



Radon in Water

EMSL Radiochemistry Laboratory

What is Radon?

Radon is a radioactive gas that comes from the natural radioactive decay of radium, which is a natural decay product of uranium. Scientifically, “radon” is known as radon-222 that is the most abundant isotope of the element radon. As a noble gas, radon is colorless, odorless and chemically inert and cannot be detected by human senses.

Is Radon in Drinking Water a Health Concern?

According to the U.S. Environmental Protection Agency (EPA) ⁽¹⁾, radon gas can also dissolve and accumulate in water. When water containing radon is used in the home for showering, washing dishes and cooking, its gas escapes from the water and goes into the air. Breathing in radon can cause lung cancer. Radon gas decays into radioactive particles that can get trapped in your lungs when you breathe it in. 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.

In 2003, the EPA updated the estimates of lung cancer risks from indoor radon based on the National Academy of Sciences' (NAS) latest report on radon called, “*The Health Effects of Exposure to Radon: The Biological Effects of Ionizing Radiation (BEIR) VI Report (1999)*”. A best estimate of annual lung cancer deaths from radon is about 21,000 with an uncertainty range of 8,000 to 45,000⁽²⁾.

(1) For more information, please visit the EPA’s “Radon in Drinking Water: Questions & Answers” page at: <http://bit.ly/2aZkmlq>.

(2) For more information, please visit the EPA’s “Health Risk of Radon” page at: <https://www.epa.gov/radon/health-risk-radon#beir>.

Is there Radon in my Water?

Not all drinking water contains radon. The EPA states that if your drinking water comes from a surface water source such as a river, lake or reservoir, radon present in the water would 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.



What Levels of Radon in Water is A Concern?

The EPA has proposed to require community water suppliers to provide water with radon levels no higher than 4,000 pCi/L⁽³⁾. 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, which are referred to as Multimedia Mitigation Programs, since most of the radon you breathe comes from soil under the house.

Under the proposed regulation, states that choose not to develop enhanced indoor air programs community water systems 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.

(3) For more information, please visit the EPA's "Proposed Radon in Drinking Water Regulation" page at: <https://archive.epa.gov/water/archive/web/html/regulations.html>.

Does EMSL provide Tests for Radon in Water?

EMSL's Radiochemistry Laboratory provides air and water radon testing services. Radon in water will be tested by an EPA procedure (EPA Method 913.0) with detection limit of ~ 50 pCi/L. If your results are < 300 pCi/L, no additional actions are needed. This amount of radon in water contributes only about 0.03 pCi/L of radon to the air in your home. Analysis of radon in water should always come after air testing.

How Radon can be Removed from the water?

The most effective treatment 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** -- Use activated carbon to remove radon
- **Aeration Devices** -- Bubbles air through the water and carries radon gas out into the atmosphere through an exhaust fan

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

For more information, please visit the following websites:

- <https://www.epa.gov/radon>
- <http://www.cdc.gov/healthywater/drinking/private/wells/disease/radon.html>



EMSL Sampling Instructions

1. Samples are collected from a non-aerated faucet or spigot to minimize desorption of radon as follows.
2. Turn on the faucet and allow the water to flow for two minutes.
3. Open the sample vial and fill with water. Allow to gently overflow over the bottle.
4. Cap the sample container and check that there is no bubble when upside down.
5. Samples should be received by the laboratory within three days of collection.



Sampling Kit



20 mL clear glass vials with black PP hole cap and 0.135" Teflon/Silicone Septum



Allow to gently overflow over the bottle.



Check there is no bubble when upside down.