Kansas Public Water Supply Survival Guide For Compliance With the Radionuclides Rule

Kansas Department of Health and Environment
Bureau of Water
Public Water Supply Section

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Disclaimer

This guidance document is provided by the State of Kansas as a "quick reference guide" to assist public water supply systems (PWS) in complying with requirements of the Radionuclides Rule stated in the Code of Federal Regulations 40 CFR 141.25; 40 CFR 141.26; and 40 CFR 141.66, and can be found online at the Kansas Department of Health & Environment, Public Water Supply Section website http://www.kdheks.gov/pws . The Radionuclides Rule is part of the National Primary Drinking Water Regulations of the federal Safe Drinking Water Act which Kansas has adopted by reference into the Kansas Administrative Regulations (K.A.R.). This guidance provides a summary of the requirements which must be met.

This document is not a regulation and does not substitute for federal or Kansas regulations. It cannot impose legally-binding requirements on the State of Kansas, Environmental Protection Agency (EPA) or water suppliers. In some cases it may not apply to a particular water system based upon the water system's unique circumstances. The Kansas Department of Health and Environment (KDHE) and EPA retain the discretion to adopt approaches on a case-by-case basis that differ from this guidance where appropriate.

Applicable users for this survival guide include:

> **Water System Types:** Community water systems (CWS).
> **Source Water Types:** All source water types, which includes groundwater (GW), surface water (SW), and groundwater under the direct influence of surface water (GUI). **Water System Sizes:** All CWS having at least 10 service connections or serving 25 persons year round.

Questions regarding the information contained in this document, the Kansas Primary Drinking Water Regulations, or any other matters pertaining to drinking water and PWS in Kansas should be directed to:

Kansas Department of Health and Environment
Bureau of Water, Public Water Supply Section
1000 SW Jackson, Suite 420
Topeka, Kansas 66612-1367
Phone: (785) 296-5514
Fax: (785) 559-4258

The Basics About Radionuclide Compliance Monitoring

What is the Radionuclides Rule?
The Radionuclides Rule is regulation for a group of radionuclides in drinking water. For Kansas CWS, there are 3 radionuclides: Gross Alpha (excluding Uranium); Combined Radium (Radium -226 + Radium -228); and Uranium Mass. The rule establishes monitoring requirements, maximum contaminant levels (MCL), and approved analytical laboratory methods.

What are the MCLs of the Radionuclides Rule?
Table 1 gives the names of the radionuclides and their MCL.

Radionuclides Rule Maximum Contaminant Levels (MCL)

Radionuclide	MCL
Gross Alpha (excluding Uranium) particle activity	15 pCi/L (pico Curies per Liter)
Combined Radium (-226 + -228) particle activity	5 pCi/L
Uranium Mass	30 µg/L (micrograms per liter or parts per billion)

Table 1. Chart of Radionuclide MCLs

Who is required to follow the Radionuclides Rule?
These regulations must be followed by all community water systems (CWS) that treat raw water.

So, what do I have to do?
If you are a CWS that treats raw water, you are required to collect samples according to a monitoring schedule, and you must provide sample results to Kansas Department of Health and Environment (KDHE).

How do I know what my monitoring schedule is; once every 6 years, once every 3 years, or once per quarter?
The Very First Schedules
All points-of-entry (POE) that treat raw water for Kansas CWS went through an initial monitoring period during the years 2002 – 2007. As POEs for new water sources and new water systems come into existence, they also go through an initial monitoring period. Results from initial monitoring samples determine a POE's future monitoring schedule.

- Quarterly schedules (1/QT): If a POE has any one radionuclide result above the MCL, that one radionuclide at that POE is given a 1/QT schedule and the rest of the radionuclides at that POE are given a 1/3Y schedule.
- Triennial schedules (1/3Y): A POE with sample results showing any one of the radionuclides greater than or equal to 50% of its MCL is given a 1/3Y schedule. The first 1/3Ycompliance period was 20082010. Other 1/3Y compliance periods are 2011 – 2013, 2014 – 2016, 2017 – 2019, etc.

- Sexennial schedules (1/6Y): A POE with sample results showing all radionuclides in the range of 0% to 49% of the radionuclides' MCL is given a 1/6Y schedule. The first 1/6Y compliance period is 20082013. Other 1/6Y compliance periods are 2014 – 2019, 2019 – 2024, etc.

Future Schedules
Results of compliance monitoring samples determine when the next monitoring sample is due for collection (1/QT, 1/3Y, or 1/6Y). Because of the results, either the monitoring schedule stays the same or it changes. If the POE's schedule increases or decreases, the water system is sent a notification letter.

If you do not know what the radionuclide monitoring schedule is for your water system's POE, you can call KDHE at 785-296-5514 and ask.

How do I go about getting a sample collected and analyzed for radionuclides?
Using the Kansas Health and Environmental Laboratories (KHEL)
Many Kansas CWS use KHEL. When you use KHEL, they already have your schedule and will ship sample collection containers to you. Look out! The water system is the responsible party! If you do not receive containers as expected, it is your responsibility to notify KHEL and remedy the problem so as not to incur a failure to monitor violation. Once KHEL has analysis results of a sample, the sample results are electronically reported to the KDHE, Public Water Supply Section on your behalf, and a copy of the results report is provided to your water system.

Using a Commercial Laboratory
If you decide to use a commercial laboratory, you must contract with one that has been certified by the State of Kansas to analyze radionuclide compliance samples. You can call KDHE, Public Water Supply Section at 785296-5514 and get a list of certified commercial labs with their contact information. Then it is a water system's responsibility to contact labs on the list and make arrangements. When the commercial lab sends you a results report, you must make a complete copy and send it to KDHE, Public Water Supply Section. Your monitoring schedule is actually a monitoring *and reporting* schedule. When you use a commercial lab, you have to be sure to take care of both the monitoring and the reporting by sending in a complete copy of the radionuclide results report. The address for mailing a results report is

Kansas Department of Health and Environment
Bureau of Water, Public Water Supply Section
1000 SW Jackson, Suite 420
Topeka, Kansas 66612-1367

After KDHE receives the radionuclide results report, then what?
The results of the most recent compliance monitoring sample determines when your next sample collection is due (1/QT, 1/3Y, or 1/6Y). Because of the results, either the schedule will stay the same or it will change. A notification letter is sent only if a schedule change occurs.

Understanding the Radionuclide Result Report When Using KHEL

This section gives information for water systems that choose to use KHEL for analyzing their radionuclides compliance monitoring samples.

Let's begin with the chart shown in Table 1 that gives the names of the radionuclides and their MCL.

Radionuclides Rule Maximum Contaminant Levels (MCL)

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Table 1. Chart of Radionuclide MCLs

For POEs on Triennial (1/3Y) or Sexennial (1/6Y) Monitoring Schedules: Results for Gross Alpha (including Uranium) and Results for Gross Alpha (excluding Uranium)

Some analyses are designed to measure radiation from a large number of radionuclides that could possibly be contained in the sample. Other analyses are designed to detect specific radionuclides (specific analyses). EPA allows low-cost gross measurements to be substituted for more expensive specific analyses, as long as the gross analyses results are low enough.

For PWS using KHEL, the low-cost gross analyses are made first to determine the total amount of Gross Alpha (including Uranium) radioactivity. Gross Alpha (including Uranium) radioactivity is a measurement of all Alpha radioactivity present, regardless of specific radionuclides contained in the sample.

On your report, if Gross Alpha (including Uranium) is <= 15 pCi/L, then no further analysis of the sample for Alpha radioactivity is required, and you will not see results for Gross Alpha (excluding Uranium) for this sample. In cases like this, the Gross Alpha (including Uranium) result of the sample is substituted in for the Gross Alpha (excluding Uranium) and also for the Uranium Mass level.

If the result for Gross Alpha (including Uranium) is > 15 pCi/L, further analysis of the sample is required and you will see results for Gross Alpha (excluding Uranium) and Uranium Mass (ug/L).

In summary of Gross Alpha (including Uranium) and Gross Alpha (excluding Uranium) results reports:
Gross Alpha (including Uranium) is the measure of all Alpha radionuclides radioactivity in a sample
Gross Alpha (excluding Uranium) is the measure of Alpha radionuclides radioactivity less the specific Uranium radioactivity.

On your results report, if the Gross Alpha (including Uranium) is <= 15 pCi/L, you are not likely to see results for Gross Alpha (excluding Uranium) nor Uranium Mass. Conversely, if the Gross Alpha (including Uranium) is > 15 pCi/L, you will see results for Gross Alpha (excluding Uranium) and Uranium Mass.

For POEs on Quarterly (1QT) Monitoring Schedules: Results for Gross Alpha (including Uranium) and Results for Gross Alpha (excluding Uranium)

If a POE is on a quarterly monitoring schedule for either Gross Alpha (excluding Uranium) or Uranium Mass, your results report will show results for these radionuclides regardless of what the result for Gross Alpha (including Uranium) is because substitutionary values are not allowed for quarterly monitoring results.

Results for Combined Radium (Radium -226 + Radium -228)

Results for Combined Radium are pretty straight forward to explain. Radioactivity for Radium -226 and Radium -228 are each analyzed, and the results are added together for a Combined Radium value.

If your Combined Radium result exceeds 5 pCi/L, you can expect the POE to have a quarterly schedule for these radionuclides.

For POEs on Triennial (1/3Y) or Sexennial (1/6Y) Monitoring Schedules: Results for Uranium Mass

Uranium is a weakly radioactive metal that is very dense and heavy. Uranium does not absorb through the skin, but once Uranium gets inside the body this heavy metal can lead to cancer or kidney damage.

Naturally occurring Uranium has 3 different isotopes; U-238, U-235, and U-234, and each isotope has a different mass. Specific analysis for Uranium Mass produces a measure of the mass of all the Uranium isotopes contained in the sample.

When Gross Alpha (including Uranium) measurements of a sample are made there is no distinction between which radionuclide isotopes are present. The more expensive, specific analysis for Uranium Mass is only made if the Gross Alpha (including Uranium) measurement is >15 pCi/L.

If Gross Alpha (including Uranium) is > 15 pCi/L, further analysis of the sample is required and you will see results for Gross Alpha (excluding Uranium) and Uranium Mass (ug/L).

For POEs on Quarterly (1/QT) Monitoring Schedules: Results for Uranium Mass

If a POE is on a quarterly monitoring schedule for either Gross Alpha (excluding Uranium) or Uranium Mass, your results report will show results for these radionuclides regardless of what the result for Gross Alpha (including Uranium) is because substitutionary values are not allowed for quarterly monitoring results.

Quarterly Monitoring and Radionuclide MCL Exceedance Violations

What if an MCL is exceeded? Quarterly monitoring begins.
If a routine compliance sample result or an initial monitoring result shows that any one radionuclide exceeds the MCL, the water system must collect quarterly samples for that one radionuclide at that POE. The other radionuclides at that POE will be on a triennial schedule (1/3Y). Substitutionary values such as Gross Alpha (including Uranium) < 15 pCi/L as a Gross Alpha (excluding Uranium) value or a Uranium Mass value are not allowed for radionuclides on a quarterly schedule. Samples for radionuclides on a quarterly monitoring schedule will go through specific analysis.

Results of quarterly samples will create a profile of that radionuclide at that POE. It is not uncommon for results to have seasonal variations, or for results to vary with amount of water usage.

As quarterly results accumulate, compliance for that radionuclide is based on a running annual average (RAA). The RAA is calculated by taking the most recent 4 quarters of results and dividing by 4. If the RAA exceeds the MCL that is shown in the chart in Table 1 of this document, your system has incurred an MCL Exceedance Violation. It is possible for a system to incur a violation before 4 quarters are collected, such as if the first 2 or 3 quarters of results are high enough that when they are added together and divided by 4 the MCL is exceeded.

When can a radionuclide schedule be reduced to less than quarterly?
Any POE required to perform quarterly monitoring for a radionuclide must continue to do so until KDHE determines that at least 4 consecutive quarters of results have been reliably and consistently below the MCL. After the POE is determined to be reliably and consistently below the MCL, monitoring for that radionuclide can be reduced to triennial. If your schedule is reduced to less than quarterly, your system will be sent a notification letter. ***Do not discontinue collecting quarterly samples until KDHE gives you official notification.*** You can always call KDHE to inquire about the possibility of your schedule being reduced to less than quarterly if you think you should have already received reduced monitoring notification.

What is a radionuclide violation?
Two types of violations can occur for the Radionuclides Rule.

1. If a PWS is required to monitor a POE for a radionuclide and fails to do so within the required time frame, it will incur a Failure to Monitor Violation and be required to distribute public notice.
2. If the RAA of a POE's radionuclide results exceed an MCL, it will incur an MCL Exceedance Violation and be required to distribute public notice.

Summary

Here is a summary of the main actions you can take to be in compliance with the Radionuclides Rule.

- Be aware of what the radionuclides monitoring schedule is for your system's POE(s).
- Collect samples within the required time frame.
- If using a commercial lab, submit complete copies of results reports to KDHE.
- Review results reports to see how the results of the radionuclide levels will affect the monitoring frequency of the POE (increase, decrease, or stay the same).
- If your system incurs a violation of the Radionuclides Rule, be sure to perform and submit proof of the required public notice, or else another violation will be assessed to your water system.
- If you have questions about the Radionuclides Rule, your system's compliance or monitoring schedule, call KDHE, Public Water Supply Section at 785-296-5514.