



Pat Quinn, Governor

Illinois Department of Public Health

Environmental Health FACT SHEET

Radium in Drinking Water

What Is Radium?

Radium (Ra) is a naturally occurring radioactive element that is present in varying amounts in rocks and soil within the earth's crust. Small amounts of radium also can be found in groundwater supplies. Radium can be present in several forms, called isotopes. The most common isotopes in Illinois groundwater are Ra-226 and Ra-228. The main type of radiation emitted by radium is the alpha particle.

Is Radium In My Water?

Surface water is usually low in radium but groundwater can contain high levels of radium depending on local geology. Deep bedrock aquifers used for drinking water sometimes contain levels of Ra-226 and Ra-228 that exceed health-based regulatory standards. In Illinois, high radium levels occur primarily in the northern third of the state due to the presence of radium in the granite bedrock that surrounds aquifers from which water supplies are drawn.

Most of the private wells in Illinois draw their well water from aquifers that are much shallower than those used by public water supplies. Most shallow aquifers do not contain higher levels of radium. However, radium has been found in some private and public wells. Radium cannot be seen, tasted, or smelled in your drinking water. Unless your private water supply has been tested for radium, you should not assume your water is radium-free. All public water supplies are tested regularly for radium.

Is Radium In Water Harmful To My Health?

Radium in water may pose a hazard to human health when the water is used for drinking or cooking. Only a small portion of ingested radium is absorbed from the digestive tract and distributed throughout the body. The rest is passed unchanged from the body. Some absorbed radium is excreted in urine. Absorbed radium behaves similarly to calcium and is deposited in the tissues of the body, especially bone. Any radiation received externally through showering, washing, or other uses is not a hazard since alpha particles do not travel through your skin.

Internally deposited radium emits alpha particles that may then damage surrounding tissue. Studies of workers exposed to high levels of radium and other sources of alpha radiation for extended periods show that high levels of radium may cause depression of the immune system, anemia, cataracts, and fractured teeth. Exposure to high levels of radium also has shown an increased incidence of bone, liver and breast cancer.

Is There A Safe Level Of Radium In Drinking Water?

Based upon our current knowledge, it is assumed that any radiation exposure carries some degree of risk. However, the U.S. Environmental Protection Agency (USEPA) has established a maximum contaminant level (MCL) for radium in public water supplies of 5 picoCuries per liter (pCi/L). The MCL for radium has been set well below levels for which health effects have been observed and is therefore assumed to be protective of public health. Public water supplies whose radium levels exceed 5 pCi/L are required to notify the public that the water exceeded the MCL. They also must evaluate ways to reduce the radium levels in the water. Individuals may test their private wells and use the MCL of 5 pCi/L as a guideline.

Is There A Test To Determine If I Have Been Exposed To Radium?

If you think that you have been exposed to radium in your drinking water, you should consult your doctor. Urine tests can determine if you have been exposed to radium. Another test measures the amount of radon (a breakdown product of radium) in exhaled air. However, these tests cannot tell how much radium you have been exposed to or if adverse health effects will occur.

Can Radium Be Removed From Water?

A number of treatment methods are available to remove radium from water. Ion exchange, lime softening, and reverse osmosis are the most common and can remove up to 90 percent of radium present. Ion exchange (i.e. water softeners) can often remove 90 percent of radium present along with water hardness. For some people, an undesired effect of ion exchange is the addition of sodium to the treated water. Those on low sodium (salt) diets should consider this before installing a softener. Reverse osmosis does not add sodium to the water.

Where Can I Get More Information?

Illinois Department of Public Health
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