



Radium in Drinking Water

This brochure describes the presence of radium in Wisconsin's drinking water supplies, information on basic requirements of public water supplies, recommendations for private well water, an introduction to potential health effects and where to find out more detailed information.

What is radium?

Naturally occurring radium (Ra) is a radioactive element contained in many rock formations, usually in small amounts. There are two forms of radium that can most likely be transferred from the rock into Wisconsin (WI) groundwater: Ra-226 and Ra-228. As they naturally break down over time, (a process called radioactive decay), they give off different types of radioactive particles. Ra-226 gives off alpha particles; Ra-228 gives off beta particles. However chemically, they both behave like calcium and magnesium, the two major components of water hardness.

Under the requirements of the federal Safe Drinking Water Act (SDWA), all community public water systems must routinely monitor their water source(s) for certain radioactive substances, called radionuclide indicator parameters. When elevated levels of these indicator parameters are discovered, additional testing is required to measure the actual levels of Ra-226 and Ra-228.

Produced by Department of Natural Resources in cooperation with the State Department of Health Services. Reviewed by the GCC Education Subcommittee.

Wisconsin Department of Natural Resources
Bureau of Drinking Water & Groundwater

How does radium get into the water supply?

Radium naturally occurs in some of Wisconsin's groundwater. Nearly 70% of Wisconsin residents receive drinking water from groundwater resources. Groundwater moves slowly through the pores and cracks in underground layers of unconsolidated material and rock called aquifers. As it moves through the aquifer, minerals and other elements, including radium, can be dissolved out of the rock into the groundwater. Some rock more effectively transfers radium into groundwater than others. Eventually, the water can be drawn into nearby drinking water wells as the water is extracted.

What makes a well likely to have high levels of radium?

Location may be the biggest factor in determining if a well is likely to have a high level of radium present. In Wisconsin, the highest radium levels occur in water from two types of rock aquifers; the deep sandstone in Wisconsin's eastern quarter and the crystalline granite rock found in the north central part of the state. Wells located in these aquifers may be most likely to contain elevated levels of radium. However, elevated radium may also occur in other areas if conditions are right.

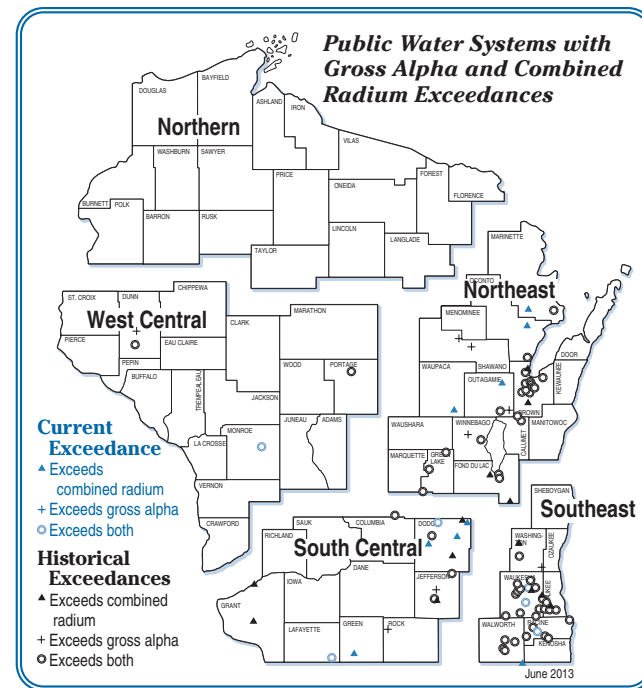
What are the health risks of radium in drinking water?

The National Academy of Sciences has concluded that long-term exposure to elevated levels of radium in drinking water may result in an increased risk of bone cancer. When ingested into the body from drinking water, radium can accumulate in the bones; just like calcium does from milk. When consumed in high doses, or at a lower dose extended over a lifetime, the risk increases. The background exposure risk from other radioactive elements in food, in the air, etc. was considered in setting the radium drinking water standard. Your local Public Health Department or family doctor is the best resource for determining how important the risk of exposure may be to your overall health.

How can I find out if my water is safe to drink?

Public Water Supplies

All community public water systems are required to notify consumers, on a quarterly basis, if any contaminant, including radium, goes above the maximum contaminant level (MCL) allowed by the federal and state drinking water codes. The MCL for combined Ra-226 and Ra-228 is currently 5 pCi/l (picocuries per liter of water).



A picocurie is a measurement describing the rate of radioactive decay.

In addition, all public water systems are required to complete a Consumer Confidence Report (CCR) each year. CCR's must include information on all regulated contaminants found in the drinking water system throughout the year. If you would like to view your community's CCR, contact your local water supplier or visit the Wisconsin Department of Natural Resources (DNR) website dnr.wi.gov, Search: Drinking Water Select the **Water Quality Data** link where you may search for *public water systems* by city or system name.

Private Wells

Radium in drinking water cannot be seen, tasted, or smelled.* Water must be tested to detect the presence of radium. Although the radium drinking water standard is not enforceable for private well owners, the same health risks apply. Private well owners are responsible for the safety of their own water supply and taking action to reduce elevated radium levels may be recommended.

In Wisconsin, private wells are not usually drilled into the deeper geologic formations containing higher concentrations of radium. Nevertheless, radium has been found in a small number of private drinking water supplies. Concerned owners whose wells have not been tested may wish to contact the regional office of the DNR for an estimate of approximate radioactivity levels, based



on available geologic data and previous well sampling. Owners should have the well's location and construction information available for DNR staff. A federally certified laboratory can perform a detailed analysis of water samples for radium. Water sample bottles, testing instructions and radium analyses are available for a fee from the only certified radiological lab in the state: The Wisconsin State Lab of Hygiene, (608) 224-6202 or 1-800-442-4618.

** Despite the fact that radium can not be detected by sight, taste or smell, private well owners are encouraged to test their water supply if changes do occur. A change in color, odor, or taste can be indicative of other water quality changes. In these instances, well owners may want to use an alternate safe drinking water source until you can have your water tested.*

What can be done if a community well contains elevated radium?

Communities have several options to reduce or eliminate the presence of radium in their drinking water supplies if it exceeds the MCL. These options include but are not limited to the following:

- Blend high radium water with water from sources containing lower levels of radium.
- Find an alternative water supply or construct a new well into a low radium aquifer.
- Soften or apply another effective radium removal treatment technique to the water supply.

The DNR and the water system owner will work together to develop a plan to bring the community public water system back into compliance with Wisconsin Administrative Code and SDWA requirements. Since USEPA revised the Radionuclide Rule in 2001, the DNR has worked with over 40 communities to bring them back into compliance with the radioactivity standards. The DNR is still working with a few communities on long-term alternatives for returning to compliance.

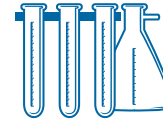
The water system owner must also notify consumers of the planned methods they will take to reduce the levels of radium to below the MCL. Typically, the water system owner will attempt to obtain water from a low radium source to replace or blend with the water containing higher levels. Some systems may be able to drill new wells or reconstruct existing wells to obtain groundwater with a lower radium content.

Treatment techniques that soften water are usually effective in removing radium. In some cases, the cost of the equipment, operation and maintenance can be significant. However, treatment for radium removal may often have beneficial side effects, such as reducing elevated iron content in the water. More frequent water quality monitoring will be necessary until such time as the radium levels have been reduced and maintained below the MCL.

What solutions are available for private well owners?

Private well owners are encouraged to have their well water tested if they live in areas known to have high radium levels in groundwater. In most cases owners will be advised to reconstruct or replace the well in order to obtain water with a lower radium content. Another option may be for the homeowner to purchase a Wisconsin Department of Safety and Professional Services approved water treatment system. A list of approved water treatment devices and the contaminants they remove is available at dsps.wi.gov/php/sb-ppalopp/contam_alpha_list.php. However, because water softeners and other treatment systems vary in their ability to remove different types of contaminants, well owners should proceed cautiously before installing a home water treatment unit.

If the well serves the public, such as a restaurant or daycare, then prior written approval from the DNR is required for the specific installation. All well owners whose wells have radium above the MCL are encouraged to contact the regional office of the DNR for assistance. To learn more about the approval process or to receive a list of home units approved for radium removal, contact your regional drinking water & groundwater specialist or call (608) 266-1054.



Where can I get more information?

Information on radium in drinking water and groundwater resources

Visit dnr.wi.gov, Search: Drinking Water. Select the **Publications** link where you will find information on a variety of listed topics.



Information on radium and related health issues

To obtain more information specific to radium and health contact your health care provider, local public health department or the Wisconsin Department of Health Services, Radiation Protection Section at (608) 267-4797.

Information on drinking water testing or sampling procedures

To receive appropriate bottles, sampling instructions and fee information for testing your private well for radium, contact the Wisconsin State Lab of Hygiene at (608) 224-6202 or 1-800-442-4618.

Information on the quality of your drinking water supply

Contact your local water supplier, your regional drinking water & groundwater specialist or visit the DNR website, listed above, for consumer confidence reports or other information related to public and private drinking water supplies.

Contact Us

Customer Service Staff are here to assist you.

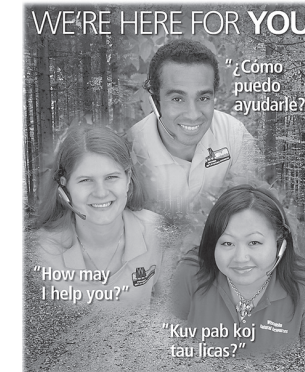
How may we help you?

Call Toll Free 1-888-WDNRINFO (1-888-936-7463)
Or, go to dnr.wi.gov, Search: Contact
Click on one of the following options:

Chat with customer service.

Call a representative.

Email your question.



Toll free hotlines Violation Hotline:
1-800-TIP-WDNR or
phone 1-800-847-9367
Confidentially report
suspected wildlife,
recreational and
environmental
violations.

Emergency Spill Hotline:
1-800-943-0003 phone

Bilingual Services are available Drinking Water & Groundwater Program

101 S. Webster
P.O. Box 7921
Madison, WI 53707-7921
(608) 266-1054

For more information, go to dnr.wi.gov,
Search: Drinking Water

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This publication is available in alternative format (large print, Braille, audiotape, etc.) upon request. Please call (608) 266-1054 for more information.



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