

General Information on Radon in Water

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Radon, a radioactive gas that is continuously made in the soil and rock beneath our homes from the radioactive breakdown of uranium and radium, moves through the soil and can enter the house, the atmosphere or even the water table that is used by your well.

Generally speaking, if your water is supplied by a well, either your own private well or a public drinking water system that uses a well, there is a chance that you will have some radon in your water unless it has been treated. Water taken from streams, reservoirs, cisterns, or any water supply open to the atmosphere, is not expected to have measureable radon because the radon has already escaped to the atmosphere prior to being pumped into the house or the distribution system. If you find that your radon is elevated, once you get back your radon in water result, and you are on a public drinking water system, you should contact your water provider for further information or advice. If your own private well has radon above your comfort level, you will be responsible for any radon reduction. **The two common treatment systems are discussed in the second page and following, of this hand-out, a document provided by the U.S. EPA. You can click on the URL of that document and download it, if you wish. The EPA does not copyright its documents.**

Why is radon in water a concern?

Once your water is brought into the house, radon can escape out of the water and enter the house air and be breathed in. This is the main concern. The radon, of course, can also be consumed when you drink your water. However, a nation-wide study done by the National Academy of Science in the late 90's, calculated that fewer than 170 cancers a year nationally were caused by radon in water, about 17 of these being stomach cancer from ingestion, the rest being lung cancer from the radon that degassed during water use into the air and was breathed in by the occupant.

Are there regulations on the levels of radon in water?

No. The U.S. EPA attempted to set a minimum contaminant level (MCL) of 300 pCi/L for community water systems (4000 pCi/L if the water provider's state instituted an education program). That MCL was never promulgated. No attempt was ever made to control the level of radon in private wells. So, as things stand now, the radon in your private well water is not regulated by the Feds, or most states, at all, although 4000 pCi/L is being used nationally by radon mitigation experts and is the recommended action level by the MW-RN (radon in water committee) formed by the America Association of Radon Scientists and Technologists (AARST) Consortium on National Radon Standards.

Why should I test my well?

There is a rule of thumb that has been used for many years that for each 10,000 pCi/L of radon in the water, an additional 1 pCi/L of radon will be released into the indoor air by daily use of the water while showering, washing dishes, etc. So, if earlier testing of your indoor air has shown an elevated level (say, 4.0 pCi/L or higher, then, testing your water may reveal that a significant portion of the indoor radon is degassing from your water and you may decide to mitigate the water. For example, if your air contains 4.0 pCi/L and your water contains 30,000 pCi/L of radon, then, using the 10,000 to 1 rule of thumb, of

the 4 pCi/L in your indoor radon, most (3 pCi/L) is coming from radon degassing from the water and you may consider treating the water. (3 is 1/10,000 Of 30,000).

It is always recommended, for this reason, to test your home air for radon, prior to, or along with a radon in water test, in order to judge if water treatment is worthy of consideration.

How does Radon Measurements Lab calculate the radon in your well water?

You, the homeowner are an important part of this process. When you purchase a test kit, you will receive a detailed instruction sheet. Care is required on your part while sampling your water. Read the instruction sheet thoroughly and do not start the sampling until you understand all of it. It is especially important that the water you sample has run long enough so that you are not sampling water from your pressure tank or holding tank. Next, it is important that both bottles are filled one right after the other and that neither has any air bubbles in it when it is capped. Finally, the back of the instruction sheet has a report form on it. You must fill out all of the report form in order for us to calculate the radon in the water.

When we receive your samples, we will measure the alpha particle activity in the radon-222 and two of its decay products, polonium-218 and polonium-214, which occur naturally in the water. We will compare that activity to three standards made by the U.S. EPA and already programmed into our computer. The alpha particle counter uses liquid scintillation as recommended by the EPA standard 7500 RN. The counter is made by Hidex, the model is a Triathler. It is a state of the art liquid scintillation counter. We also follow the recommendations made by the AARST radon in water advisory committee (MW-RN) currently in draft form, and will continue to follow this committees decisions once they are formally adopted by the industry consortium.

We will measure and report both vials and give you a radon value for both vials and a relative percent difference (RPD) between the two vials. Generally speaking, a radon value of 100 pCi/L is the lowest that can be reliably measured and is called the MDL or minimum detectable level (which is equivalent to adding 0.01 pCi/L to your indoor air). The relative percent difference (RPD) tells you how close the radon values of two vials are to each other. **For high radon, above 4000 pCi/L, a 10 % RPD, or lower, is expected, meaning the two values are within 10 % of each other but, this low of an RPD requires that you followed the instructions carefully and returned the samples promptly, preferably UPS or FedEx overnight.**

Can the radon in water be reduced?

If your radon in water test comes back at 4000 pCi/L or higher. It is recommended that you do a confirmatory test. If both the initial and the confirmatory results are 4000 pCi/L or higher, mitigation is recommended.

For radon around 4000 pCi/L to 5000 pCi/L, a simple granulated activated charcoal (GAC) filter will often reduce the radon to below 100 pCi/L. This filter is installed professionally in the main water line, **and not at one of the water faucets. This is not one of the water filters that is purchased at a hardware store for a single tap (point of use).** Check the Yellow pages or online for purchase or rent.

Radon above 5000 pCi/L is normally mitigated using an aeration system. Here, the water coming into the house is sprayed in a sealed tank which resembles an old-fashioned clothes washer, and fresh air is also brought in to strip the radon out of the water. That air is then exhausted safely above the eave line, similar to a radon in air mitigation system. The cleaned water is then again pumped up to pressure and put back into the water line for distribution throughout the house. Again, find a seller and installer online or in the Yellow pages.

The following pages are from the EPA website. Although written some years back, this information is still valid and correct, although phone numbers contained herein may be out of date.

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Basic Information about Radon in Drinking Water

- [Radon Home](#) <https://archive.epa.gov/water/archive/web/html/basicinformation-2.html>

- [Basic Information about Radon in Drinking Water](#)

- [Proposed Radon in Drinking Water Regulation](#)

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What is radon?

Radon is a gas that has no color, odor, or taste and comes from the natural radioactive breakdown of uranium in the ground. You can be exposed to radon by two main sources: (1) radon in the air in your home (frequently called "radon in indoor air") (2) and radon in drinking water.

Radon can get into the air you breathe and into the water you drink. Radon is also found in small amounts in outdoor air.

Most of the radon in indoor air comes from soil underneath the home. As uranium breaks down, radon gas forms and seeps into the house. Radon from soil can get into any type of building – homes, offices, and schools – and build up to high levels in the air inside the building.

Radon gas can also dissolve and accumulate in water from underground sources (called ground water), such as wells. When water that contains radon is used in the home for showering, washing dishes, and cooking, radon gas escapes from the water and goes into the air. It is similar to carbonated soda drinks where carbon dioxide is dissolved in the soda and is released when you open the bottle. Some radon also stays in the water.

Radon is not a concern in water that comes from lakes, rivers, and reservoirs (called surface water), because the radon is released into the air before it ever arrives at your tap.

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Why is radon in drinking water a health concern?

Breathing radon in indoor air can cause lung cancer. Radon gas decays into radioactive particles that can get trapped in your lungs when you breathe it. As they break down further, these particles release small bursts of energy. This can damage lung tissue and increase your chances of developing lung cancer over the course of your lifetime. People who smoke have an even greater risk. Not everyone exposed to high levels of radon will develop lung cancer. However, radon in indoor air is the second leading cause of lung cancer. About 20,000 deaths a year in the U.S. are caused by breathing radon in indoor air.

Only about 1–2 percent of radon in the air comes from drinking water. However breathing radon increases the risk of lung cancer over the course of your lifetime. Some radon stays in the water; drinking water containing radon also presents a risk of developing internal organ cancers, primarily stomach cancer. However this risk is smaller than the risk of developing lung cancer from radon released to air from tap water.

Based on a National Academy of Science report, EPA estimates that radon in drinking water causes about 168 cancer deaths per year: 89% from lung cancer caused by breathing radon released to the indoor air from water and 11% from stomach cancer caused by consuming water containing radon.

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Is there radon in my water?

Not all drinking water contains radon. If your drinking water comes from a surface water source, such as a river, lake, or reservoir, most radon that might be in the water will be released into the air before reaching your water supplier or home. Radon is only a concern if your drinking water comes

from underground, such as a well that pumps water from an aquifer, though not all water from underground sources contains radon.

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What levels of radon in water should I be concerned about?

There is currently no federally-enforced drinking water standard for radon. EPA has proposed to regulate radon in drinking water from community water suppliers (water systems that serve 25 or more year-round residents). EPA does not regulate private wells.

EPA has proposed to require community water suppliers to provide water with radon levels no higher than 4,000 pCi/L, which contributes about 0.4 pCi/L of radon to the air in your home. This requirement assumes that the State is also taking action to reduce radon levels in indoor air by developing EPA-approved, enhanced State radon in indoor air programs (called Multimedia Mitigation Programs). This is because most of the radon you breathe comes from soil under the house. This option gives States the flexibility to focus on the greatest problems, by encouraging the public to fix radon in indoor air problems and build homes that keep radon from entering.

Under the proposed regulation, States that choose not to develop enhanced indoor air programs, community water systems in that State will be required to reduce radon levels in drinking water to 300 pCi/L. This amount of radon in water contributes about 0.03 pCi/L of radon to the air in your home. Even if a State does not develop an enhanced indoor air program, water systems may choose to develop their own local indoor radon program and meet a radon standard for drinking water of 4,000 pCi/L.

EPA proposed this option, under the framework specified by the 1996 Amendments to the Safe Drinking Water Act, so that the overall risks from exposure to radon, both through air and water, are reduced.

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How do I test for radon in drinking water and how do I get rid of it?

- **If you get water from a public water system:** Find out whether your water system gets its water from a surface (river, lake, or reservoir) or a ground water (underground) source.

- *If the water comes from a surface water source*, most radon that may be in the water will be released to the air before it makes its way to your tap.
- *If the water comes from a ground water source*, call your water system and ask if they've tested the water for radon.
- **If you have a private well:** EPA recommends testing your drinking water for radon. Call the [Safe Drinking Water Hotline](#) (1-800-426-4791) which can provide phone numbers for your State laboratory certification office. Your State laboratory certification office or State radon office can direct you to laboratories which may be able to test your drinking water for radon.

If testing your private well shows that you have high levels of radon in your drinking water and you are concerned about it, there are some things you can do to improve the water. The most effective treatment you can apply is to remove radon from the water right before it enters your home. This is called point-of-entry treatment. There are two types of point-of-entry devices that remove radon from water:

- Granular activated carbon (GAC) filters (which use activated carbon to remove the radon) **(Note added by Dr. Burkhart; GAC is recommended for radon in water less than 5000 pCi/L)**, and
- Aeration devices (which bubble air through the water and carry radon gas out into the atmosphere through an exhaust fan) **(Note added by Dr. Burkhart; aeration is recommended for radon in water more than 5000 pCi/L)**.

GAC filters tend to cost less than aeration devices, however, radioactivity collects on the filter, which may cause a handling hazard and require special disposal methods for the filter.

For more information on point of use treatment, you should contact the following independent certifying organizations: [EXIT Disclaimer](#)

- [NSF International](#);
- [Water Quality Association](#); or the
- [Underwriter's Laboratory](#).

Additional information and documents about radon in your home can be found below.

- [EPA's Indoor Air Quality Radon site](#)
- [A Citizen's Guide to Radon](#) – This document provides information on how to [test for Radon in your home](#)
- [Consumer's Guide to Radon Reduction *How to Reduce Radon Levels in Your Home...*](#)
- [The Home Buyer's and Seller's Guide to Radon](#)

I receive water from a public water supplier. How will EPA's proposed regulation affect me?

The proposed radon regulation does not affect public water systems or their customers. EPA must promulgate a final regulation before a federal radon regulation will be enforced. Within three years of promulgating the final regulation, your State may decide to develop a plan for an enhanced radon in indoor air program, which would require your public water supplier to reduce radon levels in the water supply to 4,000 pCi/L. Consumers may be interested in participating in their State's development of this plan, once the radon rule is finalized. If your state or public supplier does not develop an enhanced radon in indoor air program, your public water supplier will be required to reduce radon levels to 300 pCi/L. Under either option, your water bills may increase depending on the size of your water supplier and the radon levels in the drinking water in your area.

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How do I get more information about radon?

- **Call the Safe Drinking Water Hotline (1-800-426-4791)** – The Safe Drinking Water Hotline can provide you with more information about what EPA is doing to regulate radon in drinking water and refer you to your State drinking water program for information about your community water system.
 - [Safe Drinking Water Hotline Web site](#)
- **Call your Local Water Supplier** – Your local water supplier will have information about your local water supply and can answer any questions you have about your water. Look for the phone number on your water bill or in the government section of your phone book.
- **Call the Radon Hotline (1-866-730-GREEN)** – The Radon Hotline can refer you to your State radon office for more information, and can send you free publications about radon in indoor air.
- **The Indoor Environments Division (IED)**, located within the Office of Radiation and Indoor Air (ORIA), under the Office of Air and Radiation (OAR), is responsible for implementing EPA's Indoor Environments Program, a voluntary (non-regulatory) program to address indoor air pollution.
 - [EPA's Indoor Air Quality Radon site.](#)

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