

WELL WATER & CHILDREN'S HEALTH

Groundwater is stored in aquifers – layers of soil, sand and rocks – but can come to the surface naturally through a spring or brought to the surface through a well. More than 23 million U.S. households depend on individual wells for their drinking water. Groundwater is naturally filtered on its way from the surface to the water table, so it is relatively free of particulate organic material and bacteria. However, it will only remain so if it is protected on its way from the aquifer to the tap. This information sheet provides recommendations to well owners and their families to help ensure safe drinking water for children.

Well Water Testing

As a well owner, you are responsible for testing your water to ensure the safety of your drinking water. At a minimum, your water should be tested every year for bacteria, anything of local concern, or any contaminants that you are monitoring from previous test results. Testing more than once a year may be warranted in special situations:

- Someone in your household is pregnant or nursing
- There are unexplained illnesses in the family
- Your neighbors find a dangerous contaminant in their water
- You note a change in water taste, odor, color, or clarity
- There is a spill of chemicals or fuels near your well

We have provided water testing resources for each U.S. state and Canadian province to assist well owners in those areas obtain lists of certified water testing laboratories. These lists can be found by using our [interactive map](#) or calling the wellcare® Hotline at 888-395-1033. See our information sheet on [Well Water Testing](#) for more information.

Potential Contaminants of Concern

The following section provides information on contaminants that may be of special concern to households, especially with young children. Please note that this is a limited list of potential contaminants of concern. Not all of these contaminants will pertain to your area or water system. If you suspect contamination or experience illness, stop drinking or cooking with the water immediately and do not resume use until testing has proven it to be safe. Always seek the advice of your medical doctor if you have any health concerns.

Bacteria and Other Microorganisms

We are in contact with millions of bacteria every day and nearly all of them are harmless. Yet some of these small organisms are responsible for waterborne illnesses. Total coliforms are one group of mostly harmless bacteria that live in soil and water, as well as the intestines of animals. The presence of total coliforms in drinking water can indicate that more dangerous bacteria have contaminated the water like E. coli or fecal coliforms.

Bacteria in drinking water are usually the result of contamination by a nearby sewer, septic tank, feedlot or animal yard, or may also be introduced into a well during construction or repair.

Bacteria, protozoa, algae, and fungi are all microorganisms. Although viruses are not considered living organisms, they are sometimes classified as microorganisms. Microorganisms can only be seen through a microscope. Since we cannot see them without one, it is necessary to test your water for them. Waterborne microorganisms can trigger gastrointestinal illnesses, diarrhea, and vomiting and can be life-threatening for infants, children, the elderly, and those with compromised immune systems. The U.S. Environmental Protection Agency (EPA) has set the Maximum Contaminant Level Goal (MCLG) for regulated microorganisms at zero.

Additionally, well owners should also be aware of adenovirus, giardia lamblia, legionella, mycobacterium avium complex (MAC), pseudomonas aeruginosa, salmonella, and turbidity. If you are having unexplained gastrointestinal problems, discuss these contaminants with your doctor to see if testing is advised.

Copper

Copper is a reddish metal that occurs naturally in rock, soil, water, sediment, and air. It is commonly found in pennies, electrical wiring, and water pipes. In small amounts, copper is a necessary part of our diet to ensure good health. Copper occurs in drinking water primarily due to its use in plumbing materials and the subsequent corrosion of copper pipes. A major indication of high copper contamination is a bitter metallic taste in the water, as well as the presence of blue-green stains on plumbing fixtures.

While copper is an essential nutrient, too much copper can cause adverse health effects, including nausea, vomiting, diarrhea, liver damage, kidney damage, and changes in behavior. Anyone who has been diagnosed with Wilson's disease has a higher risk of experiencing damaging effects of copper.

EPA set a limit of 1.3 parts per million (ppm) for levels of copper in public water supplies, at which steps must be taken to control corrosivity in the water. This standard can be used as a guideline for tests on the water from your private well.

Fluoride

Fluoride is a natural substance that is a form of the element fluorine, which is found naturally in rocks and soil. As water passes through the earth, it absorbs fluoride. As a result, most water contains some amount of fluoride. Fluoride content varies by region. Dry regions generally have higher fluoride levels in their water than regions that have higher average rainfall amounts. Groundwater typically contains more fluoride than surface water.

At low concentrations, fluoride is believed to prevent tooth decay and strengthen teeth. According to the American Dental Association (ADA), the optimal level of fluoride in water is 0.7 ppm. However, excessive amounts of fluoride consumed over time can accumulate in the bones and lead to skeletal fluorosis. The EPA has set an enforceable drinking water standard for fluoride of 4 milligrams per liter (mg/L), as it believes this is the maximum safe level to prevent individuals from acquiring skeletal fluorosis. Even at lower levels, dental fluorosis (discoloration or weakening of teeth) may occur. Therefore, the EPA has also set a secondary standard of 2 mg/L for fluoride to protect against dental fluorosis. A secondary standard is one which the EPA recommends for public water systems to follow but does not enforce. Dental fluorosis only affects the teeth before they emerge from the gums, so the EPA suggests that children under age 9 not drink water containing more than 2 mg/L of fluoride. Well owners should use this as guidance.

Lead

Lead is a highly toxic dull gray metal that is soft enough to be easily scratched with a house key. Lead can get into your water as it flows through your plumbing system. Corrosion can cause lead to leach from lead pipes, lead-based solder pipe joints, and brass alloy faucets. Lead exposure at even minimal amounts can create serious behavior and brain developmental problems for children. Low-level exposure can cause irritability, hyperactivity, and inattentiveness. Children exposed to higher levels of lead may have delays in physical or mental development.

EPA reports that the health effects of lead are most severe for infants and children. Although the main sources of exposure to lead are ingesting lead paint chips and inhaling lead dust, EPA estimates that 10 to 20 percent of human exposure to lead may come from lead in drinking water. Infants who consume mostly mixed formula can receive 40 to 60 percent of their exposure to lead from drinking water.

While EPA does not regulate lead in private household water systems, the agency requires public water systems to take action to reduce corrosivity of water if more than 10 percent of tap water samples exceed 15 parts per billion (ppb). EPA also sets a MCLG for lead in drinking water at zero. Well owners should follow these standards.

Manganese

Manganese is an abundant metal on Earth. It can be found in air, consumer products, food, and water. Manganese makes its way into groundwater and surface water from natural sources or from activities like mining and industrial discharges. Manganese is used in many industries, with the majority of manganese used as an alloying element in steel.

In water, manganese can look yellow, brown, or black and is often found together with iron and a low pH. Manganese can cause water to taste unpleasant and stain fixtures and water appliances throughout your home.

Manganese is essential for human health. However, studies show too much manganese may cause neurological effects in children. EPA has a non-regulatory health advisory for manganese of 0.3 mg/L and has established a Secondary Maximum Contaminant Level (SMCL) of 0.05 mg/L based upon aesthetic effects. These levels are established for public water systems in the U.S.. Canada has set two new guidelines for manganese; maximum acceptable concentration (MAC) for total manganese in drinking water at 0.12 mg/L (120 micrograms per liter (µg/L)) and an aesthetic objective (AO) for total manganese in drinking water at 0.02 mg/L (20 µg/L). Private well owners should use these levels as guidelines to treat their well water.

Mercury

Mercury is a silvery metal and a chemical element. Mercury is found in the earth and in manufactured devices such as thermometers, batteries, and fluorescent light bulbs. Mercury can seep into groundwater supplies if it is mishandled and not properly stored at industrial and hazardous waste sites, or from natural deposits.

Overexposure to mercury can lead to serious damage to the brain, nervous system, and kidneys. Children and fetuses are at a higher risk for developing these health effects. The current EPA regulated Maximum Contaminant Level (MCL) for mercury is 2 ppb. Well owners should use this level as a guideline.

Nitrate and Nitrite

Nitrate and Nitrite are nitrogen-based chemicals which occur naturally in water, soil, plants, and food. Nitrate and nitrite are found more commonly in groundwater than in surface water and are two of the more commonly detected well water contaminants. Principle sources of nitrate or nitrite contamination are fertilizers, septic tank waste, livestock manure, and erosion of natural deposits. The most vulnerable wells are those in farm communities or areas with large numbers of aging septic tanks.

Ingestion of water containing high nitrate or nitrite concentrations can be fatal to infants. Water containing nitrate or nitrite should not be used to prepare food or formula for infants less than 6 months of age. Nitrate and nitrite are rarely a problem for people older than 6 months. However, some individuals are more susceptible to health problems from nitrate or nitrite due to certain health conditions. In addition, long term exposure to nitrate and nitrite can lead to diuresis, starchy deposits, hemorrhaging of the spleen, and cancer.

EPA's MCL for nitrate in public drinking water is 10 ppm and for nitrite the limit is 1 ppm. The sum of the amount of nitrate and nitrite in drinking water should not total more than 10 ppm. Well owners should use these MCLs as guidance.

Perchlorate

Perchlorate is a toxic chemical typically found in weapons, explosives, and rocket fuel. It also is used to make matches, fireworks, roadside flares, and airbag inflators. The substance dissolves easily in water. Perchlorate contamination in water and soil is attributed mainly to manufacturing facilities, defense contracting sites, and military operations.

Perchlorate disrupts the thyroid gland. It is linked to child development problems and thyroid cancer. It poses the greatest threat in drinking water of nursing and expectant mothers, children, and persons with improperly functioning thyroids.

EPA has not issued a MCL for perchlorate. However, some states have regulated perchlorate in drinking water including Arizona, California, Massachusetts, New Jersey, New York, and Texas. Check with your state environmental agency to see if your state has a maximum level for perchlorate in drinking water. If your state does not have a set standard, it is recommended to have no more than 2 ppb perchlorate in drinking water, and ideally 1 ppb, to protect children's health. Well owners should follow their state's regulation unless your state does not regulate perchlorate then you should use the recommended level as a guideline.

PFAS

The per- and polyfluoroalkyl substances (PFAS) also known as 'forever chemicals' are a large group of manufactured man-made chemicals. Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are the two most widely studied PFAS substances. These substances are used in the manufacturing of a variety of everyday products. They have been used to make water, grease, or stain resistant products including carpets, clothing, furniture fabrics (e.g., Scotchgard™), cookware (e.g., Teflon®), food packaging, and for other industrial processes.

Research is still being conducted to better understand what the potential effects are of PFAS. However, there is evidence from research that exposure to PFOA and PFOS can cause increased cholesterol levels, low infant birth weights, effects on the immune system, cancer (PFOA), and thyroid disruption (PFOS). Additional studies on laboratory animals indicate reproductive and developmental, liver, kidney, and immunological effects. Since PFOA and PFOS have been used in an array of consumer products most people have been exposed to low levels.

On April 10, 2024, the Environmental Protection Agency (EPA) established legally enforceable Maximum Contaminant Levels (MCLs) for six PFAS in public drinking water systems. PFOA, PFOS, PFHxS, PFNA, and HFPO-DA (also known as GenX) as contaminants with individual MCLs, and PFAS mixtures containing at least two or more of PFHxS, PFNA, HFPO-DA, and PFBS using a Hazard Index MCL to account for the combined and co-occurring levels of these PFAS in drinking water. Additionally, a health-based, non-enforceable Maximum Contaminant Level Goals (MCLGs) for these PFAS has been established. Some states may have recommended levels even lower than those provided by EPA. Check with your state environmental agency for more information. If your state has lower maximum levels for PFAS in drinking water, these levels supersede the EPA levels and should be used in its place. Well owners are encouraged to use these levels as a guideline when well water should be treated.

To learn more, view our information sheet on [PFAS](#).

Water Treatment

Information on treatment options can be found in our [wellcare® information sheets on each topic](#) or our [Water Treatment](#) information sheet. Technologies may have a wide range of effectiveness. Look for treatment systems that are certified by [NSF](#) or [Water Quality Association \(WQA\)](#). Certified water treatment professionals can help you select the right treatment. To locate a certified water treatment professional in your area, visit [WQA's website](#).

It is imperative to maintain treatment devices and change filters as specified by the manufacturer or your water treatment professional.

You should also retest your water after treatment is installed and after maintenance to confirm the effectiveness of the device.

NOTE: Boiling your water can be effective to kill microorganisms, but it can also concentrate certain contaminants like nitrate and heavy metals. You must test your water first to determine if these contaminants are present in your water.

Actions You Should Take

Private well owners are responsible for maintaining their wells to make sure their water supply is safe. We have provided a list of actions you should take below:

Inform yourself

- ✓ Know where your water comes from – a public water supplier, community water system, or a private well.
- ✓ Find out about contaminants in your area and any possible health risks.
- ✓ If you have any health concerns, contact your medical doctor for advice.

Complete well maintenance

- ✓ Have your water well inspected by a licensed well contractor every five years. Use our [interactive map](#) on our website to locate a well contractor in your area.
- ✓ Test your water annually. Compare your results with our information sheet, [Understanding Your Well Water Test Results](#).
- ✓ If you suspect contamination or experience illness, stop drinking or cooking with the water immediately and have your water tested. Do not resume use until testing has proven it to be safe.
- ✓ Treat your water if necessary. Have water treatment systems maintained regularly.

Learn more

- ✓ Review our [wellcare®](#) information sheet on [Well Maintenance](#).
- ✓ Join the [wellcare®](#) Well Owners Network to learn more about your well and well water. For more information and to join, visit our [website](#).

Share with your neighbors

- ✓ Share this information with other well owners in your area.

For More Information on Well Water and Children's Health

Contact your licensed well contractor, local health department, state environmental agency, or the [wellcare®](#) Hotline.



Information to help maintain and protect your water well system:

[wellcare®](#) is a program of the [Water Systems Council \(WSC\)](#). WSC is the only national organization solely focused on protecting the health and water supply of an estimated 23 million households nationwide who depend on private wells (according to the U.S. EPA).

This publication is one of more than 100 [wellcare®](#) information sheets available FREE at www.watersystemscouncil.org.

Well owners and others with questions about wells and well water can contact the [wellcare®](#) Hotline at 1-888-395-1033 or visit www.wellcarehotline.org to fill out a contact form or chat with us live!

JOIN THE WELLCARE® WELL OWNERS NETWORK!

By joining the FREE [wellcare®](#) Well Owners Network, you will receive regular information on how to maintain your well and protect your well water.

Contact us at 1-888-395-1033 or visit www.wellcarehotline.org to join!