



**Chemicals in Drinking Water
Fact Sheet**
Florida Department of Health, Bureau of Environmental Health

This fact sheet discusses possible health risks from exposure to low levels of radionuclides found in drinking water.

Radionuclides

What are radionuclides?

Radionuclides are radioactive forms of chemicals. They are not stable and will emit radiation over time, forming different, more stable chemicals (a process called decay). When this happens, energy is released as alpha particles, beta particles, or gamma radiation.

Alpha particles are easily blocked by thin clothing or even paper. Some beta particles can enter the upper layer of human skin and cause burns, but most cannot. Gamma rays are pure energy. They can travel long distances and pass completely through the human body. Gamma rays can easily damage tissue and DNA.

Fortunately, radionuclides found in Florida mostly give off alpha or beta particles. These chemicals must enter your body to affect your health.

How might exposure to radionuclides in water occur?

Some areas of Florida naturally have uranium and radium in the soil. Water that seeps through this soil dissolves some of these substances, and they are then carried into underground aquifers. Some of these aquifers are used for drinking water.

What is the standard for radionuclides in drinking water?

The Florida Department of Environmental Protection sets drinking water standards for uranium, combined radium, and total alpha radiation (called gross alpha particle activity).

The standard for uranium is 30 micrograms per liter (30 µg/L). The standard for radium is not the amount of the chemical, but the amount of radiation given off by the two most common forms (called isotopes). The standard for combined radium is 5 picoCuries per liter (5 pCi/L). The standard for gross alpha particle activity is 15 picoCuries per liter (15 pCi/L).

How can radionuclides affect my health?

Drinking water standards are set at very low levels. Drinking water every day at or below the standard for your entire lifetime is unlikely to cause illness.

To set drinking water standards, scientists study reports of people exposed to chemicals at work. They also study reports of experiments with animals. From these reports, they determine a “no-effect level” or level that doesn’t cause illness. Then, to be on the safe side, they set drinking water standards hundreds or thousands of times less than the “no-effect level.” Therefore, drinking water with levels slightly above the standard for a short time does not significantly increase the risk of illness. However, the risk of illness increases as the level of chemical increases and the length of time you drink the water increases.

The type and severity of health effects associated with exposure to a particular chemical depends on a number of factors:

- How much of the chemical was someone exposed to each time?
- How long did the exposure last?
- How often did the exposure occur?
- What was the route of exposure (eating, drinking, or breathing)?

How chemical exposures may affect someone can range widely from one person to the next. A number of personal factors also determine health effects. These include:

- How old are they?
- What gender are they?
- Is the person generally healthy or do they already have other health problems?
- What are their health habits? (For instance, do they drink alcohol or smoke tobacco?)

Drinking water that has high levels of uranium over a long period of time may cause kidney or lung damage. These non-cancer effects are due to chemical processes, and not radiation. The alpha particles given off by uranium is assumed to increase your cancer risk, but uranium has not been linked to any specific cancer type.

Drinking water that has high levels of radium over a long period of time may cause anemia, fractured teeth, or cataracts. It can also cause bone, liver, or breast cancer.

Is there a medical test for radionuclide exposure?

Special urine tests can determine if you have been exposed to radium. Uranium can be measured in blood, urine, hair, or other tissues. These tests cannot predict your health risks.

Is it safe to keep drinking water with radionuclides in it?

Levels of radionuclides less than the drinking water standard are not likely to cause illness. Drinking water with levels slightly above the standard for a short time period does not significantly increase the risk of illness. However, health risks increase as the levels of a chemical, or how long a person drinks it, increases. Because of this, it is best to drink water that meets standards.

For additional health information, please call the Florida Department of Health at 850-245-4250 or visit us online at www.floridahealth.gov/environmental-health/drinking-water/Chemicals-HALs.html

For more information about the health effects from exposure to radionuclides in different situations and at higher levels than those usually found in drinking water wells, please see the ATSDR ToxFAQs for uranium at: <https://www.atsdr.cdc.gov/toxfaqs/tfacts150.pdf> or radium at: <https://www.atsdr.cdc.gov/toxfaqs/tfacts144.pdf>