

Radon in Groundwater

Radon is a naturally occurring, radioactive gas that can be found in the soil and rock beneath homes, buildings, and private wells.

The U.S. Environmental Protection Agency (U.S. EPA) estimates that about 1 in 15 homes in the country have elevated radon levels. No level of radon gas exposure is considered safe.

The significance of radon in private wells lies in the potential health risks associated with long-term exposure to the gas. Radon can enter homes and buildings through cracks in the foundation, sump pumps, floor-wall joints, and other openings, and can accumulate to levels that are hazardous to human health.



Health Impacts

Radon is the second leading cause of lung cancer U.S. after smoking. It is estimated to cause more than 20,000 deaths in the country every year (U.S. EPA, 2023).

Exposure to radon through drinking water can have significant health impacts, although the risk is generally lower than from inhaling radon gas (Otahal et al., 2014).

When radon is ingested through drinking water, it is absorbed into the bloodstream, potentially increasing the risk of developing certain types of cancer, including lung, stomach, and intestinal.

People who are exposed to radon through both drinking water and indoor air can face an increased risk of health problems compared with people exposed through only one source. While the risk of health problems from drinking water is lower than from inhaling radon gas, exposure to high levels of radon in drinking water can still have significant health impacts.

Individuals relying on private wells for drinking water are particularly at risk of exposure to high levels of radon in drinking water, as these wells are not subject to the same regulations as public water supplies (Chen, 2019).

It is important for homeowners with private wells to have their water tested for radon on an annual basis to determine if levels are high enough to pose a risk. If high levels are found, there are mitigation techniques that can be used to reduce exposure, such as installing a radon removal system in the water supply.

Treating Radon in Groundwater

U.S. EPA recommends testing radionuclides in private wells every 3 years. If high levels of radon are found in a private well, there are several methods that can be used to treat the water and reduce exposure. Some of the most common methods include:

- **Aeration:** This process involves bubbling the water through a tank of air to remove radon gas. This method is simple and can be effective for reducing radon levels in drinking water.
- **Granulated activated carbon (GAC):** This type of carbon is highly effective at removing radon from water. This method involves running the water through a tank filled with GAC, where the radon is adsorbed onto the carbon. GAC can be used only if radon gas levels in groundwater are very low. The use of GAC can create a radiation source and expose residents to radiation that cannot be disposed of as household waste.

The most effective method will depend on the specific situation, including the radon level, the well water chemistry, and the needs and preferences of the homeowner. A water treatment professional can help determine the best treatment option for a specific private well.

Recommended Resources

- Basic Information on Radon in Drinking Water | U.S. EPA
- Natural Radionuclides in Private Wells | U.S. EPA
- Radon in Private Drinking Wells | University of Massachusetts Outreach Extension

Tips to Maintain a Healthy Well

- **Know** your private well and take pictures of the following to reference later if there is damage:
 - Storage or pressure tanks
 - Pump
 - Treatment system, including filters
 - Electrical components
- **Know** your well depth and pump setting if using a submersible pump.
- **Test** your water annually for coliform and nitrate, and every 3–5 years for a complete analysis to determine if there have been any changes to the water quality.
- **Check** your private well periodically for any damage or maintenance problems. Always hire a qualified professional well contractor to service your well.
- **Keep** the contact information for a licensed well contractor, local health department, university extension service, licensed electrician, and water testing laboratory handy.

References

- Chen, J. (2019). A discussion on issues with radon in drinking water. *Radiation Protection Dosimetry*, 185(4), 526-531. <https://doi.org/10.1093/rpd/ncz035>
- Otahal, P., Merta, J., & Burian, I. (2014). Radon in private drinking water wells. *Radiation Protection Dosimetry*, 160(1-3), 235-238. <https://doi.org/10.1093/rpd/ncu095>
- U.S. Environmental Protection Agency. Health Risks of Radon. <https://www.epa.gov/radon/health-risk-radon>