Piedmont Water Company

Water Essentials

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Radionuclides and Drinking Water

What Are Radionuclides?

The majority of radionuclides found in drinking water sources are naturally-occurring. Naturally occurring radionuclides are found both in the Earth's crust and in the upper atmosphere.

Certain rock types contain trace amounts of uranium-238. As this element breaks down or decays, it can produce ions of the U-238 in the form of radon, radium and uranium. U-238 is not the same form of uranium used in nuclear power plants or weapons.

Manmade radionuclides in drinking water have not been a wide spread problem to date, but the potential for contamination exists from sources such as medical facilities or nuclear power plants.

How Do Radionuclides Get Into My Water?

Uranium can commonly be found in very small amounts in rocks, soil, water, plants and animals (including humans). As we know, water is a very effective solvent and is able to dissolve a large number of things. As water washes through rivers, lakes, streams and underground aquifers, a small portion of whatever it touches is usually dissolved into the water. When groundwater dissolves minerals that contain radionuclides, these minerals get into the drinking water.

What Are The Health Effects of Radionuclides?

Naturally occurring uranium has very low levels of radioactivity. Studies have not demonstrated that low levels of natural uranium exposure are a cause of cancer; however, the EPA has classified all of the radionuclide contaminants as known human carcinogens.

At high exposure levels, uranium is believed to increase the chances for cancer and the EPA believes that high exposure can be toxic to the kidneys. The body eliminates a majority of any ingested uranium as waste; however, a small amount is absorbed and carried through the bloodstream. Because uranium can not be absorbed through the skin, bathing and showering with water that contains uranium is not a health concern.

What Are the Regulations Regarding Radionuclide Levels in Drinking Water?

The Georgia Department of Natural Resources and the US Environmental Protection Agency have set Maximum Contaminant Levels (MCL) for radionuclides. These levels were adopted in 2000. Initial monitoring began in January 2004 and final implementation of the rule by December 31, 2007. Because radionuclide levels vary throughout the year, the test takes a year to complete with samples taken at quarterly intervals to form a composite sample.

pCi/L—Picocuries per Liter common unit for measuring radioactivity level
µ/L—Micrograms per liter equivalent to parts per billion or one part of chemical per billion parts of water.

Regulated Contaminant Levels

Regulated Radionuclide	Maximum Contaminant Level (MCL)	Maximum Contaminant Level Goal (MCLG)
Gross Alpha Particle	15 pCi/L	0
Combined radium 226/228	5 pCi/L	0
Uranium	30 µ/L	0

ADDITIONAL RESOURCES:

U.S. Environmental Protection Agency Radiation Protection Programs
http://www.epa.gov/radiation/basic

Georgia Division of Public Health Chemical Hazards Program
http://www.health.state.ga.us/programs/hazards

Nation Drinking Water Clearinghouse Fact Sheet: "Radionuclides"
http://www.nesc.wvu.edu/ndwc/pdf/OT/TB/TB13_radionuclides.pdf