

August 2006

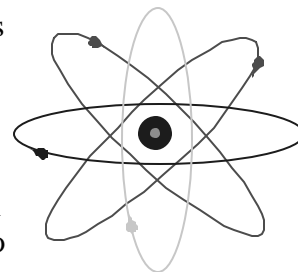
WHAT YOU NEED TO KNOW ABOUT

Uranium in Drinking Water

This information on uranium in drinking water has been prepared by the Connecticut Department of Public Health, Division of Environmental Epidemiology and Occupational Health. It answers some of the most common questions and concerns about uranium in drinking water.

What is Uranium (U)?

Uranium is a silver-colored metal that is radioactive. Small amounts of uranium occur naturally in rocks, soil, and water. Natural uranium is composed of three forms (also known as *isotopes*): uranium-234, uranium-235, and uranium-238. Uranium-238 is the most predominant form. Over 99 percent of the uranium found in nature is uranium-238. Uranium is not stable but breaks down into other elements including radium and radon. This process is called decay, and alpha radiation is released. Both radium and radon are also unstable, and decay to other elements, releasing additional radiation. The total amount of radioactivity emitted is combined and often referred to as *gross alpha*. The gross alpha results are measured using the term pico Curies per liter (pCi/l). Uranium-238 decays very slowly. Uranium-238 is not the same form of uranium used in nuclear power plants or weapons. Depending on the type of analysis, uranium results are measured in terms of micrograms per liter ($\mu\text{g/l}$), or pico Curies per liter (pCi/l).



How Does Uranium Get Into Drinking Water?

Uranium is a naturally occurring element in groundwater in some portions of Connecticut. However, there is little information on where uranium may be found. Uranium gets into drinking water when groundwater dissolves minerals that contain uranium. The amount of uranium in well water will vary depending upon its concentration in bedrock. However, even within areas that have bedrock types containing uranium, there is a large degree of variation within relatively small areas. Levels of naturally occurring radiation in water are not likely to be high in shallow wells. The potential exists for deep bedrock wells in Connecticut to have uranium, although most will be very low. High levels of uranium indicate the potential for radon and radium also to be present.

How Can Uranium Affect My Health?

Naturally occurring uranium has very low levels of radioactivity. However, the chemical properties of uranium in drinking water are of greater concern than its radioactivity. Most ingested uranium is eliminated from the body. However, a small amount is absorbed and carried through the bloodstream. Studies show that drinking water with elevated levels of uranium can affect the kidneys over time. Bathing and showering with water that contains uranium is not a health concern.

Do I Have Uranium in My Drinking Water?

To find out if you have uranium in your drinking water you must test for it. The Connecticut Department of Public Health recommends conducting an initial screening test for *gross alpha*. A *gross alpha* test is a measure of overall radioactivity in the water. If this initial and inexpensive analysis indicates there is little or no *gross alpha*, then there is no need to conduct additional testing. If, on the other hand, the results indicate elevated *gross alpha*, then the water should be resampled and analyzed for additional compounds.

How to interpret results of *gross alpha* tests:

- if 5 pCi/l or less, water is OK, no further testing is needed
- if above 5 pCi/l and lower than 15 pCi/l, then test for Radium 226 and Radium 228
- if greater than 15 pCi/l then test for Uranium, Radium 226, and Radium 228

You should contact your local health department for information on testing and for the most current listing of approved laboratories.

What Do The Results of My Water Test Mean?

The new federal standard, known as the *maximum contaminant level* (or MCL), for uranium in public water supplies is 30 µg/l (which is roughly equivalent to 30 pico Curies per liter). The testing and treatment requirements under this federal standard apply only to public water systems servicing residential populations and not to private home wells or public facilities such as schools that are not residences. Private well owners are not required to follow this standard, but by following the recommendations below you can protect your family's health. If your water test comes back with uranium results greater than 30 µg/l, you should look into obtaining treatment for your water. However, since results can vary widely from season to season, it is prudent to re-test whenever the results are above 10 µg/l. While water treatment is strongly recommended only at confirmed levels of 30 µg/l or higher, some individuals on private wells may choose to increase their safety margin and treat water that contains lower levels (e.g., 10-30 µg/l). If you follow the screening protocol described above you will also have results for *gross alpha* and radium to evaluate. For the purposes of comparison it is best to compare these results to current standards for public water supplies. The current federal standard (MCL) for *adjusted gross alpha* (includes radiation from radium but excludes radiation from radon and uranium) in public water supplies is 15 pCi/l. The current federal MCL for combined radium 226 and radium 228 in public water supplies is 5 pCi/l.

What Type of Treatment Will Decrease Uranium in Well Water?

Water treatment systems can effectively remove uranium from drinking water. Two common methods are **reverse osmosis** and **ion exchange**. Reverse osmosis works by forcing water filtering through a membrane that prevents the uranium from passing through. This membrane should be replaced every 2 to 3 years. Ion exchange works by passing water through a system that replaces uranium with a safer compound. Both methods usually involve maintenance, including backwashing. Both methods involve costs and disposal systems that should be investigated carefully before choosing a system. Both systems also require periodic monitoring of the treated water to make sure they are working properly.

Whom Can I Contact For More Information?

Health Questions	Regulatory Questions or Public Water Systems	Testing/Treatment of Private Wells and Certified Testing Labs
CT Dept. of Public Health Division of Environmental Epidemiology & Occupational Health (860) 509-7742 PO Box 340308, MS # 11CHA 410 Capitol Avenue Hartford, CT 06134-0308 email: webmaster.dph@po.state.ct.us	CT Dept. of Public Health Water Supplies Section (860) 509-7333 PO Box 340308, MS # 11WAT 410 Capitol Avenue Hartford, CT 06134-0308	Your Local Health Department Note: The Water Supplies Section of CT DPH will provide local health departments with water treatment guidelines.

This fact sheet is funded in part by funds from the Comprehensive Environmental Response, Compensation, and Liability Act trust fund through a cooperative agreement with the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services.