

H. Linking Enforcement and Follow-up Actions, and RTC to Violations

All responses to violations (e.g., informal follow-up actions, formal enforcement, RTC) must be linked to the specific violations they address. The following describes the three appropriate ways in which these responses may be linked to violations:

Associated Violation IDs (Y5000) - FY & VIOLATION ID NUMBER.

Entering the specific violation ID(s) to which the enforcement action is related will establish a link between the enforcement record and each violation record matching the specific violation ID. If no links are established (reported violation IDs are not found or matched in the data base) the enforcement record will be posted to the data base and the link data will be rejected.[2]

Associated Violation Contaminant Groups (Z5000) - VIOLATION TYPE, CONTAMINANT, MONITORING PERIOD BEGIN DATE

Entering the Radionuclides violation type code, the contaminant code and the monitoring period begin date will establish a link between the enforcement action and all Radionuclides violations which exactly match the enforcement link data. If no matches are found, the enforcement record will be posted to the data base and the link data will be rejected.[2]

Associated J5000 Group (J5000) - VIOLATION TYPE, CONTAMINANT CODE, MONITORING PERIOD BEGIN DATE, ENFORCEABLE COMPLIANCE END DATE

Entering the ASSOCIATED J5000 GROUP data, which consists of Violation Type, Contaminant Code or Rule Code, Monitoring Period Begin Date, and Projected Compliance End Date, of those violations will establish a link between enforcement actions and violations.[3] If the violation record data exactly matches the specified ASSOCIATED J5000 GROUP, SDWIS/FED will automatically establish a link between the enforcement record and that violation record. If no exact matches are found, no links will be established, and the enforcement action will be rejected. J5000 cannot be used with EOX or SOX enforcements.

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[2]Corrections should be submitted to SDWIS/FED as soon as possible to provide the correct link data for the violation-to-violation and enforcement-to-violation records.

[3]Projected Compliance End Date can be the compliance due date associated with enforcement actions, or some other defined end date in the future.

The J5000 is only valid for long-term compliance issues and was intended for specific formal enforcement actions such as administrative orders, civil referrals, bilateral compliance agreements, and referrals to the Department of Justice. It is not intended for Notices of Violation, boil orders, etc. It is not appropriate for linking RTC records to violation. It was designed to capture violations during compliance periods where construction was required and additional violations would likely occur between the issuance of the formal action and the construction completion or compliance achievement date. If the system continues to have violations after the end date and the system has not RTC, the addressed flag in the SNC/Exceptions Tracking System reverts to unaddressed and will be displayed on the Management Tracking Report. This link method should be used cautiously. Again, it is not appropriate for RTC.

The Y5000 transaction link is the preferred method for linking enforcement actions to violations. Refer to the *SDWIS/FED Data Entry Instructions* for more detailed information on linking violations.

The Z5000 transaction link is not recommended for linking enforcement actions to violations and will be removed from SDWIS in the near future.

I. Public Notification

The Final Radionuclides Rule requires CWSs to provide a Tier 2 public notice (notice as soon as possible, within 30 days) for MCL violations and failure to comply with variance and exemption conditions. CWSs are to provide a Tier 3 public notice (annual notification) for M/R violations and operations under a variance and exemption (40 CFR Part 141, Subpart Q, Appendix A).

Violations of the Radionuclides Rule and the Public Notification Rule are required to be linked. Refer to the *State Implementation Guidance for the Public Notification (PN) Rule* for detailed information on reporting violation information to the general public.

J. Significant Noncomplier (SNC)

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/yr 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.

Refer to the *SDWIS/FED Data Entry Instructions* and the *SDWIS/FED Significant Non-Compliance Specifications* for more detailed information.

SNC Levels for Radionuclides

Contaminant Name	MCL	SNC
Combined Radium (-226 & -228)	5 pCi/L	10 pCi/L
Combined Uranium	30 µg/L	60 µg/L
Gross Alpha, Excluding Radon & Uranium	15 pCi/L	30 pCi/L
Man-Made Beta Particle & Photon Emitters	4 mrem/year	8 mrem/year
Tritium	n/a	n/a
Strontium-90	n/a	n/a
Iodine-131	n/a	n/a

III. SDWIS/FED Data Transmittal

The Data Transfer Format (DTF) is the only format by which data can be entered into the SDWIS/FED data base.

Each Data Transfer File record is 80 characters in length and has the following format:

Definition	Positions	Example
Form ID	1 - 2	D1
Qualifier 1	3 - 11	PWS-ID
Qualifier 2	12 - 18	VIOLATION-ID
Qualifier 3	19 - 25	
Action Code	26	D, I, or M*
Data Element Number	27 - 31	Cnnnn
Data Value	32 - 71	
Reserved for SDWIS/FED	72 - 74	
Batch Sequence Number	75 - 80	NNNNNN, where the batch date with format MMDDYY is suggested

* D = DELETE, I = INSERT, and M = MODIFY

FORM ID	DATA ADDRESS QUALIFIERS QUAL 1 QUAL 2 QUAL 3	ACT. CODE	DATA ELEM. NUM	DATA VALUE	N/A	Batch Sequence Number
1-2	3-11 12-18 19-25	26	27-31	32-71	72-74	75-80

The following table presents the SDWIS/FED violation record data elements for reporting Radionuclides Rule violations.

SDWIS/FED DTF C1100 - Violation Record Data Elements			
DTF Number	**Format**	**Description**	**Permissible Values**
C101	Character 9	PWS ID	Must be included within SDWIS/FED inventory
C1101	Character 7	Violation ID	Characters 1 & 2 must be the Federal fiscal year (FY) in which the violation was issued by the State or Federal agency
C1103	Character 4	Contaminant Code	4000=Gross Alpha 4010=Combined Radium (-226&-228) 4006=Combined Uranium 4101=Man-Made Beta Particle 4102=Tritium 4174=Strontium-90 4264=Iodine-131
C1105	Character 2	Violation Type Code	02=MCL, Average 03=M/R 06=Public Notice 08=Variance/Exemption
C1107	Date 8 (YYYYMMDD)	Monitoring Period Begin Date	Date monitoring period begins
C1109	Date 8 (YYYYMMDD)	Monitoring Period End Date	Date monitoring period ends

SDWIS/FED DTF C1100 - Violation Record Data Elements			
DTF Number	**Format**	**Description**	**Permissible Values**
C1123	Decimal 6.9	Analysis Result	Required for MCL violations only; Must be ≥ 0; Must be reported in same unit as MCL
C1125	Decimal 6.9	MCL Violated	Required when primacy agency has a different MCL than in the Federal regulations
C1131	Character 1	Major Violation Indicator	Required for M/R viols only; Y = Yes, a major M/R violation N = No, a minor M/R violation
C1143	Numeric 5	Source/Entity ID	Source/Entry ID must be included within SDWIS/FED inventory; **OR** blank

Note: SDWIS/FED DTF element C1111 - Monitoring Period Duration will not be stored in the SDWIS/FED database and will not be acceptable in SDWIS/FED as of January 2003.

The following table presents the SDWIS/FED Enforcement/Violation Link record data elements for linking Radionuclides Rule violations to enforcement actions.

SDWIS/FED DTF C1200 - Enforcement/Violation Link Record Data Elements			
DTF Number	Format	Description	Permissible Values
C1201	Character 7 (YYNNNNN)	Enforcement ID	Uniquely identifies a specific enforcement action taken by a State or Federal agency. Characters 1 & 2 must be the Federal fiscal year (FY) in which the enforcement action was taken Characters 3 through 7 contain a unique identification number for each enforcement action for the PWS for the Federal fiscal year.
C1203	Date 8 (YYYYMMDD)	Enforcement Action Date	Calendar date on which an enforcement action was taken by the State or Federal agency against a public water system
C1205	Character 3	Enforcement Action Type Code	Refer to Section II-G of this document or the *SDWIS/FED Online Data Dictionary* for the listing of valid action codes
Y5000	Character 40	Enforcement Link to Violation ID	The specific violation ID to which the enforcement action is related
Z5000	Character 40	Enforcement Link to Violation Contaminant Group	The associated violation contaminant group data (violation type; contaminant code; and monitoring period begin date) of those violations to be linked to an enforcement action
J5000	Character 40	Enforcement Link to Violation J5000 Group	The associated J5000 group data (violation type; contaminant code or rule code; enforcement action begin date; enforceable compliance date) of those violations to be linked to an enforcement action

IV. Sources for Additional Information

Additional technical information on SDWIS/FED reporting information can be obtained by contacting Valerie Love-Smith of the Infrastructure Program, Drinking Water Protection Division, Office of Ground Water and Drinking Water at (202)-564-4630, or from the following resources:

- SDWIS/FED Internet Site (www.epa.gov/safewater/sdwisfed/sdwis.htm).
- *SDWIS/FED Data Entry Instructions*. July 23, 2001.
- *SDWIS/FED Online Data Dictionary*. July 23, 2001.
- *SDWIS/FED Significant Non-Compliance Specifications.* February 4, 2002.
- *Implementation Guidance for Radionuclides*. March 2002.
- Radionuclides Internet Site (www.epa.gov/safewater/rads/implement.html).
- *Radionuclides Final Rule*. EPA-815-Z-00-006. December 7, 2000.
- *Radionuclides Rule: A Quick Reference Guide.* EPA-816-F-01-003. January 2001.
- *Technical Fact Sheet: Final Rule for (Non-Radon) Radionuclides in Drinking Water*. EPA-815-F-00-013. November 2000.
- *State Implementation Guidance for Public Notification (PN) Rule.* See www.epa.gov/safewater/pn.html
- *Water Supply Guidance Manual.* EPA-816-R-00-003. January 2000.

SDWIS/FED Regional Coordinators	
Region 1 Josh Nemzer 617-918-1961	Region 2 Mark Rasso 212-637-3839
Region 3 Jackie Pine 215-814-5782	Region 4 Charlie O'Donnell 404-562-9762
Region 5 Kris Werbach 312-886-6527	Region 6 Andrew Waite 214-665-7332
Region 7 Carolyn Mitchell 913-551-7187	Region 8 Rich Gomez 303-312-7073
Region 9 Mark Rathbun 415-744-1840	Region 10 Jane Schuster 206-553-1096

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Appendix A
Monitoring, Reporting, and Compliance Determination Examples

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Example 1 - "Major" M/R Violation

On June 3, 2005, a "new" ground water (GW) system MD5234590 with one sampling site begins to collect its four consecutive quarterly samples of gross alpha, radium-226, radium-228, and uranium during the initial monitoring period of December 8, 2003, to December 31, 2007.[1]

Example 1 - Initial Monitoring Results

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 5	Annual
	6/03/05	9/10/05	12/12/05	3/31/06	5/30/06	Average
Gross Alpha	7 ± 2 pCi/L	6 ± 2 pCi/L	7 ± 1 pCi/L	7 ± 2 pCi/L	n/a	7 pCi/L
Radium-226	no sample	2 ± 2 pCi/L	1 ± 1 pCi/L	2 ± 1 pCi/L	1 ± 2 pCi/L	-
Radium-228	3 ± 2 pCi/L	2 ± 2 pCi/L	3 ± 2 pCi/L	2 ± 2 pCi/L	3 ± 2 pCi/L	-
Radium -226/-228	-	4 pCi/L	4 pCi/L	4 pCi/L	4 pCi/L	4 pCi/L
Uranium	7 µg/L	7 µg/L	7 µg/L	6µg/L	n/a	7 µg/L

Monitoring Schedule based upon Initial Monitoring Results:

Gross Alpha - The gross alpha annual average of 7 pCi/L (do not add or subtract the ± values) is between the gross alpha DL (3 pCi/L) and ½ the MCL; therefore, the system reduces monitoring for gross alpha to one sample every six years (i.e., the next sample must be collected between 2008 and 2013).[2]

Combined Radium-226/228 - The combined radium (-226 & -228) annual average of 4 pCi/L (do not add or subtract the ± values) is greater than ½ the MCL but less than the MCL. The system must collect one sample every three years (next sample required between 2008 and 2010).[3]

[1]New CWS without acceptable historical data must collect four consecutive quarterly samples at all sampling points as defined in 40 CFR 141.26(a)(1)(ii) and 141.26(a)(2)(i).

[2]States may allow CWS to reduce the future monitoring frequency to once every six years at each sampling point as defined in 40 CFR 141.26(a)(3)(ii).

[3]States may allow CWS to reduce the future monitoring frequency to once every three years at each sampling point as defined in 40 CFR 141.26(a)(3)(iii).

Uranium - The uranium annual average of 7 µg/L is less than ½ the MCL, thereby allowing the system to reduce monitoring for uranium to one sample every six years (i.e., the next sample must be collected between 2008 and 2013).

Violation Determination and Reporting:

The resultant rounded annual average of each contaminant is below the MCL, therefore, no MCL violations are incurred. The system failed to collect a combined radium (-226 & -228) sample during the monitoring period of 4/01/05 to 6/30/05. M/R violations are to be reported using the major and minor severity indicators. A major M/R violation is defined as "no" samples were collected/reported during the monitoring period. A minor M/R violation is defined as "some, but not all" samples were collected/reported during the monitoring period. In this example the system failed to collect any combined radium (-226 & -228) samples during the monitoring period and would therefore receive a major M/R violation.

The State, reporting at the system level, would report the following violation information:

1- Combined Radium (-226 & -228) Major M/R Violation incurred during the 1st quarter (4/1/05 - 6/30/05)

Example 1 - Major M/R Violation Record		
C1101	0555111	Violation ID
C1103	4010	Contaminant Code
C1105	03	Violation Type Code
C1107	20050401	Monitoring Period Begin Date
C1109	20050630	Monitoring Period End Date
C1131	Y	Major Violation Indicator

The DTF transactions for this violation are:

Example 1 - SDWIS/FED DTF Transactions					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5234590	0555111		IC1103	4010
D1	MD5234590	0555111		IC1105	03
D1	MD5234590	0555111		IC1107	20050401
D1	MD5234590	0555111		IC1109	20050630
D1	MD5234590	0555111		IC1131	Y

Example 2 - MCL Violation

A GW system MD5234590 serving 1,510 people has been in operation since 1994. The system has one sampling site (#34555). On July 17, 2004, the system starts collecting its four consecutive quarterly samples of gross alpha, radium-226, radium-228 and uranium during the Rule initial monitoring period of December 8, 2003 to December 31, 2007.[4]

Example 2 - Initial Monitoring Results

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
	7/17/04	10/12/04	1/23/05	4/07/05	Average
Gross Alpha	10 ± 2 pCi/L	12 ± 1 pCi/L	11 ± 2 pCi/L	13 ± 1 pCi/L	12 pCi/L
Radium-226	1 ± 1 pCi/L	1 ± 1 pCi/L	1 ± 1 pCi/L	1 ± 1 pCi/L	-
Radium-228	1 ± 1 pCi/L	1 ± 1 pCi/L	1 ± 1 pCi/L	1 ± 1 pCi/L	-
Radium-226/228	2 ± 1 pCi/L	2 ± 1 pCi/L	2 ± 1 pCi/L	2 ± 1 pCi/L	2 pCi/L
Uranium	34 µg/L	32 µg/L	31 µg/L	30 µg/L	32 µg/L

Monitoring Schedule based upon Initial Monitoring Results:

Gross Alpha - The annual average of 12 pCi/L is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years (next sample required between 2008 and 2010).

Combined Radium-226/228 - The annual average of 2 pCi/L is between the DL and ½ the MCL. The system is allowed to reduce monitoring to one sample every six years (i.e., the next sample is due between 2008 and 2013).

Uranium - The annual average of 32 µg/L is greater than the MCL. The system must collect quarterly samples until four consecutive quarterly results are less than or equal to the MCL, or the State specifies a different monitoring frequency as part of a formal compliance agreement.[5]

[4] A CWS without acceptable historical data must collect four consecutive quarterly samples at all sampling points as defined in 40 CFR 141.26(a)(2)(i).

[5] 40 CFR 141.26(a)(2)(iv).

Violation Determination and Reporting:

After collecting four consecutive quarters of radionuclide data, the system can compute its running annual average. The annual average for uranium (after rounding) is above the MCL, therefore, the system would incur an MCL violation. The system collected all of its required radionuclide samples and has incurred no M/R violations.

The State, reporting by sampling point, would report the following violation information:

1 - Uranium MCL Violation of 32 µg/L incurred during qtr 4 (4/1/05 - 6/30/05)

Example 2 - MCL Violation Record		
C1101	0555333	Violation ID
C1103	4006	Contaminant Code
C1105	02	Violation Type Code
C1107	20050401	Monitoring Period Begin Date
C1109	20050630	Monitoring Period End Date
C1123	32	Analysis Result
C1143	34555	Source/Entity ID*

*The Source/Entity ID must exist within SDWIS/FEDs inventory or the record(s) will be rejected [e.g., source/entity #34555 must already be defined as an entry point for this system (MD5234590) prior to entering violation data].

The DTF transactions for this violation are:

Example 2 - SDWIS/FED DTF Transactions					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5234590	0555333		IC1103	4006
D1	MD5234590	0555333		IC1105	02
D1	MD5234590	0555333		IC1107	20050401
D1	MD5234590	0555333		IC1109	20050630
D1	MD5234590	0555333		IC1123	32
D1	MD5234590	0555333		IC1143	34555

Example 3 - Multiple Entry Points

A surface water (SW) system serving 5,332 people has been in operation since 1995. The system has two sampling sites, identified as Samplesite-1 and Samplesite-2. At each sampling site, the system has collected the last of its four consecutive quarterly radionuclide samples on March 23, 2007, during the Rule initial monitoring period of December 8, 2004, to December 31, 2007.

Initial Annual Average Monitoring Results:

Samplesite-1	Samplesite-2
Gross Alpha = 10 pCi/L	Gross Alpha = 4 pCi/L
Radium-226 = 1 pCi/L	Radium-226 < 1 pCi/L
Radium-228 = 2 pCi/L	Radium-228 < 1 pCi/L
Uranium = ND	Uranium = ND

Monitoring Schedule based upon Initial Monitoring Results:

Samplesite-1

Gross Alpha - The annual average is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years (next sample required between 2008 and 2010).

Combined Radium-226/228 - The annual average is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years.

Uranium - The annual average is less than the regulatory DL.[6] The system must collect a sample once every nine years (next sample must be collected between 2008 and 2016).[7]

Samplesite-2

Gross Alpha - The annual average is greater than the regulatory DL but less than ½ the MCL. The system must collect a sample once every six years (next sample required between 2008 and 2013).

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[6]Compliance is determined based upon the DLs as defined in 40 CFR 141.25(c)(1)(Table B). The Agency will propose a DL for uranium in a future rule before the effective date of the Radionuclides Rule.

[7]States may allow CWSs to reduce the future monitoring frequency to once every nine years at each sampling point as defined in 40 CFR 141.26(a)(3)(i).

Combined Radium-226/228 - The annual average is less than the regulatory DL. The system must collect a sample once every nine years.

Uranium - The annual average is less than the regulatory DL. The system must collect a sample once every nine years.

The system collected all required radionuclide samples and had no MCL exceedances, therefore, the system is in compliance with the Rule and has no violations to be reported to SDWIS/FED.

Example 4 - MCL Violations at Multiple Entry Points

A GW system serving 3,862 people has been in operation since 1995. The system has two sampling sites, identified as Samplesite-98775 and Samplesite-98766. The system has collected gross alpha samples from a representative point in the distribution system for the three compliance periods under the existing (1976) Radionuclides Rule (1992-1996, 1996-2000, 2000-2004). The system has been in compliance with the existing Rule.

- The gross alpha levels have exceeded the trigger of 5 pCi/L
- Radium-226 levels have not exceeded 3 pCi/L, so the system has been in compliance with the existing Rule.
- The system does not collect any radium-228 samples prior to the effective date of the Radionuclides Rule.

The State has made a written finding that the samples collected from the distribution system during the 2000-2004 compliance period under the existing Rule are representative of both entry points and allows the system to grandfather the gross alpha and radium-226 data (gross alpha = 10 ± 1 pCi/L, and radium = 3 ± 1 pCi/L). The system decides not to use gross alpha as a surrogate for uranium. The system starts collecting quarterly samples for radium-228 and uranium beginning September 3, 2006, at each sampling point, since they did not have grandfatherable data for these two contaminants.

Example 4 - Initial Monitoring Results

	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
	9/3/06	12/19/06	3/07/07	6/16/07	Average
Radium 228 (SS-98775)	6 pCi/L	5 pCi/L	4 pCi/L	3 pCi/L	----
Radium 226/228 (SS-98775)	9 pCi/L	8 pCi/L	7 pCi/L	6 pCi/L	8 pCi/L
Uranium (SS-98775)	ND	ND	waived[8]	waived[8]	ND
Radium 228 (SS-98766)	4 pCi/L	4 pCi/L	4 pCi/L	4 pCi/L	----
Radium 226/228 (SS-98766)	7 pCi/L	7 pCi/L	7 pCi/L	7 pCi/L	7 pCi/L
Uranium (SS-98766)	35 µg/L	38 µg/L	40 µg/L	38 µg/L	38 µg/L

[8]States may waive the final two quarters of initial monitoring if the results of the first two quarters are below the DL. The system is then required, under the reduced monitoring requirements, to sample once every nine years (40 CFR 141.26(a)(2)(iii)).

Quarterly combined radium (-226 & -228) results were calculated by adding the grandfathered radium-226 result of 3 pCi/L to the quarterly radium-228 sample results.

Monitoring Schedule based upon Initial Monitoring Results:

Samplesite-98775

Gross Alpha - The grandfathered result of 10 pCi/L is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years (i.e., the next sample must be collected between 2008 and 2010).

Combined Radium-226/228 - The annual average of 8 pCi/L is greater than the MCL. The system must collect quarterly samples until four consecutive quarterly results are less than or equal to the MCL, or until the State specifies a different monitoring frequency as part of a formal compliance agreement.

Uranium - Uranium was not detected at this entry point. The system must collect a sample once every nine years (i.e., the next sample must be collected between 2008 and 2016).

Samplesite-98766

Gross Alpha - The grandfathered result of 10 pCi/L is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years (i.e., the next sample must be collected between 2008 and 2010).

Combined Radium-226/228 - The annual average of 7 pCi/L is greater than the MCL. The system must collect quarterly samples until four consecutive quarterly results are less than or equal to the MCL, or until the State specifies a different monitoring frequency as part of a formal compliance agreement.

Uranium - The annual average of 38 µg/L is greater than the MCL. The system must collect quarterly samples until four consecutive quarterly results are less than or equal the MCL, or until the State specifies a different monitoring frequency as part of a formal compliance agreement.

Violation Determination and Reporting:

If Reporting Violations by System:

1 - Combined Radium (-226 & -228) MCL Violation of 8 pCi/L for the 4th qtr at Samplesite-98775

1 - Uranium MCL Violation of 38 µg/L 4th qtr at Samplesite-98766

(Even though both entry points had MCL violations for combined radium (-226 & -228) during the same monitoring period, the State only has to report the highest concentration for each contaminant for each monitoring period, if reporting at the system level.)

The DTF transactions for this violation are:

Example 4 - SDWIS/FED DTF Transactions (by System)					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5612950	0755444		IC1103	4010
D1	MD5612950	0755444		IC1105	02
D1	MD5612950	0755444		IC1107	20070401
D1	MD5612950	0755444		IC1109	20070630
D1	MD5612950	0755444		IC1123	8
D1	MD5612950	0755555		IC1103	4006
D1	MD5612950	0755555		IC1105	02
D1	MD5612950	0755555		IC1107	20070401
D1	MD5612950	0755555		IC1109	20070630
D1	MD5612950	0755555		IC1123	38

If Reporting Violations by Sampling Point: The State has to report three MCL violations.

1 - Radium-226/228 MCL Violation of 8pCi/L for the 4th qtr at Samplesite-98775

1 - Radium-226/228 MCL Violation of 7pCi/L for the 4th qtr at Samplesite-98766

1 - Uranium MCL Violation of 38 µg/L for the 4th qtr at Samplesite-98766

Example 4 - SDWIS/FED DTF Transactions (by Sampling Point)					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5612950	0755444		IC1103	4010
D1	MD5612950	0755444		IC1105	02
D1	MD5612950	0755444		IC1107	20070401
D1	MD5612950	0755444		IC1109	20070630
D1	MD5612950	0755444		IC1123	8
D1	MD5612950	0755444		IC1143	98775
D1	MD5612950	0755555		IC1103	4010
D1	MD5612950	0755555		IC1105	02
D1	MD5612950	0755555		IC1107	20070401
D1	MD5612950	0755555		IC1109	20070630
D1	MD5612950	0755555		IC1123	7
D1	MD5612950	0755555		IC1143	98766
D1	MD5612950	0755666		IC1103	4006
D1	MD5612950	0755666		IC1105	02
D1	MD5612950	0755666		IC1107	20070401
D1	MD5612950	0755666		IC1109	20070630
D1	MD5612950	0755666		IC1123	38
D1	MD5612950	0755666		IC1143	98766

Example 5 - M/R Violation Determination at Multiple Entry Points

SW system #MD4001320 samples for combined radium, which has an MCL of 5 pCi/L. The samples are taken from three different sampling points within the system.

A major M/R violation is defined as "no" samples collected/reported during the monitoring period. A minor M/R violation is defined as "some, but not all" samples collected/reported during the monitoring period.

Example 5 - Monitoring Results

	Monitoring Period	EP-1	EP-2	EP-3
Quarter 1	7/1/04 - 9/30/04	sampled	sampled	sampled
Quarter 2	10/1/04 - 12/31/04	no sampling	no sampling	no sampling
Quarter 3	1/1/05 - 3/31/05	sampled	no sampling	no sampling
Quarter 4	4/1/05 - 6/30/05	sampled	sampled	no sampling
Quarter 5	7/1/05 - 9/30/05	sampled	sampled	sampled
Quarter 6	10/1/05 - 12/31/05	N/A	sampled	sampled
Quarter 7	1/1/06 - 3/31/06	N/A	N/A	sampled
Quarter 8	4/1/06 - 6/30/06	N/A	N/A	N/A

Note: Monitoring is completed at EP-1 by the end of the 5th quarter, at EP-2 by the end of the 6th quarter, and at EP-3 by the end of the 7th quarter.

If reporting violations by system:

- One major M/R violation during quarter 2.
- One minor M/R violation during quarter 3.
- One minor M/R violation during quarter 4.
- No violations during quarters 1, 5, 6, 7, or 8.

Example 5 - SDWIS/FED DTF Transactions (by System)					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5612950	0555444		IC1103	4000
D1	MD5612950	0555444		IC1105	03
D1	MD5612950	0555444		IC1107	20041001
D1	MD5612950	0555444		IC1109	20041231
D1	MD5612950	0555444		IC1131	Y
D1	MD5612950	0555555		IC1103	4000
D1	MD5612950	0555555		IC1105	03
D1	MD5612950	0555555		IC1107	20050101
D1	MD5612950	0555555		IC1109	20050331
D1	MD5612950	0555555		IC1131	N
D1	MD5612950	0555556		IC1103	4000
D1	MD5612950	0555556		IC1105	03
D1	MD5612950	0555556		IC1107	20050401
D1	MD5612950	0555556		IC1109	20050630
D1	MD5612950	0555556		IC1131	N

If reporting violations by sampling point:

- Three major M/R violations (one at each entry point) during quarter 2.
- Two major M/R violations (one each at entry points 2 and 3) during quarter 3.
- One major M/R violation (at entry point 3) during quarter 4.
- No violations at any entry point during quarters 1, 5, 6, 7, or 8.

Example 5 - SDWIS/FED DTF Transactions (by Sampling Point)					
Positions 1-2	Positions 3-11	Positions 12-18	Positions19-25	Positions 26-31	Positions 32-71
D1	MD5612950	0555444		IC1103	4000
D1	MD5612950	0555444		IC1105	03
D1	MD5612950	0555444		IC1107	20041001
D1	MD5612950	0555444		IC1109	20041231
D1	MD5612950	0555444		IC1131	Y
D1	MD5612950	0555444		IC1143	1
D1	MD5612950	0555444		IC1103	4000
D1	MD5612950	0555444		IC1105	03
D1	MD5612950	0555444		IC1107	20041001
D1	MD5612950	0555444		IC1109	20041231
D1	MD5612950	0555444		IC1131	Y
D1	MD5612950	0555444		IC1143	2
D1	MD5612950	0555444		IC1103	4000
D1	MD5612950	0555444		IC1105	03
D1	MD5612950	0555444		IC1107	20041001
D1	MD5612950	0555444		IC1109	20041231
D1	MD5612950	0555444		IC1131	Y
D1	MD5612950	0555444		IC1143	3
D1	MD5612950	0555555		IC1103	4000
D1	MD5612950	0555555		IC1105	03
D1	MD5612950	0555555		IC1107	20050101
D1	MD5612950	0555555		IC1109	20050331
D1	MD5612950	0555555		IC1131	Y
D1	MD5612950	0555555		IC1143	2
D1	MD5612950	0555555		IC1103	4000
D1	MD5612950	0555555		IC1105	03
D1	MD5612950	0555555		IC1107	20050101
D1	MD5612950	0555555		IC1109	20050331
D1	MD5612950	0555555		IC1131	Y
D1	MD5612950	0555555		IC1143	3
D1	MD5612950	0555556		IC1103	4000
D1	MD5612950	0555556		IC1105	03
D1	MD5612950	0555556		IC1107	20050401
D1	MD5612950	0555556		IC1109	20050630
D1	MD5612950	0555556		IC1131	Y
D1	MD5612950	0555556		IC1143	3

Example 6 - M/R Violation while on Reduced Monitoring

GW system #MD5234577 with one sampling site completed its initial radionuclides monitoring on November 10, 2005. The system was placed on a reduced monitoring schedule of one sample every six years for gross alpha, combined radium (-226 & -228), and uranium. On December 31, 2013, the system obtained the following sample results:

Monitoring Results:

Gross Alpha = 7 ± 2 pCi/L

Uranium = 7 µg/L

Monitoring Schedule:

Gross Alpha - The gross alpha value of 7 pCi/L is between the gross alpha DL (3 pCi/L) and ½ the MCL; therefore, the system continues to monitor for gross alpha once every six years (i.e., the next sample must be collected between 2014 and 2019).

Uranium - The uranium value of 7 µg/L is less than ½ the MCL, and the system is allowed to continue reduced monitoring for uranium at once every six years (i.e., the next sample must be collected between 2014 and 2019).

Violation Determination and Reporting:

Combined Radium-226/228 - The system failed to collect a combined radium (-226 & -228) sample during the monitoring period of 1/01/08 to 12/31/13.

The State, would report a major M/R Violation for combined radium (-226 & -228) incurred during the six-year monitoring period of 1/01/08 to 12/31/13.

The DTF transactions for this violation are:

Example 6 - SDWIS/FED DTF Transactions

Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD5234577	1400111		IC1103	4010
D1	MD5234577	1400111		IC1105	03
D1	MD5234577	1400111		IC1107	20080101
D1	MD5234577	1400111		IC1109	20131231
D1	MD5234577	1400111		IC1131	Y

Example 7 - MCL Violation Determination

GW system #MD4782412 samples for combined radium, which has an MCL of 5 pCi/L. The system has one sampling point.

Example 7 - Monitoring Results

	Monitoring Period	Result	MCL Violated	Rounded Annual Average
Quarter 1	7/1/04 - 9/30/04	6 pCi/L	No	N/A
Quarter 2	10/1/04 - 12/31/04	7 pCi/L	No	N/A
Quarter 3	1/1/05 - 3/31/05	7 pCi/L	No	N/A[9]
Quarter 4	4/1/05 - 6/30/05	5 pCi/L	Yes	6 pCi/L
Quarter 5	7/1/05 - 9/30/05	1 pCi/L	No	5 pCi/L
Quarter 6	10/1/05 - 12/31/05	10 pCi/L	Yes	6 pCi/L
Quarter 7	1/1/06 - 3/31/06	3 pCi/L	No	5 pCi/L
Quarter 8	4/1/06 - 6/30/06	8 pCi/L	Yes	6 pCi/L

<u>If reporting violations by system OR sampling point</u>:

- One MCL violation during quarter 4.
- One MCL violation during quarter 6.
- One MCL violation during quarter 8.
- No violations during quarters 1, 2, 3, 5 or 7.

[9]Note: At the end of quarter 3, the running annual average was equal to 5 pCi/L, which was at but not above the MCL, so no violation was incurred.

Example 8 - Annual Average Determination

GW system #MD4782412 samples for combined radium, which has an MCL of 5 pCi/L. The system has one sampling point.

Example 8 - Monitoring Results

	Monitoring Period	Result	MCL Violated	Rounded Annual
Quarter 1	7/1/04 - 9/30/04	24 pCi/L	Yes	6 pCi/L*
Quarter 2	10/1/04 - 12/31/04	6 pCi/L	Yes	8 pCi/L*
Quarter 3	1/1/05 - 3/31/05	2 pCi/L	Yes	8 pCi/L*
Quarter 4	4/1/05 - 6/30/05	4 pCi/L	Yes	9 pCi/L
Quarter 5	7/1/05 - 9/30/05	2 pCi/L	No	4 pCi/L
Quarter 6	10/1/05 - 12/31/05	10 pCi/L	No	5 pCi/L
Quarter 7	1/1/06 - 3/31/06	9 pCi/L	Yes	6 pCi/L
Quarter 8	4/1/06 - 6/30/06	3 pCi/L	Yes	6 pCi/L

* During quarters 1, 2, and 3, the system had quarterly results that were so great that they caused the system to be in violation before the annual compliance period was complete.[10]

<u>If reporting violations by system OR sampling point</u>:

- One MCL violation during quarter 1.
- One MCL violation during quarter 2 .
- One MCL violation during quarter 3 .
- One MCL violation during quarter 4 .
- One MCL violation during quarter 7 .
- One MCL violation during quarter 8.
- No violations during quarters 5 or 6.

[10]The system is out of compliance immediately, if any sample result causes the running annual average to exceed the MCL as stated in 40 CFR 141.26(c)(3)(ii).

Example 9 - MCL Violations & RTC

System with MD1011100 has one sampling site (#1). While on reduced monitoring, sample results exceeded the radium-226/228 MCL of 5 pCi/L, so the system was placed on quarterly monitoring for radium 226/228.[11]

Example 9 - Monitoring Results

	Monitoring Period	Result	MCL Violated	Rounded Annual
Quarter 1	7/1/08 - 9/30/08	0 pCi/L	No	N/A*
Quarter 2	10/1/08 - 12/31/08	6 pCi/L	No	N/A*
Quarter 3	1/1/09 - 3/31/09	16 pCi/L	Yes	6 pCi/L*
Quarter 4	4/1/09 - 6/30/09	6 pCi/L	Yes	7 pCi/L*
Quarter 5	7/1/09 - 9/30/09	0 pCi/L	Yes	7 pCi/L*
Quarter 6	10/1/09 - 12/31/09	0 pCi/L	Yes	6 pCi/L*
Quarter 7	1/1/010 - 3/31/10	6 pCi/L	No	3 pCi/L*
Quarter 8	4/1/10 - 6/30/10	8 pCi/L	No	4 pCi/L*
Quarter 9	7/1/10 - 9/30/10	2 pCi/L	No	4 pCi/L*
Quarter 10	10/1/10 - 12/31/10	1 pCi/L	No	4 pCi/L

*Values of zero are used to calculate the running annual average when the result is less than the DL.[12]

[11]If a monitoring result exceeds the MCL while on reduced monitoring, the system must collect and analyze quarterly samples at that sampling point until results from four consecutive quarters are below the MCL as stated in 40 CFR 141.26 (a)(3)(v).

[12]40 CFR 141.26(c)(3)(v).

Example 9 - SDWIS/FED DTF Violation Transactions					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
D1	MD101110	0910001		IC1103	4010
D1	MD101110	0910001		IC1105	02
D1	MD101110	0910001		IC1107	20090101
D1	MD101110	0910001		IC1109	20090331
D1	MD101110	0910001		IC1123	6
D1	MD101110	0910001		IC1143	00001
D1	MD101110	0910001		IC1103	4010
D1	MD101110	0910001		IC1105	02
D1	MD101110	0910001		IC1107	20090401
D1	MD101110	0910001		IC1109	20090630
D1	MD101110	0910001		IC1123	7
D1	MD101110	0910001		IC1143	00001
D1	MD101110	0910001		IC1103	4010
D1	MD101110	0910001		IC1105	02
D1	MD101110	0910001		IC1107	20090701
D1	MD101110	0910003		IC1109	20090930
D1	MD101110	0910003		IC1123	7
D1	MD101110	0910003		IC1143	00001
D1	MD101110	1010004		IC1103	4010
D1	MD101110	1010004		IC1105	02
D1	MD101110	1010004		IC1107	20091001
D1	MD101110	1010004		IC1109	20091231
D1	MD101110	1010004		IC1123	6
D1	MD101110	1010004		IC1143	00001

Because the running annual averages for quarters 7, 8, 9, and 10 are below the MCL, the State determines that the system has returned to compliance as of 12/31/10 for these violation. The State reports the RTC properly linked to the violations using the preferred Y5000 linking method:

Example 9 - SDWIS/FED DTF RTC Transactions					
Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
E1	MD1011100	1100001		IC1203	20101231
E1	MD1011100	1100001		IC1205	SOX
E1	MD1011100	1100001		IY5000	1010004

Alternatively, the State could have reported the RTC via the Z5000 linking method:

Positions 1-2	Positions 3-11	Positions 12-18	Positions 19-25	Positions 26-31	Positions 32-71
E1	MD1011100	1100001		IC1203	20101231
E1	MD1011100	1100001		IC1205	SOX
E1	MD1011100	1100001		IZ5000	2401020090101

Example 10 - Compliance Determination

GW system MD5234590 serving 1,510 people has been in operation since 1994. The system only has one sampling site. The system has collected gross alpha samples for two compliance periods under the existing Radionuclides Rule (1992-1996, 1996-2000). The average gross alpha value for these periods was 4 pCi/L, so no radium-226 or radium-228 monitoring was required under the 1976 regulations. The State has informed the system that the Rule will not be effective until December 8, 2003. The State tells the system that if it collects samples for gross alpha, radium-226, and radium-228, and uranium between June 2000 and December 8, 2003, then it may be able to grandfather this data and not be subject to the initial quarterly monitoring requirements. The system collects samples for gross alpha, radium-226 and radium-228 on July 17, 2002, at its sampling point. Since all previous gross alpha results were less than 15 pCi/L, the system elects to use gross alpha as a surrogate for uranium.

July 17, 2002, Results:[13]

Gross Alpha = 4 ± 1 pCi/L

Radium-226 = 1 ± 1 pCi/L

Radium-228 = 2 ± 1 pCi/L

Uranium = Not measured. The gross alpha value of 4 ± 1 is used as a surrogate for uranium.

The system is in compliance with the existing Rule for the 2000-2004 compliance period (i.e., 1976 regulations). When the revised Radionuclides Rule becomes effective December 8, 2003, the system will be able to grandfather these data for the initial monitoring period of December 8, 2003, to December 31, 2007.

Monitoring Schedule:

Gross Alpha - The result is greater than the DL but less than ½ the MCL. The system must collect a sample once every six years (i.e., the next sample is due between 2008 and 2013).

Combined Radium (-226 & -228) - The result is greater than ½ the MCL but less than the MCL. The system must collect one sample every three years (i.e., the next sample is due between 2008 and 2010).

Uranium - Using gross alpha as a surrogate for uranium, the system assumes a value of 4 pCi/L. Since the gross alpha value is less than ½ the MCL for uranium, an activity to mass ratio of 1:1 is assumed and a value of 4µg/L is used for determining reduced monitoring for uranium (40 CFR 141.26(a)(5). Since 4 µg/L is between the DL and ½ the MCL, the system is allowed to reduce monitoring for uranium to one sample every six years (i.e., the next sample is due between 2008 and 2013).

[13]The Agency is encouraging systems to monitor early to ensure sufficient time for contingency planning.

Example 11 - Using Grandfathered Data

GW system MD5234590 serving 1,510 people has been in operation since 1994. The system has one sampling site (#34555). The system has collected gross alpha and radium-226 samples for two compliance periods under the existing Radionuclides Rule (1992-1996, 1996-2000). The State has informed the system that the revised Rule will not be effective until December 8, 2003. The State tells the system that if it collects samples for gross alpha, radium-226, radium-228, and uranium between June 2000 and December 8, 2003, then it may be able to grandfather these data and not be subject to the initial quarterly monitoring requirements. Since all previous gross alpha results were less than 15 pCi/L, the system elects to use gross alpha as a surrogate for uranium. The system collects samples for gross alpha, radium-226, and radium-228 on July 17, 2002, at its sampling point.

Results:
Gross Alpha = 12 ± 1 pCi/L
Radium-226 = 3 ± 1 pCi/L
Radium-228 = 6 ± 1 pCi/L[14]

Monitoring Schedule:
Gross Alpha - The result of 12 pCi/L is greater than ½ the MCL but less than the MCL. The system must collect a sample once every three years (the next sample is required between 2008 and 2010).

Combined Radium (-226 & -228) - The result of 9 pCi/L is greater than the MCL; therefore, these results do not satisfy the initial monitoring requirements. The system must collect four consecutive quarterly samples at its sampling point during the initial compliance period of December 8, 2003, to December 31, 2007.[15]

Uranium - Using gross alpha as a surrogate, the system assumes a value of 12 pCi/L. Since the gross alpha value is less than ½ the MCL for uranium, an activity to mass ratio of 1:1 is assumed and a value of 12 µg/L is used for determining reduced monitoring. Since 12 µg/L is below ½ the MCL, the system is allowed to reduce monitoring for uranium to one sample every six years (the next sample is required between 2008 and 2013).

The system is in compliance with the current Rule. The State does not need to report any violations to SDWIS/FED.

---

[14]Since the system was not required to monitor for radium-228 under the existing Rule, the system would not receive a combined radium 226/228 violation.

[15]CWSs without acceptable historical data must collect four consecutive quarterly samples at all sampling points as defined in 40 CFR 141.26(a)(2)(i).

Example 12 - More on Grandfathered Data

GW system MD5234590 serving 1,510 people has been in operation since 1994. The system only has one sampling site. The system has collected gross alpha and radium-226 samples for two compliance periods under the existing Radionuclides Rule (1992-1996, 1996-2000). The State has informed the system that the revised Rule will not be effective until December 8, 2003. The State tells the system that if it collects samples for gross alpha, radium-226, radium-228, and uranium between June 2000 and December 8, 2003, then it may be able to grandfather these data and not be subject to the initial quarterly monitoring requirements. The system collects samples for gross alpha, radium-226, radium-228, and uranium on August 3, 2001, at its sampling point.

August 3, 2001, Results:
Measured gross alpha = 41 ± 1 pCi/L
Gross alpha (excluding uranium) = 41 pCi/L - 29 pCi/L = 12 pCi/L
Radium-226 = < 1 pCi/L
Radium-228 = < 1 pCi/L
Uranium = 32 µg/L and 29 ± 3 pCi/L (mass spec)

The system is in compliance with the existing Rule for the 2000-2004 compliance period (i.e., 1976 regulations). When the revised Radionuclides Rule becomes effective December 8, 2003, the system will be able to grandfather these data for the initial monitoring period of December 8, 2003, to December 31, 2007.

Monitoring Schedule:
Gross Alpha - For determining compliance with the gross alpha MCL, uranium should be excluded from the calculation (41 pCi/L - 29 pCi/L = 12 pCi/L). After subtracting out uranium, gross alpha is greater than ½ the MCL but less than the MCL. Therefore, the system must collect a sample once every three years (i.e., the next sample must be collected between 2008 and 2010).

Combined Radium (-226 & -228) - The result is less than the regulatory DL of 1 pCi/L. The system must therefore collect a sample once every nine years (i.e., the next sample must be collected between 2008 and 2016).

Uranium - The result is greater than the MCL, but the uranium MCL is not effective until December 8, 2003. Legally, the system is in compliance with the current Rule. When the revised Rule becomes effective it will not be in violation of the Rule, but the EPA is encouraging States to ensure these systems are in compliance by the effective date of the revised Rule. Since the uranium results exceed the MCL, the system must conduct four consecutive quarters of monitoring for uranium during the initial monitoring period of December 8, 2003, to December 31, 2007.

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Appendix F

Statement of Principles—Guidance on Audit Law Issues

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

FEB 14 1997

MEMORANDUM

SUBJECT: Statement of Principles
Effect of State Audit Immunity/Privilege Laws
On Enforcement Authority for Federal Programs

TO: Regional Administrators

FROM: Steven A. Herman
Assistant Administrator, OECA

Robert Perciasepe
Assistant Administrator, OAR

Mary Nichols
Assistant Administrator, OAR

Timothy Fields
Acting Assistant Administrator, OSWER

Under federal law, states must have adequate authority to enforce the requirements of any federal programs they are authorized to administer. Some state audit immunity/privilege laws place restrictions on the ability of states to obtain penalties and injunctive relief for violations of federal program requirements, or to obtain information that may be needed to determine compliance status. This statement of principles reflects EPA's orientation to approving new state programs or program modifications in the face of state audit laws that restrict state enforcement and information gathering authority. While such state laws may raise questions about other federal program requirements, this statement is limited to the question of when enforcement and information gathering authority may be considered adequate for the purpose of approving or delegating programs in states with audit privilege or immunity laws.

I. Audit Immunity Laws

Federal law and regulation requires states to have authority to obtain injunctive relief, and civil and criminal penalties for any violation of program requirements. In determining whether to authorize or approve a program or program modification in a state with an audit immunity law, EPA must consider whether the state's enforcement authority meets federal program requirements. To maintain such authority while at the same time providing incentives for self-policing in appropriate circumstances, states should rely on policies rather than enact statutory immunities for any violations. However, in determining whether these requirements are met in states with laws pertaining to voluntary auditing, EPA will be particularly concerned, among other factors, with whether the state has the ability to:

1) Obtain immediate and complete injunctive relief;

2) Recover civil penalties for:

i) significant economic benefit;

ii) repeat violations and violations of judicial or administrative orders;

iii) serious harm;

iv) activities that may present imminent & substantial endangerment.

3) Obtain criminal fines/sanctions for wilful and knowing violations of federal law, and in addition for violations that result from gross negligence under the Clean Water Act.

The presumption is that each of these authorities must be present at a minimum before the state's enforcement authority may be considered adequate. However, other factors in the statute may eliminate or so narrow the scope of penalty immunity to the point where EPA's concerns are met. For example:

1) The immunity provided by the statute may be limited to minor violations and contain other restrictions that sharply limit its applicability to federal programs.

2) The statute may include explicit provisions that make it inapplicable to federal programs.

II. Audit Privilege Laws

Adequate civil and criminal enforcement authority means that the state must have the ability to obtain information needed to identify noncompliance and criminal conduct. In

determining whether to authorize or approve a program or program modification in a state with an audit privilege law, EPA expects the state to:

1) retain information gathering authority it is required to have under the specific requirements of regulations governing authorized or delegated programs;

2) avoid making the privilege applicable to criminal investigations, grand jury proceedings, and prosecutions, or exempt evidence of criminal conduct from the scope of privilege;

3) preserve the right of the public to obtain information about noncompliance, report violations and bring enforcement actions for violations of federal environmental law. For example, sanctions for whistleblowers or state laws that prevent citizens from obtaining information about noncompliance to which they are entitled under federal law appear to be inconsistent with this requirement.

III. Applicability of Principles

It is important for EPA to clearly communicate its position to states and to interpret the requirements for enforcement authority consistently. Accordingly, these principles will be applied in reviewing whether enforcement authority is adequate under the following programs:

1) National Pollutant Discharge Elimination System (NPDES), Pretreatment and Wetlands programs under the Clean Water Act;

2) Public Water Supply Systems and Underground Injection Control programs under the Safe Drinking Water Act;

3) Hazardous Waste (Subtitle C) and Underground Storage Tank (Subtitle I) programs under the Resource Conservation Recovery Act;

4) Title V, New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, and New Source Review Programs under the Clean Air Act.

These principles are subject to three important qualifications:

1) While these principles will be consistently applied in reviewing state enforcement authority under federal programs, state laws vary in their detail. It will be important to scrutinize the provisions of such statutes closely in determining whether enforcement authority is provided.

2) Many provisions of state law may be ambiguous, and it will generally be important to obtain an opinion from the state Attorney General regarding the meaning of the state law

and the effect of the state's law on its enforcement authority as it is outlined in these principles. Depending on its conclusions, EPA may determine that the Attorney General's opinion is sufficient to establish that the state has the required enforcement authority.

3) These principles are broadly applicable to the requirements for penalty and information gathering authority for each of the programs cited above. To the extent that different or more specific requirements for enforcement authority may be found in federal law or regulations, EPA will take these into account in conducting its review of state programs. In addition, this memorandum does not address other issues that could be raised by state audit laws, such as the scope of public participation or the availability to the public of information within the state's possession.

IV. Next Steps

Regional offices should, in consultation with OECA and national program offices, develop a state-by-state plan to work with states to remedy any problems identified pursuant to application of these principles. As a first step, regions should contact state attorneys general for an opinion regarding the effect of any audit privilege or immunity law on enforcement authority as discussed in these principles.

Appendix G

Rule Presentations

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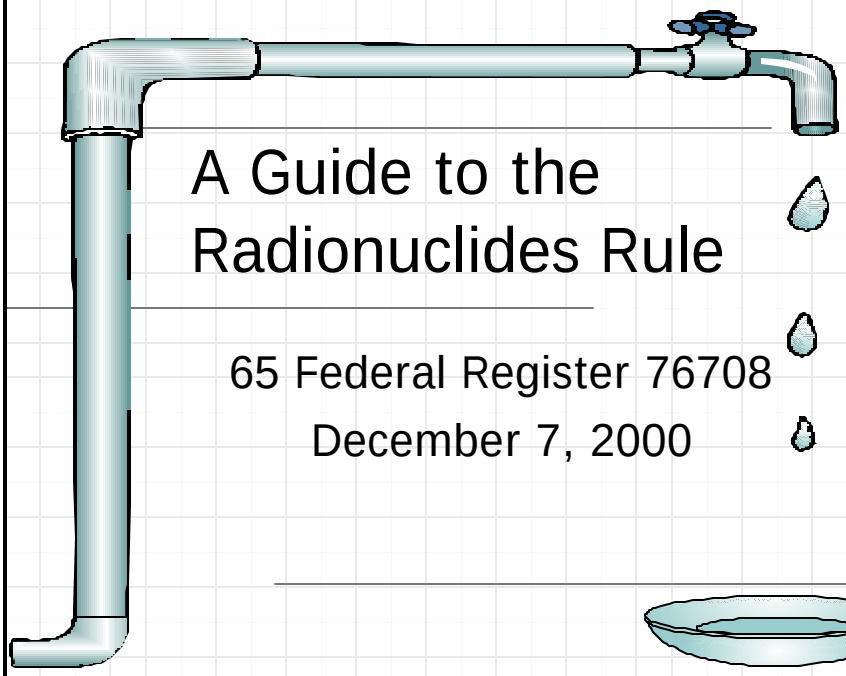


A Guide to the Radionuclides Rule

65 Federal Register 76708

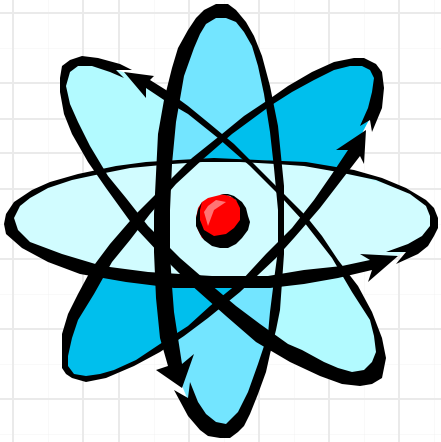
December 7, 2000

Radionuclides: Summary of Agenda

- Introduction to new rule requirements
- Provide justification for Agency decisions
- Identify rule flexibility's and burden reduction
- Implementation tools

Training Structure

- Part 1
  - Gross alpha
  - Radium-226/228
  - Uranium
- Part 2
  - Beta and Photon emitters



Radionuclides Introduction: Major Points

- Summary of 2000 Final Rule requirements
- Comparison of 1976 vs. 2000 Rules
- Health benefits
- Occurrence and likely sources
- Critical dates

The Final Radionuclides Rule

- Sets an MCL for:
  - Uranium (30 µg/L)
- Retains the existing MCLs for:
  - Radium-226/228
    - 5 pCi/L
  - Gross alpha particle radioactivity
    - 15 pCi/L
  - Beta particle and photon activity
    - 4 mrem/yr
- Revises monitoring requirements
  - Standardized monitoring framework
- Applies to all CWSs

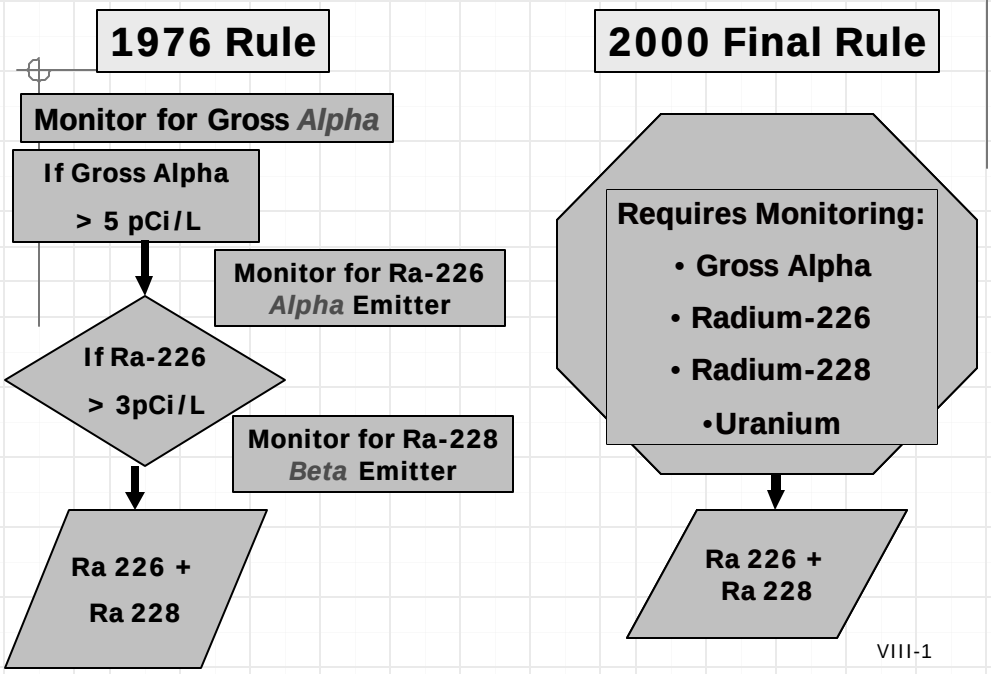
VIII-1

Rule Comparison

Provision	1976 Rule	2000 Final Rule (Effective 12/03)
MCLG	None	MCLG = 0
Uranium MCL	Not Regulated	30 µg/L
Monitoring baseline	4 quarterly measurements > 1/2 MCL? 4 samples/4 yrs < 1/2 MCL? 1 sample/4 yrs.	Standardized Monitoring Framework.
Beta Particle & Photon Emitters	Surface water systems > 100,000 & vulnerable systems screen at 50 pCi/L. Vulnerable Contaminated systems screen at 15pCi/L.	Vulnerable systems screen at 50 pCi/L. Contaminated systems screen at 15 pCi/L.

VIII-6

Rule Comparison: GA and Ra-226/228



VIII-1

Health Benefits of the Rule

- Uranium
  - Reduces toxic kidney effects from uranium
  - Reduces risk of bladder cancer
- Other Rads
  - Reduces risk of cancer
  - Reduces kidney and liver toxin

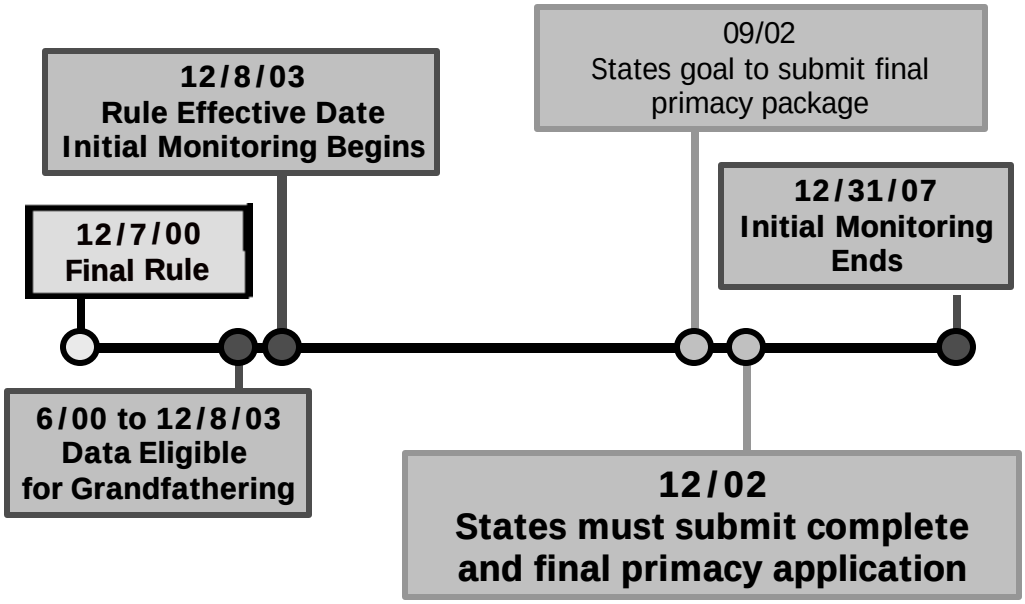
VIII-1

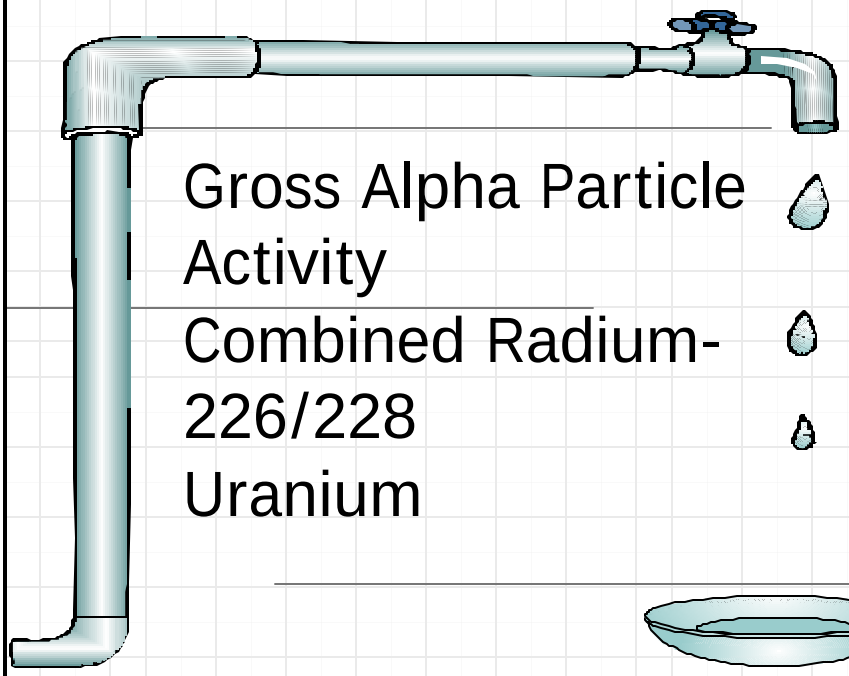
Likely Sources

- Naturally Occurring Sources
  - Regions
    - Piedmont - East Coast
    - Continental Shield - GL
    - Mountainous regions
    - Coastal Plains - TX
  - Geological
    - Granitic formations
    - Sandstone aquifers
    - Shales
    - Phosphate deposits
- Man-Made Sources
  - Mining
  - Nuclear weapons
  - Nuclear power plants
  - Hospitals/Medical treatments
  - Industry
    - Laboratories
    - Pharmaceuticals

VIII-1

Important Dates





Gross Alpha Particle Activity
Combined Radium-226/228
Uranium

VIII-1

Radionuclides Monitoring: Major Points

- Standardized monitoring framework
- Initial, reduced, and increased monitoring requirements
- Grandfathered data
- Compliance determination

VIII-1

Initial Monitoring

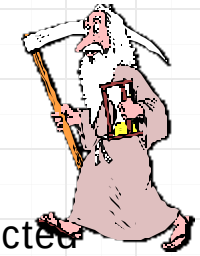
Gross Alpha, Ra-226, Ra-228 and Uranium

- December 31, 2007
- 4 consecutive quarterly samples at each EPTDS
- Waiver
  - Last 2 quarters
- Compositing

VIII-1

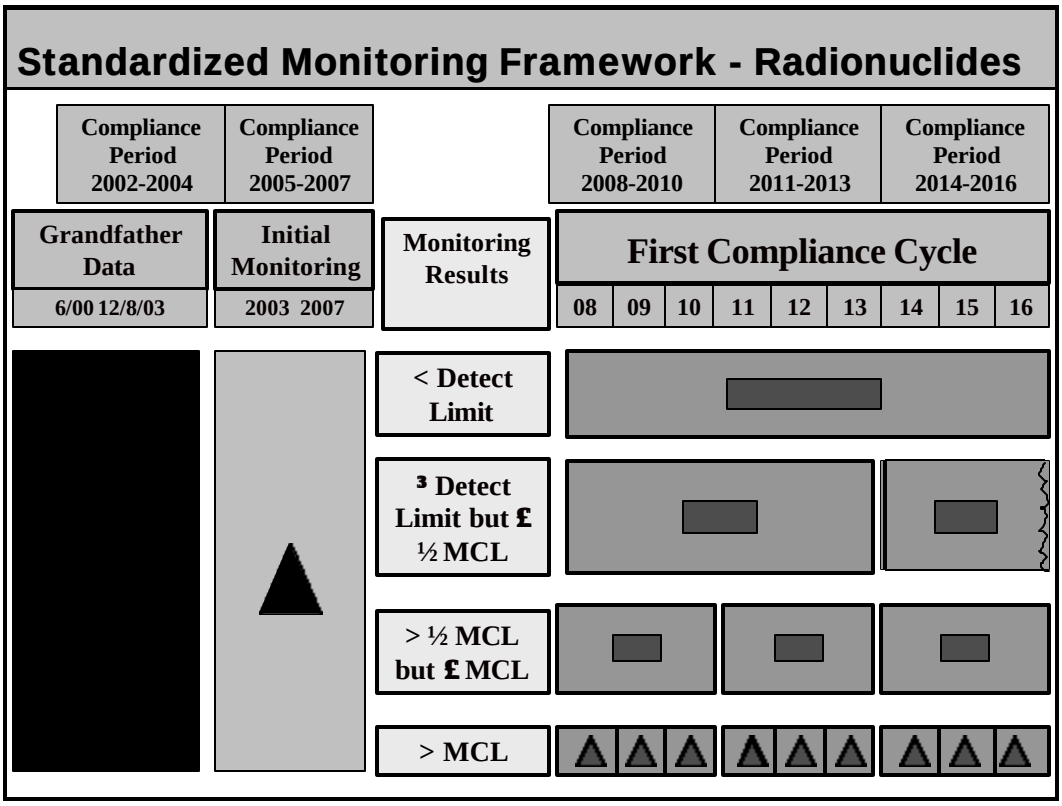
Grandfathered Data

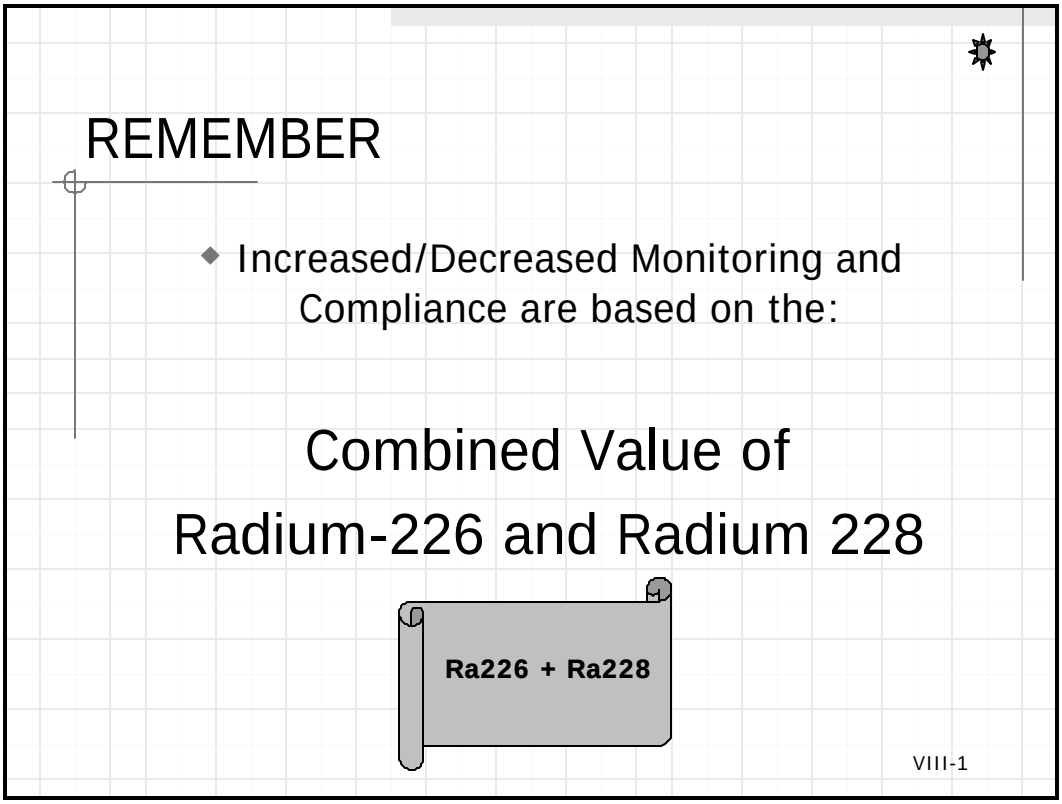
Gross Alpha, Ra-226, Ra-228 and Uranium



- Primacy Agency *may* allow data collected between 6/00 - 12/08/03 to satisfy the initial monitoring requirements if:
  - Samples were collected at each EPTDS
  - The system has a single EPTDS and samples were collected from the distribution system
  - The system has multiple EPTDS and samples were collected from the distribution system but the Primacy Agency must make a written finding that the data are representative of all EPTDS

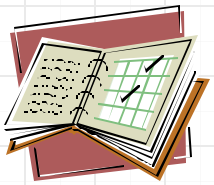
VIII-1


Standardized Monitoring Framework - Radionuclides
Compliance Period 2002-2004
Compliance Period 2005-2007
Compliance Period 2008-2010
Compliance Period 2011-2013
Compliance Period 2014-2016
Grandfather Data
6/00 12/8/03
Initial Monitoring
2003 2007
Monitoring Results
First Compliance Cycle
08 09 10 11 12 13 14 15 16
< Detect Limit
³ Detect Limit but £ ½ MCL
> ½ MCL but £ MCL
> MCL


REMEMBER
Increased/Decreased Monitoring and Compliance are based on the:
Combined Value of
Radium-226 and Radium 228
Ra226 + Ra228
VIII-1

Increased Monitoring

Gross Alpha, Ra-226, Ra-228 and Uranium



- A system can remain on a monitoring schedule only if the sampling results support the schedule
- MCL Exceedance?
  - Must begin quarterly sampling
  - Must continue until 4 consecutive quarterly samples are below the MCL
    - NOTE: compliance determination based on annual average

VIII-1

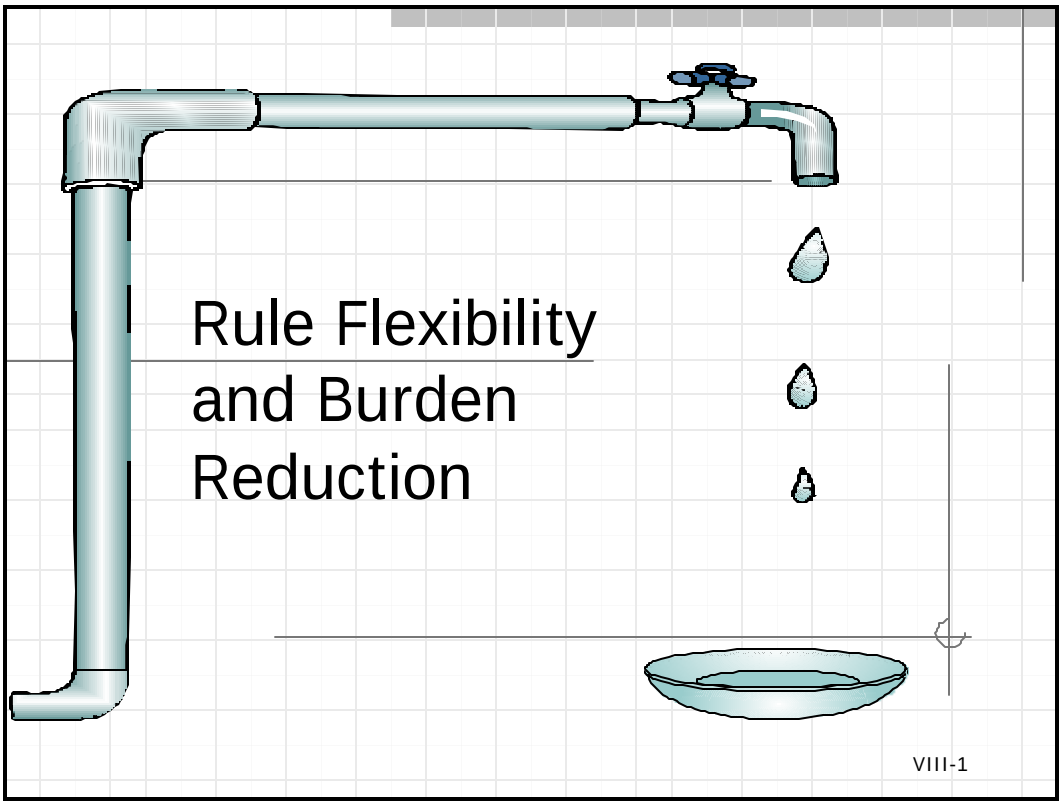
Compliance Determination Review

Ground Water System Monitors for Gross Alpha (MCL 15 pCi/L)		
Date	**Result**	
Jan. 04	**Initial Result**	**16**
	Confirmation	**15**
Apr 04		**12**
Jul 04		**13**
Oct 04		**16**
Running Annual Average		**14**

Average = 16 pCi/L

$$\frac{16 + 12 + 13 + 16}{4} = 14$$

VIII-1



Radionuclides Burden Reduction: Major Points

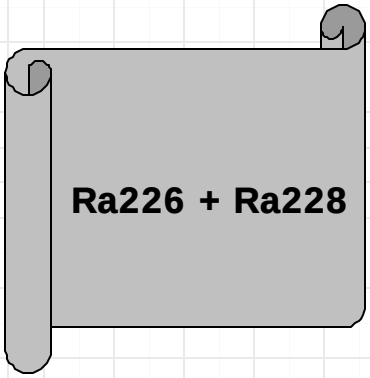
- Substitution ⇒ reduces monitoring burden
  - Gross alpha for Ra-226
- Net Alpha ⇒ reduces number of violations
  - Subtracting uranium
- Variances ⇒ allows PWS to operate above MCL
- Exemptions ⇒ extends effective date

VIII-1

Burden Reduction

Gross Alpha, Ra-226, Ra-228 and Uranium

- Substitution
  - Gross alpha for Ra-226
- Net Alpha
  - Subtracting uranium
- Variances
- Exemptions



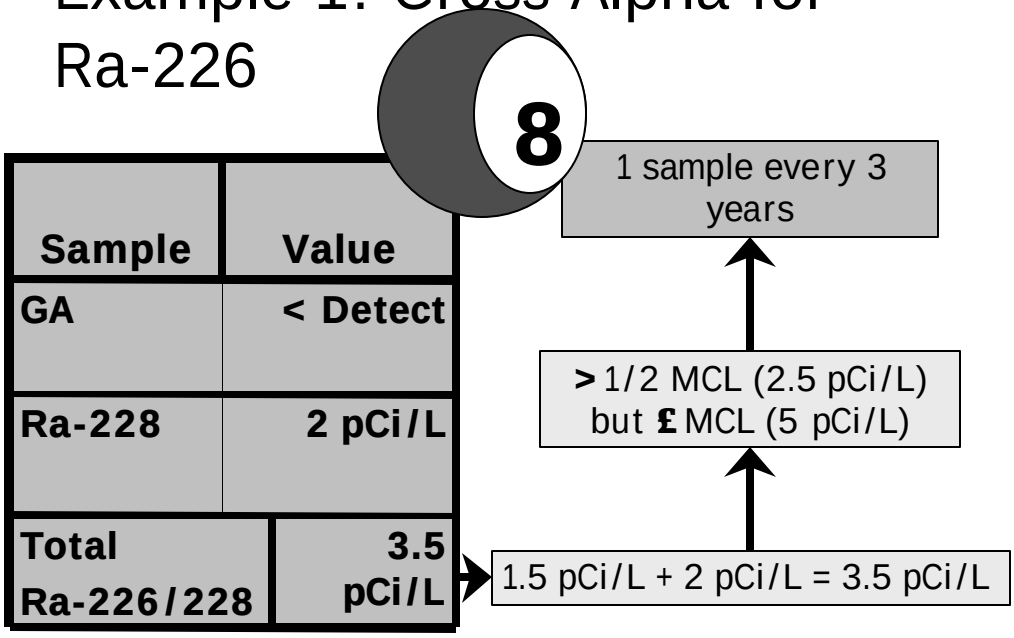
VIII-1

If a System Substitutes Gross Alpha for Radium-226. . .

And the GA is:	Use the following formula:	To Determine:
< Detect	**1.5 pCi/L + Ra 228**	Reduced monitoring frequency (Qtrly, 3, or 6 yrs)
detect £ GA ³ 5	**GA result + Ra 228**	Compliance with 226/228 MCL Reduced monitoring frequency (Qtrly or 3 yrs)

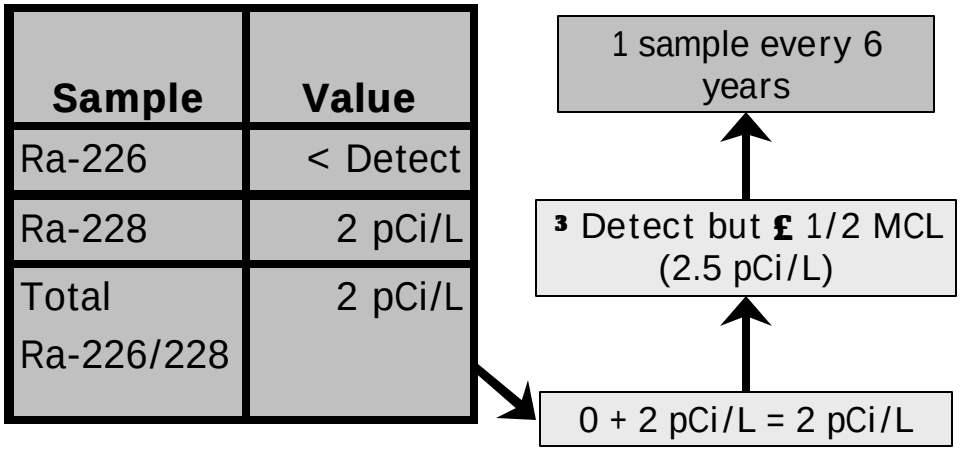
VIII-1

Example 1: Gross Alpha for Ra-226



VII-23

Example 2: Ra-226 and Ra-228



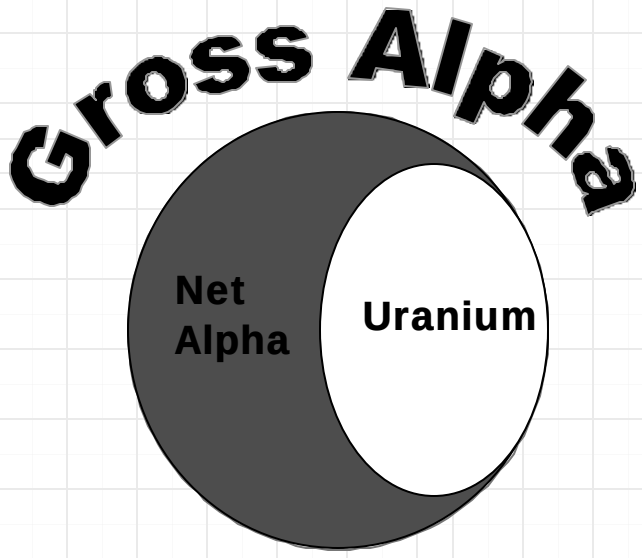
VII-24

If a system substitutes Gross Alpha for Uranium. . .

And the result is:	The Primacy Agency must:
£ 15 pCi/L	Assume all of gross alpha = uranium
	Use mass to activity ratio of 1:1
>15 pCi/L	Require the system to collect uranium samples

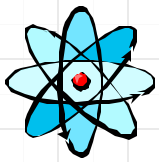
VIII-1

Subtracting Uranium Activity From GA to Determine "Net Alpha"



VIII-1

Net Alpha



- The laboratory must analyze and report the activity to the Primacy Agency
- Either use the laboratory analyzed mass/activity levels
- OR Primacy Agency can convert uranium
  - Uranium Mass to activity conversion factor
    - Multiply by 0.67 pCi/μg
  - Uranium activity to mass conversion factor
    - multiply by 1.49 μg/pCi

VIII-1

Example 3: Net Alpha

22 μg/L x 0.67 pCi/μg = 15 pCi/L

1 sample every three years

Sample	Result
Gross alpha	24 ± 3 pCi/L
U (mass)	22 μg/L
U (activity)	15 pCi/L
Net Alpha	9 pCi/L

24 pCi/L - 15 pCi/L = 9 pCi/L

1 sample every 3 years

Variances

- The system must install a BAT or SSCT for small systems
- A Primacy Agency evaluation indicates that an alternative source of water is not reasonably available
- Will not result in an unreasonable risk to public health

VIII-1

Exemptions

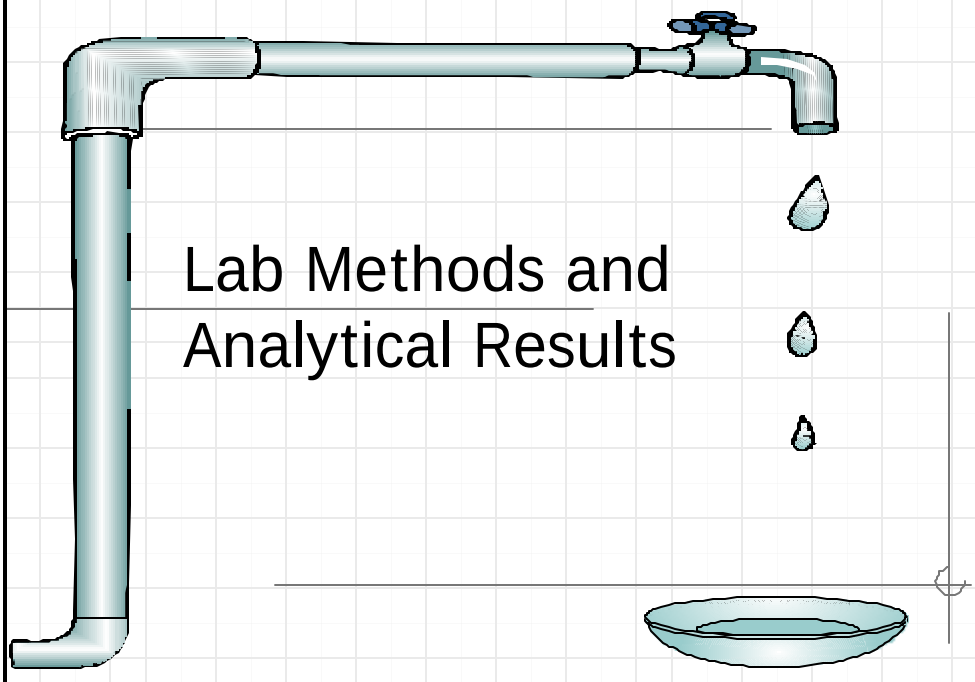
- NO Exemptions
  - Gross Alpha, Radium 226/228, beta and photon emitters
  - MCL was not revised
- Uranium exemptions……

VIII-1

A System is eligible for an exemption from the Uranium MCL if:

- Due to compelling factors:
  - Unable to comply with the MCL(e.g. economically); or,
  - It cannot develop an alternative source of supply;
- If operating before December 2003; or,
  - If operating after 12/03 and there is no reasonable alternative source of supply;
- The exemption will not result in an unreasonable risk to public health; and,
- Management and/or restructuring changes will not lead to compliance or improve the quality of water.

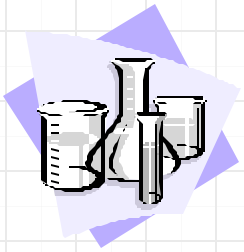
VIII-1



Lab Methods and Analytical Results

VIII-1

Laboratory Methods

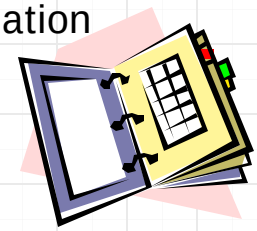


- 90 radiochemical methods
- EPA is currently reviewing :
  - The use of an Inductively Coupled Plasma Mass Spectrometry (ICP-MS) method for uranium analysis
  - The feasibility of using Gamma Spectrometry for radium-228 analysis
- Detection limits
  - Uranium limit will be set before December 8, 2003

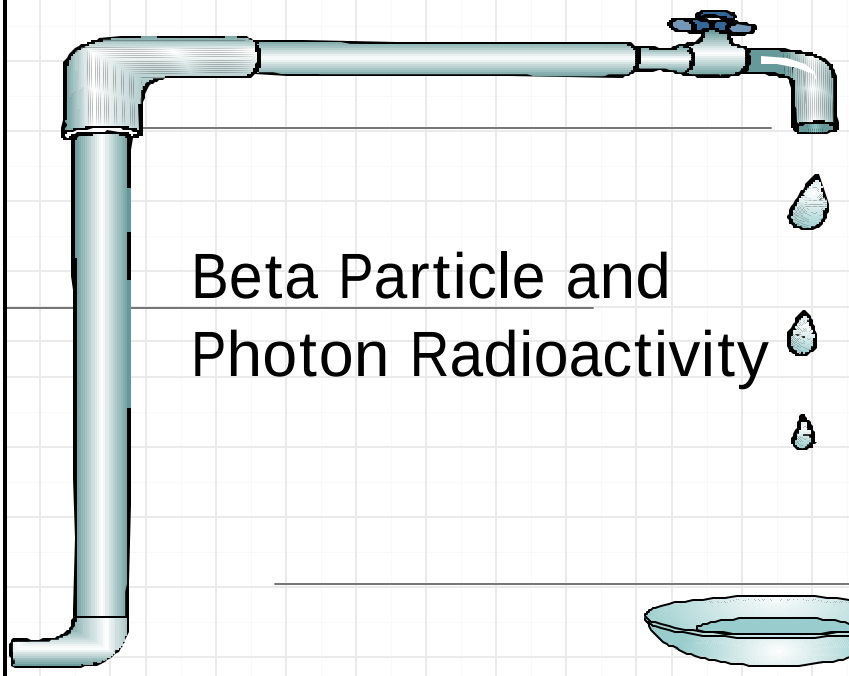
VIII-1

System Analytical Result Reporting

- Systems must report entire analytical result (including the standard deviation) to the Primacy Agency
  - Within 10 days of the result or the end of the compliance period
  - Within 48 hours of NPDWR violation



VIII-1



Beta Particle and Photon Radioactivity

VIII-1

Radionuclides Beta Emitters: Major Points

- 1976 vs. 2000 Radionuclide Rules
- Routine, reduced, and increased monitoring
- Compliance determinations

VIII-1

What do we mean by Gross Beta Particle activity?

- Primarily manmade radioactive contaminants
  - Operating nuclear power plants
  - Facilities that use radioactive material for research or manufacturing
  - Facilities that dispose of radioactive material
- 168 contaminants
  - Each impact the body differently at different levels
- Screen to determine compliance with individual MCLs

VIII-1

Applicability

- "Vulnerable" systems
- Systems "Designated" as utilizing waters contaminated by effluents from nuclear facilities
- Primacy Agency discretion

VIII-1

Routine Monitoring

	Quarterly	Annually
Vulnerable Systems	Gross Beta	Tritium Strontium-90
Contaminated Systems	Gross Beta Iodine - 131	

VIII-1

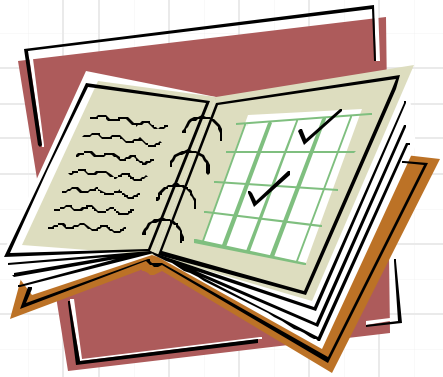
Reduced Monitoring

If Gross Beta Minus Potassium-40 Has a Running Annual Average of...	Reduce Monitoring to Once Every. .
£ 50 pCi/L Vulnerable Systems	Three Years
£ 15 pCi/L Contaminated Systems	Three Years

VIII-1

Increased Monitoring

- Exceedance of Gross Beta Minus Potassium-40
  - Speciate for most likely emitters
- MCL violation
  - Monthly Monitoring



VIII-1

Compliance Determination

- Sum of the fractions
- 4 millirems/year
- "Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air or Water for Occupational Exposure"

VIII-1

Example 4: Sum of the Fractions

Emitter	X Lab Analysis (pCi/L)	Y Conversion from table (pCi/4mrem)	X/Y Calculate Fraction	4(X/Y) Calculate Total (mrem)
Cs-134	5,023	20,000	0.25115	
Cs-137	30	200	0.150	
Sr-90	4	8	0.5	
I-131	2	3	0.7	
	Sum of the Fractions =		1.60115	6

VII-43

Appendix H

Rule Language

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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), and141.27–141.30;

(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		
*	*	*	*	*

40 CFR citation			OMB control No.	
*	*	*	*	*
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 EPTDS 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 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 1/2 the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is at or above the detection limit but at or below 1/2 the MCL, the system must collect and analyze for that contaminant using at least one sample at that sampling point every six years.

(iii) For gross alpha particle activity and uranium, if the average of the initial monitoring results for each contaminant is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years. For combined radium-226 and radium-228, the analytical results must be combined. If the average of the combined initial monitoring results for radium-226 and radium-228 is above 1/2 the MCL but at or below the MCL, the system must collect and analyze at least one sample at that sampling point every three years.

(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 1/2 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 1/2 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% (1.65$\boldsymbol{\sigma}$, where $\boldsymbol{\sigma}$ 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, 1/2 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, 1/2 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 liters 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 foot-notes)	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)		
	25–500	501–3,300	3,300–10,000
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	Traditio-nal 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.

Contaminant units	Traditio-nal MCL in mg/L	To convert for CCR, multiply by	MCL in CCR units	MCLG	Major sources in drinking water	Health effects language
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 ra-dium (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 tox-icity.
*	*	*	*	*	*	*

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).

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Appendix I

Comparison of Derived Values of Beta and Photon Emitters

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Derived Concentrations (pCi/L) of Beta and Photon Emitters in Drinking Water Yielding a Dose of 4 mrem/y to the Total Body or to Any Critical Organ as Defined in NBS Handbook 69

Nuclide	pCi/L	Nuclide	pCi/L	Nuclide	pCi/L	Nuclide	pCi/L
H-3	20,000	Sr-85 m	20,000	Sb-124	60	Er-169	300
Be-7	6,000	Sr-85	900	Sb-125	300	Er-171	300
C-14	2,000	Sr-89	20	Te-125m	600	Tm-170	100
F-18	2,000	Sr-90	8	Te-127	900	Tm-171	1,000
Na-22	400	Sr-91	200	Te-127m	200	Yb-175	300
Na-24	600	Sr-92	200	Te-129	2,000	Lu-177	300
Si-31	3,000	Y-90	60	Te-129m	90	Hf-181	200
P-32	30	Y-91	90	Te-131m	200	Ta-182	100
S-35 inorg	500	Y-91m	9,000	Te-132	90	W-181	1,000
Cl-36	700	Y-92	200	I-126	3	W-185	300
Cl-38	1,000	Y-93	90	I-129	1	W-187	200
K-42	900	Zr-93	2,000	I-131	3	Re-186	300
Ca-45	10	Zr-95	200	I-132	90	Re-187	9,000
Ca-47	80	Zr-97	60	I-133	10	Re-188	200
Sc-46	100	Nb-93m	1,000	I-134	100	Os-185	200
Sc-47	300	Nb-95	300	I-135	30	Os-191	600
Sc-48	80	Nb-97	3,000	Cs-131	20,000	Os-191m	9,000
V-48	90	Mo-99	600	Cs-134	80	Os-193	200
Cr-51	6,000	Tc-96	300	Cs-134m	20,000	Ir-190	600
Mn-52	90	Tc-96m	30,000	Cs-135	900	Ir-192	100
Mn-54	300	Tc-97	6,000	Cs-136	800	Ir-194	90
Mn-56	300	Tc-97m	1,000	Cs-137	200	Pt-191	300
Fe-55	2,000	Tc-99	900	Ba-131	600	Pt-193	3,000
Fe-59	200	Tc-99m	20,000	Ba-140	90	Pt-193m	3,000
Co-57	1,000	Ru-97	1,000	La-140	60	Pt-197	300
Co-58	300	Ru-103	200	Ce-141	300	Pt-197m	3,000
Co-58m	9000	Ru-105	200	Ce-143	100	Au-196	600
Co-60	100	Ru-106	30	Ce-144	30	Au-198	100
Ni-59	300	Rh-103m	30,000	Pr-142	90	Au-199	600
Ni-63	50	Rh-105	300	Pr-143	100	Hg-197	900
Ni-65	300	Pd-103	900	Nd-147	200	Hg-197m	600
Cu-64	900	Pd-109	300	Nd-149	900	Hg-203	60
Zn-65	300	Ag-105	300	Pm-147	600	Tl-200	1,000
Zn-69	6,000	Ag-110m	90	Pm-149	100	Tl-201	900
Zn-69m	200	Ag-111	100	Sm-151	1,000	Tl-202	300
Ga-72	100	Cd-109	600	Sm-153	200	Tl-204	300
Ge-71	6,000	Cd-115	90	Eu-152	200	Pb-203	1,000
As-73	1,000	Cd-115m	90	Eu-154	60	Bi-206	100
As-74	100	In-113m	3,000	Eu-155	600	Bi-207	200
As-76	60	In-114m	60	Gd-153	600	Pa-230	600
As-77	200	In-115	300	Gd-159	200	Pa-233	300

Nuclide	pCi/L	Nuclide	pCi/L	Nuclide	pCi/L	Nuclide	pCi/L
Se-75	900	In-115m	1,000	Tb-160	100	Np-239	300
Br-82	100	Sn-113	300	Dy-165	1,000	Pu-241	300
Rb-86	600	Sn-125	60	Dy-166	100	Bk-249	2,000
Rb-87	300	Sb-122	90	Ho-166	90		

Appendix J

References

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REFERENCES

Goodrich, J.A., Adams, J.Q., Lykins, B.W., Jr., and Clark, R.M. 1992. *Safe Drinking Water from Small Systems: Treatment Options*. JAWWA. Vol. 84, No. 4, p. 49. May 1992.

National Research Council (NRC). 1997. Safe Water From Every Tap: Improving Water Service to Small Communities. National Academy Press. Washington, DC.

US Department of Commerce. 1963. *Maximum Permissible Body Burdens and Maximum Permissible Concentrations of Radionuclides in Air and in Water for Occupational Exposure.* National Bureau of Standards (NBS) Handbook 69, amended.

USEPA. 1990. *Suggested Guidelines for Disposal of Drinking Water Treatment Wastes Containing Naturally-Occurring Radionuclides* (July 1990 draft).

USEPA. 1991. *National Primary Drinking Water Regulations; Radionuclides; Proposed Rule*. Federal Register. Vol. 56, No. 138, p. 33050. July 18, 1991.

USEPA. 1992. *Technologies and Costs for the Removal of Radionuclides from Potable Water Supplies*. Prepared by Malcolm Pirnie, Inc. July 1992.

USEPA. 1994. *Suggested Guidelines for Disposal of Drinking Water Treatment Wastes Containing Radioactivity* (June 1994 draft).

USEPA. 1996. *Performance Evaluation Studies Supporting Administration of the Clean Water Act and the Safe Drinking Water Act*. Federal Register. Vol. 61, No. 139, p. 37464. July 18, 1996.

USEPA. 1997a. *National Primary Drinking Water Regulations; Analytical Methods for Radionuclides; Final Rule and Proposed Rule*. Vol. 62, No. 43, p. 10168. March 5, 1997.

USEPA. 1997b. *Performance Evaluation Studies Supporting Administration of the Clean Water Act and the Safe Drinking Water Act*. Federal Register. Vol. 62, No. 113, p. 32112. June 12, 1997.

USEPA. 1997c. *Performance Based Measurement System*. Federal Register. Vol. 62, No. 193, p. 52098. October 6, 1997.

USEPA. 1997d. *Manual for the Certification of Laboratories Analyzing Drinking Water*. EPA 815-B-97-001. 1997.

USEPA. 1998a. *Announcement of Small Systems Compliance Technology Lists for Existing National Primary Drinking Water Regulations and Findings Concerning Variance Technologies.* Federal Register. Vol. 63, No. 151, p. 42032. August 6, 1998.

USEPA. 1998b. *Small System Compliance Technology List for the Non-Microbial Contaminants Regulated Before 1996.* EPA-815-R-98-002. September 1998.

USEPA. 1998c. *Actual Cost for Compliance with the Safe Drinking Water Act Standard for Radium-226 and Radium-228.* Final Report. Prepared by International Consultants, Inc. July 1998.

USEPA. 1999a. *Technologies and Costs for the Removal of Radionuclides from Potable Water Supplies.* Draft. Prepared by International Consultants, Inc. April 1999.

USEPA. 1999b. *Small System Compliance Technology List for the Radionuclides Rule*. Prepared by International Consultants, Inc. Draft. April 1999.

USEPA. 1999c. *Revised Cost Estimates of Radiochemical Analysis.* Prepared by EPA and Science Applications International Corporation (SAIC). April 1999.

USEPA. 1999d. *State Implementation Guidance for the Consumer Confidence Report (CCR) Rule*. EPA 816-R-99-008. August 1999.

USEPA. 2000. *Radionuclide Notice of Data Availability*. April 2000.