Radionuclides (Radium) in Drinking Water

Radioactive materials, also called radionuclides, are both naturally occurring and human-made. Radionuclides from naturally occurring sources can get into groundwater and surface waters in Minnesota. When radionuclides break down (decay), they create radiation. Radionuclides are a natural part of our environment, and small amounts of radiation are common in the air, water, and soil around us. Coming in contact with too much radiation can cause health problems.

Health Effects

Exposure to radiation can cause different types of health effects depending on the source of radioactivity, how much radiation you are exposed to (total dose), and how long you are exposed to the radiation. Drinking water that has radionuclide levels near the federal drinking water standards puts you in contact with very low doses of radiation every day. This exposure, when combined with other sources of radiation exposure, can slightly increase your lifetime risk of developing cancer or kidney problems.

How to Protect Yourself and Your Family

The U.S. Environmental Protection Agency's (EPA) *Radionuclides Rule* (see Resources section) has four federal standards for radionuclides in drinking water. The EPA Radionuclides Rule defines safe drinking water as containing up to or less than:

- 15 picocuries of alpha particles per liter of water (pCi/L)
- 5 pCi/L of combined radium 226/228
- 20 pCi/L of uranium
- 4 millirem of beta/photon emitters per year (mrem/yr)

If you have a private well

The factors that contribute to the presence of radionuclides in Minnesota's well water are not fully understood at this point. If you are concerned about radionuclides in your private well, you can pay to have it tested. Minnesota Department of Health (MDH) recommends using an accredited laboratory to test your well water (see *Search for Accredited Laboratories*). Contact the laboratory to get sample containers and instructions, or ask your county environmental or public health services if they provide well water testing services.

You can use the standards in the Radionuclides Rule for your private well. Home water treatment systems, such as ion exchange, water softeners, and reverse osmosis systems, can reduce the levels of some radionuclides in your water (see *Home Water Treatment*).

If you are on a public water system

Community public water systems (systems serving where you live) test for radionuclides and ensure levels meet EPA standards. You can find the levels of radionuclides detected in the system serving where you live by reading the system's water quality report (also known as a Consumer Confidence Report [CCR]). You can call your public water system to get a paper copy of your CCR, or you may be able to find it online (see *Consumer Confidence Report*).

Reduce Other Contact with Radionuclides

Testing your home for radon (a radionuclide in gas form) and taking steps to reduce the radon level is one of the most important things you can do to lower your overall radiation dose. See *Radon in Minnesota Homes* for more information.

Background Information

Natural and human-made radiation surround you every day. About half of the radiation you come in contact with each year is from natural sources, like the sun, soil, and rock. The other half comes from human-made sources, like medical tests (x-rays) and treatments and building and road construction materials. Each source of radiation gives you a different dose of radiation. For example, a radiation medical treatment has an extremely high dose of radiation compared to the very low dose of radiation you get from drinking water with radionuclides. Your lifestyle can also affect how much radiation you come in contact with. Flying in airplanes, living at high altitude, living near a coal mine, and some jobs (like underground mining) put you in contact with higher doses of radiation. Learn more about radiation at *Doses in Our Daily Lives*.

Radionuclides in Minnesota Water

Radionuclides, such as radium, polonium, radon, and uranium, occur naturally in Minnesota and can be found in small amounts in Minnesota's groundwater. In general, surface water does not have radionuclides at levels above the EPA standards.

In 2014, nine (1.2 percent) of Minnesota's municipal water systems (systems that serve homes in towns and cities) had levels of radium in treated water over the EPA standard. MDH studies found that the highest levels of radionuclides in source water occur in the Mount Simon-Hinckley and Jordan Aquifers in southeastern Minnesota.

Very few of Minnesota's private wells have been tested for radionuclides.

The following reports explain more about radionuclides in Minnesota's water:

- *Drinking Water Protection Annual Reports*
- *Uranium in community water systems*
- *Radium in community water systems*

What MDH is Doing

MDH regulates public water systems by:

- Approving public water systems' treatment plans.
- Enforcing the Safe Drinking Water Act.
- Testing public water supplies.

The *Environmental Monitoring Program* makes sure radiation levels are safe around nuclear power plants in Minnesota through sampling water, milk, and air.

MDH has conducted studies on radium and polonium-210 (radionuclide) in Minnesota groundwater and provides information on Safe Drinking Water Act Standards for radiological contaminants.

- *Distribution of Radium in Minnesota Drinking Water Aquifers*
- *Polonium-210 Occurrence in Minnesota's Aquifers: A Pilot Study*
- *Environmental Protection Agency Safe Drinking Water Act Standards: Microbiological Radiological, and Inorganic Contaminants.*

Resources

- Consumer Confidence Reports (www.health.state.mn.us/ccr)
- Distribution of Radium in Minnesota Drinking Water Aquifers (PDF) (www.health.state.mn.us/communities/environment/water/docs/swp/rareport.pdf)
- Doses in Our Daily Lives (www.nrc.gov/about-nrc/radiation/around-us/doses-daily-lives)
- Drinking Water Protection Annual Reports (www.health.state.mn.us/communities/environment/water/dwar)
- Safe Drinking Water Act Standards (www.health.state.mn.us/communities/environment/water/factsheet/sdwa)
- Environmental Monitoring (www.health.state.mn.us/communities/environment/radiation/monitor)
- Home Water Treatment (www.health.state.mn.us/communities/environment/water/factsheet/hometreatment)
- Polonium-210 Occurence in Minnesota's Aquifers: A Pilot Study (www.health.state.mn.us/communities/environment/risk/docs/guidance/dwec/polonium210report.pdf)
- Radionuclides Rule (www.epa.gov/dwreginfo/radionuclides-rule)
- Radon in Homes (www.health.state.mn.us/communities/environment/air/radon)
- Radium in community water systems (data.web.health.state.mn.us/web/mndata/radium-messaging)
- Search for Accredited Laboratories (www.health.state.mn.us/labsearch)
- Uranium in community water systems (data.web.health.state.mn.us/web/mndata/uranium-messaging)

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