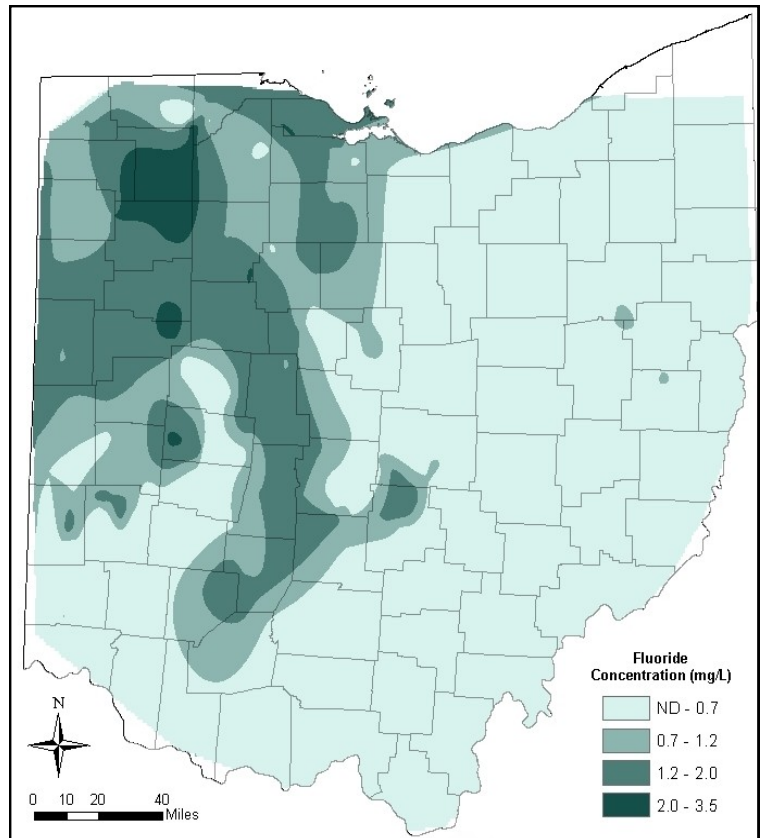


Fluoride in Ohio's Ground Water

Fluoride is the naturally-occurring stable form of the gaseous element fluorine (F). Fluoride is among the top 15 most abundant components of the Earth's crust and is naturally found in very small amounts in most aquifers. An aquifer is an underground unit of saturated earth materials that can provide usable quantities of ground water to a well.

How does fluoride get into Ohio's ground water?

As water flows through earth materials, some of the rocks and minerals it contacts are dissolved and fluoride is naturally released into the water. Most ground waters in Ohio naturally contain less than one milligram per liter (mg/L) of fluoride (1 mg/L is 1 part per million; or one cent in a million pennies). A number of human activities can also increase fluoride concentrations in soil and water, including glass, steel, and phosphate fertilizer production. In addition, agricultural run-off, infiltration of fertilizers, and discharges from septic or sewage treatment facilities that process fluoridated water can all add inorganic fluorides to the environment.



Where will you find elevated fluoride in Ohio's ground water?

The limestone aquifers in western Ohio have the highest fluoride concentrations in Ohio, as illustrated in the figure above. Limestone aquifers contain the most fluoride-bearing minerals and dissolution of these minerals releases fluoride into ground water in the limestone aquifers. The sand and gravel aquifers found throughout the state may contain some fluoride-bearing carbonate material from local erosion. Thus, the fluoride concentrations in some sand and gravel aquifers falls between the higher concentrations found in the limestone aquifers and the lower concentrations in the sandstone aquifers.

What are safe levels of fluoride in drinking water?

The U.S. Environmental Protection Agency's maximum contaminant level (MCL) for fluoride in public drinking water is 4 mg/L. MCLs are enforceable standards applied to drinking water distributed to the public. If levels exceed the fluoride MCL, a public water system is required to reduce fluoride to safe levels. The Ohio Department of Health has adopted the U.S. EPA MCLs as health based standards for private water systems that serve homes and smaller facilities not served by public water. Health based standards for private water systems provide guidance to a well owner on the possible health effects of consuming the water.

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The fluoride drinking water standard is based on the potential for unhealthy dental fluorosis (tooth mottling) and skeletal fluorosis (makes bones brittle). Ohio does not have any community water systems that have a naturally-occurring fluoride concentration above the MCL. The secondary MCL (SMCL) for fluoride is 2 mg/L. This secondary standard addresses aesthetic or cosmetic concerns. Drinking water with fluoride levels between the MCL and the SMCL poses no health risks, but unsightly dental fluorosis or mottling of tooth enamel may occur. Less than 20 community public water systems within Ohio have naturally occurring ground water fluoride levels that fall between 2 mg/L and 4 mg/L. These systems are required by Ohio EPA to issue public notices to those served.

What are the health effects of fluoride in drinking water?

Fluoride can help prevent cavities. Populations consuming fluoridated drinking water or other fluoridated products, such as fluoridated toothpaste, develop fewer cavities. However, exposure to levels of fluoride above the MCL can harm tooth development and cause severe dental and skeletal fluorosis. A comprehensive review of health effects from exposure to fluoride was published by the National Research Council in March 2006 — <http://dels.nas.edu/Report/Fluoride-Drinking-Water-Scientific/11571>. The Centers for Disease Control and Prevention also provides health information on consumption of water containing fluorides — www.cdc.gov/fluoridation/index.htm.

What is fluoridation?

Fluoridation is the controlled addition of fluoride to a public water supply with the goal of reducing tooth decay in the general public. It began in the U.S. in the 1940s in response to studies revealing that children in areas with naturally fluoridated waters showed a significantly lower incidence of tooth decay. In Ohio, the target range of fluoride concentration for public water systems that are fluoridating is 0.8 to 1.3 mg/L, and it is expected that this target will be lowered. Currently, 92 percent of Ohioans served by public water supplies have fluoridated water.

When is fluoridation required?

The Ohio General Assembly passed a law in 1969 requiring all public water systems serving more than 5,000 persons to fluoridate if their naturally-occurring fluoride is below 0.8 mg/L. Ohio EPA regulates fluoridation at public water systems. Some public water systems are exempt from this regulation by a local referendum. A list of communities that provide fluoridation can be found on the ODH website — www.odh.ohio.gov/odhPrograms/ohs/oral/oralhowdoi/cntyfl.aspx.

What should you do if you have elevated fluoride in your well?

If the fluoride level in your well water is above 4 mg/L, treatment is recommended to reduce fluoride levels. Fluoride concentrations above 2.0 mg/L pose no health risk, but tooth mottling may occur. In either case, you should consider how you are using this water. You may wish to discuss health risks with your doctor or dentist, particularly if there are young children in the home. Ohio Department of Health (ODH) has links to fluoridation information on their web site.

You may want to consider options to reduce the fluoride concentration of your water used for drinking and food preparation. Options include: using bottled water for consumption;



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hooking up to a public water system (if available); or installing treatment equipment to reduce fluoride levels in your well water. Public water systems considering installing treatment to reduce fluoride should contact the appropriate Ohio EPA district office.

How can you treat your private well to remove fluoride?

Common treatment systems such as water softeners or carbon filters do not remove fluoride from drinking water. Home treatment methods to remove fluoride from drinking water include reverse osmosis, distillation, anion exchange or activated alumina cartridges. Fluoride removal in homes generally uses point-of-use devices with separate faucets installed at sinks used for drinking water. Whole home treatment units are also available but are more expensive.

The Ohio Department of Health (ODH) regulates private wells. The treatment system selected must be sized based on the amount of water used, the rate of flow through the treatment unit, and the presence of other naturally occurring minerals in the ground water. A registered private water systems contractor is required to install water treatment equipment for fluorides, and a permit is required from the local health district. The use of a registered contractor provides consumer protection through bonding, and review of the installation by the local health district will ensure that the system is properly sized, installed and works effectively to reduce the fluoride levels. More information on the types of treatment is available on the ODH website — www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx, and on the CDC website — www.cdc.gov/healthywater/drinking/travel/household_water_treatment.html.

Information on treatment units rated to reduce fluoride in water can be found on the National Sanitation Foundation website —

www.nsf.org/consumer/drinking_water/contaminant_fluoride.asp?program=WaterTre.

Where can I get more information?

For more information on fluoride in Ohio's ground water, contact the Ohio Environmental Protection Agency, Division of Drinking and Ground Waters at (614) 644-2752, or visit www.epa.ohio.gov/ddagw. Additional information on fluoridation is available through the Ohio Department of Health's Bureau of Oral Health website — www.odh.ohio.gov/odhPrograms/ohs/oral/oralprev/fluoridation.aspx. Information regarding private water systems is available through the Ohio Department of Health's Bureau of Environmental Health website — www.odh.ohio.gov/odhPrograms/eh/water/water1.aspx.

This fact sheet is part of a series discussing the water quality of Ohio's aquifers. A companion report, available online at epa.ohio.gov/ddagw/gwqcp_pubs.aspx, describes the distribution of fluoride in Ohio's ground water in more detail.