Pennsylvania
Department of Health

Radon in Water

Understanding Your Water Quality: What to Know About Radon in Water

What is Radon and How Does It Get into My Water?

Radon is a colorless, tasteless, and odorless gas that can be found in underground rock layers throughout Pennsylvania. Radon is formed by the decay of uranium and is radioactive. Breathing in air with radon can cause lung cancer. Drinking water contaminated with radon may also cause stomach cancer; however, this risk is much lower than breathing radon and associated lung cancer risk.[1]

Radon typically enters buildings through the air. It is commonly released from the soil under the foundation or can enter through cracks and other holes in the building, regardless of age and building material. Radon can also dissolve into groundwater sources (e.g., well water). When water containing radon is used indoors, including bathing and washing dishes, it can be released into the air and accumulate inside the home. A small amount can also remain in the water and be consumed if used for drinking.[2] Water that originates from surface water sources (e.g., rivers and lakes) are unlikely to have high levels of radon as the gas will be released into the atmosphere before consumption.

A long-term study by the U.S. Geological Survey (USGS) found that 87% of the groundwater samples evaluated across Pennsylvania (PA) contained more than 300 picocuries per liter (pCi/L) of radon. The highest median radon groundwater concentrations were found in Lancaster County.[3]

Drinking Water Standard

Currently no drinking water standard for radon is set by the U.S. Environmental Protection Agency (EPA). Also, there is an action level but no regulated standard for radon gas in indoor air. If the indoor air level is at or above 4 pCi/L, the EPA and the Pennsylvania Department of Environmental Protection (PA DEP) recommend taking action to reduce the concentration indoors.[4]

Radon Quick Facts

- Radon is the second leading cause of lung cancer in the United States.
- The largest exposure to radon gas is from the air.
- Radon is found in nearly all soils across the United States.
- Forty percent of PA homes have elevated radon levels.[5]
- Radon can be found in groundwater sources, such as well water.
- Radon mitigation systems can be highly effective at reducing the level of radon in the air and/or in water inside your home.

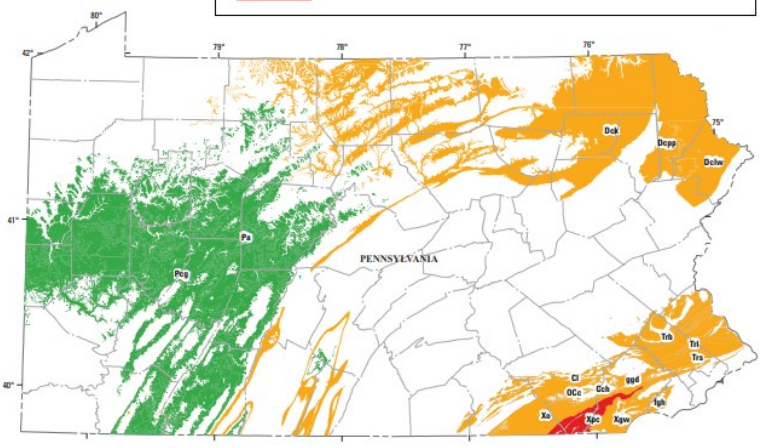


Figure 1. Median radon concentrations in groundwater by geologic area in Pennsylvania. This figure was altered from a 2017 USGS study.[3]

Radon and Health

Radon releases radiation, which can damage the cells in your body and may lead to cancer. The main health concern associated with radon in water is lung cancer caused by inhaling the radon that is released into the air from contaminated water. There is a higher risk of developing lung cancer among smokers and if spending time inside a building that has radon levels at or above 4 pCi/L. Drinking water that contains radon may also lead to stomach cancer, although the risk is not as high. According to the EPA, water contaminated with radon causes 168 cancer deaths each year, where 89% are from lung cancer and 11% are from stomach cancer.[2]

Private Wells

As of 2017, PA has the highest population served by private wells in the country.[6] More than 3.5 million Pennsylvanians are served by private wells. Private wells are not regulated by the state, and it is the responsibility of the well owner to make sure the water is safe to use.[7] High radon levels in water can occur throughout PA; however, the southeast region and the northern regions of the state tend to have the highest median levels. Because radon has no taste, color, or odor, there is no way to know whether there's radon in air or water without a laboratory test. To test for radon in water, use an accredited laboratory (see the PA DEP's list of accredited labs).

You should test your water every three years for radon if:

- Your indoor air sample shows high levels of radon within your home.
- You live in an area that has high levels of radon in the soil. You can check the level near you by using the PA Environmental Health Indicators Map. The radon information is found under the "Built Environment" category.

Safe Water Usage

If your water contains radon at a level of 4,000 pCi/L, it may add roughly 0.4 pCi/L of radon into the air in your home.[2] While keeping windows open and ventilating the area can help radon from concentrating inside your home, a radon mitigation system may be recommended.

Radon Level in Water	Suggested Water Treatment Actions
< 300 pCi/L	No actions are needed at this time.
300-4,000 pCi/L	Consider installing a water treatment system, particularly if your indoor air samples are at or above 4 pCi/L
4,000 pCi/L	Install a mitigation system to reduce the level of radon in your water.

Please keep in mind that the suggestions above are only for water test results. Air mitigation systems are suggested if the radon is detected at a level of 4 pCi/L or above in the air. For more information on radon in the air, please see the DOH radon fact sheet.

Water Treatment Systems

If you have high levels of radon in your water, you may want to install a water treatment system. Treatment systems can significantly lower the amount of radon in your water. Speak with a water treatment specialist in your area for further assistance.

The following table describes common ways to lower the amount of radon in drinking water.

Remediation Type	Additional Information
Aeration device	• This system aerates the water, releasing the radon from the water. The gas is then released through an exhaust fan. • This is the most effective mitigation option, but also the most expensive.
Granular activated carbon (GAC) filter	• Activated carbon filters absorb radon from the water. • Use caution when handling used filters. Radioactive material can accumulate on the filter as a result of radon being removed from the water.

Additional Information

- A Citizen's Guide to Radon: The Guide to Protecting Yourself and Your Family from Radon
- ATSDR Radon ToxFAQs
- EPA Radon
- PA DOH How to Interpret Water Test Results
- PA DOH Private Well Water
- PA DOH Radon Fact Sheet
- PA DEP Water Testing

Contact Us

If you have questions or concerns about your water quality and health, please contact the Division of Environmental Health Epidemiology by calling 717-787-3350 or emailing us at dehe@pa.gov.

References

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