



PRIVATE WELL WATER IN CONNECTICUT

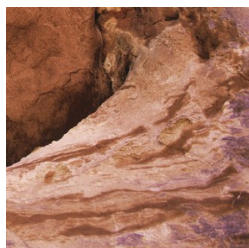
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Publication #3: Arsenic in Private Well Water

Private well owners are responsible for the quality of their private well water. Homeowners with private wells are generally not required to test their water. However, the State of Connecticut Department of Public Health (CT DPH) recommends testing at least once for arsenic to ensure that your water is safe. Refer to [Publication #24: Private Well Testing](#) for more information regarding other testing you should consider and how often you should test.



Testing for arsenic may be required by the Local Director of Health for newly drilled wells. Refer to [Connecticut General Statutes Section 19a-37\(f\)](#) for more information. Testing may also be conducted during real estate transactions.



Introduction

Arsenic is not noticeable in water because it has no taste or odor. Arsenic is naturally occurring in bedrock, therefore, wells drilled into bedrock may contain arsenic. Depending on local conditions it can leach from mineral deposits into groundwater. There are locations across Connecticut with private wells that have high levels of arsenic. Levels that have been found vary across the State. The only way to find out if your well has high arsenic is to have your private well water tested. Homeowners should test their private well at least once for arsenic.

There are two predominant types of arsenic in groundwater: arsenic III, also known as, arsenite; and, arsenic V, also known as, arsenate. These two types have different characteristics; arsenic III has no charge (neutral), and arsenic V has a negative charge. Laboratory test results will show you the total arsenic level present in your well water, which is the sum total of arsenic III plus arsenic V.

Potential Health Effects of Arsenic in Private Well Water

The U.S. Environmental Protection Agency (EPA) and expert scientific committees have classified arsenic as a human cancer-causing chemical. Research indicates that people living in areas where arsenic concentrations in water are very high are more likely to have bladder, lung, liver or skin cancer. Long term exposure to high levels of arsenic in drinking water can also cause problems with your skin, and with your cardiovascular, immune and neurological systems.

Sources of Arsenic in Private Well Water

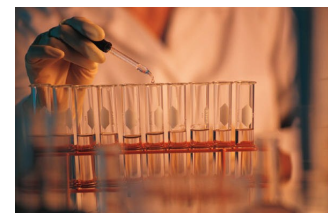
Arsenic is a naturally occurring metal that has no odor or taste. It can enter the groundwater supply from natural deposits in the bedrock. Arsenic can also contaminate groundwater from past or present industrial waste or agricultural pollution (i.e. fertilizers, herbicides, etc.).



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To determine if arsenic is present in your private well water, arrange to have your well tested through a state certified laboratory. A current list of certified labs can be obtained from your local health department, or from the [DPH Environmental Laboratory Certification Program's](#) website. Be sure to discuss proper collection and handling procedures with the laboratory before sample collection. Follow the laboratory's instructions very carefully to obtain a good sample. Be sure to follow transportation and handling instructions for the samples once they've been collected. Samples must not be kept longer than allowed by the laboratory.



You should test for arsenic when you buy a house with a well, at the time a new well is drilled or at least once for existing wells. It is possible for arsenic levels in well water to fluctuate so it is a good idea to test for arsenic every 5 years. If you have a treatment system to remove arsenic from your water, you should test the treated water at least annually to be sure your treatment system is working properly.

If Water Tests Indicate the Presence of Arsenic

The Maximum Contaminant Level (MCL) for arsenic in private well water is 0.01 mg/L (10 ug/L). The CT DPH has also set a health-based Action Level for arsenic, which is the same as the MCL. Refer to the [Action Level List for Private Wells](#) for more information. If your well water has arsenic at a level greater than the MCL or Action Level you should use an alternate source of water or install a treatment system.



Alternative sources of water may include bottled water or connecting to a public water system, if it is available in your area. For arsenic levels less than 0.1 mg/L (100 ug/L) installation of a point of use treatment system at a tap frequently used for drinking and cooking is recommended. If arsenic levels are found at or above **0.1 mg/L** (100 ug/L) whole house (*point of entry*) treatment is recommended to address both water used for drinking and cooking (ingestion) as well as water used for bathing and showering (skin absorption and inhalation).

Even though some treatment technologies will reduce both forms of arsenic, their effectiveness at reducing arsenic III is significantly lower than arsenic V. If your total arsenic level is above the MCL and you are considering installation of a treatment system you should consider testing for arsenic III. There are out-of-state drinking water laboratories that offer this special testing.

Medical Testing for Arsenic

Although there are medical tests that can measure the amount of arsenic in your urine, hair, and blood, results from these tests are difficult to interpret and, according to the American Medical Association, are unreliable. The best way to find out if you are being exposed to excessive amounts of arsenic is to test the private well water you drink.



Corrective Action and Treatment Options

Removal of arsenic from well water can be a complicated process. If your water has high arsenic, you should consult with a knowledgeable water treatment professional. There are several treatment technologies that can remove arsenic from well water. These technologies include reverse osmosis, metal oxide (adsorptive) filters, and ion exchange. The chemical parameters of your well water and the chemistry of the arsenic present in your well water will dictate which treatment technology will most effectively remove arsenic for your situation. Arsenic III (arsenite) is harder to remove than arsenic V (arsenate).

Depending on the level of arsenic present in your well water, it may not be necessary to treat all of the water in your house. In most cases treatment needs can be met by installing a point-of-use (POU) treatment system on a water line supplying fixtures that are commonly used for drinking and cooking only.

Reverse Osmosis

Reverse osmosis (RO) is effective at removing approximately 60% - 65% of arsenic III and 95% - 98% of arsenic V. The percent removal of both forms of arsenic by RO can vary based on the RO manufacturer and other water quality characteristics, such as pH and mineral content. An oxidizing agent can be installed in front of the RO unit to convert Arsenic III to Arsenic V. This will increase the removal rate of both forms of arsenic. If you are installing a POU RO treatment system for arsenic removal you should consider either using specific oxidizing agents such as chlorine or permanganate to convert arsenic III to arsenic V, or testing for arsenic III to determine if this is necessary for adequate removal. This type of testing can be done through an out-of-state drinking water laboratory that offers the testing. Consult with the treatment manufacturer, your water treatment professional, or the CT Department of Public Health, Private Well Program for further detail or to discuss your options.

POU RO treatment devices are effective and are readily available; however, they do waste approximately 3-4 gallons of water for every gallon of water treated. Refer to [Publication #21: Reverse Osmosis Treatment of Private Well Water Systems](#) for more specific information regarding RO treatment.

Metal Oxide Filters

Metal oxide filters may be favorable because of the way arsenic binds to the media inside the filter and because in some cases metal oxide filters do not need to backwash. Metal oxide filters can be used to treat both at a POU or whole house (point of entry). As with RO, if arsenic III is present, pre-oxidation should be installed to extend the filter life and to make removal of arsenic III more effective. The filter and its ability to effectively remove arsenic can be affected by the pH and mineral content of your water. Consult with your treatment manufacturer or water treatment professional to determine if pre-oxidation or other pretreatment is necessary for your situation.

Ion Exchange

Anion exchange is a type of ion exchange treatment that can be used for whole house (point of entry) treatment of arsenic. It effectively removes arsenic V, but not arsenic III because it has no charge. Consult with the treatment manufacturer or your water treatment professional to determine which pre-oxidation or other pretreatment is required or recommended for your situation.

Ion exchange requires the filter media to backwash. Refer to the 'Backwash Wastewater Generated' section for information regarding treatment backwash. Refer to Publication #10: Ion Exchange Treatment of Private Well Water Systems for more specific information regarding ion exchange treatment.

Testing to Evaluate the Effectiveness of Treatment

Once you've installed a treatment system for your home, you should establish a routine testing schedule during the first year of operation to verify the effectiveness of the treatment system installed, and to help determine maintenance needs for your treatment media or filter. For information regarding purchasing treatment for your home, refer to [Publication #19: Questions to Ask When Purchasing Water Treatment Equipment for Your Home](#).



Backwash Wastewater Generated

Treatment backwash is sometimes necessary to lift and clean the filter media of some treatment devices. This process may flush some unwanted contaminants from the treatment media and helps to restore the quality of the filter media.

For More Information

For health questions regarding arsenic in your private well water please contact:
CT DPH, [Environmental & Occupational Health Assessment Program](#), (860) 509-7740

For all other questions (i.e., treatment, testing, etc.) please contact:
CT DPH, [Private Well Program](#), (860) 509-7296