PRIVATE DRINKING WATER IN CONNECTICUT

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The U.S. Environmental Protection Agency (EPA) currently does not regulate Private wells. Private well owners are responsible for the quality of their drinking water. Homeowners with private wells are generally not required to test their drinking water. However, they can use the public drinking standards as guidelines to ensure drinking water quality. Refer to Publication #23 *Drinking Water Standards* for more information.

The Maximum Contaminant Level (MCL) for nitrate measured as nitrogen in drinking water is 10 milligrams per liter (mg/l)) or parts per million (ppm) as established by the EPA. In addition, EPA has set an MCL for nitrite-nitrogen in drinking water at 1 mg/l.

Introduction

Nitrogen, a component of protein, is essential to all living things. Nitrogen exists in the environment in many forms. It can change its form as it moves through the nitrogen cycle; organic nitrogen ↔ammonia ↔nitrite↔nitrate. Nitrate and nitrite are two forms of nitrogen of most concern in drinking water. Nitrite-nitrogen is indicative of recent pollution and is usually accompanied by highly elevated fecal coliform bacteria counts. Nitrate-nitrogen is indicative of older pollution and is the result of organic or nitrite nitrogen being "weathered or aged" as it passes through the soil overburden on its way to lower aquifers.

- Both the nitrate and nitrite forms of nitrogen in drinking water are a health concern, especially for infants, pregnant women, and the elderly.
- A water test is the only way to determine the presence and amount of these contaminants in well water.
- Proper well location and construction are important in avoiding nitrate and nitrite contamination in drinking water.
- Best Management Practices to reduce the risk of contamination from fertilizer applications and improper human and animal waste disposal also help to ensure a safe water supply.

If the concentration of either nitrate-nitrogen or nitrite-nitrogen in drinking water are elevated, the choices for addressing the problem include obtaining an alternate water supply or treating the existing well water. An alternate supply may be bottled water for drinking, especially for infant formula, or installing a new well in a different location and at a different depth. The decision to locate another well may not be realistic if you are being impacted by nitrogen applied for agricultural purposes. Another alternative, if available, is connecting to a public water system. Home water treatment options include distillation, reverse osmosis and anion exchange.

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It is also recommended that you determine if any practices in and around the home could be contributing to the elevated levels in groundwater, such as fertilizer applications for lawn and shrubbery. Take necessary steps to address these potential sources.

Potential Health Effects

The primary health hazard from drinking water with elevated nitrate-nitrogen or nitrite-nitrogen is "blue baby syndrome," in which blood lacks the ability to carry sufficient oxygen to cells in the body. Healthy adults are not susceptible to this condition, but infants under six months of age (including pregnant women) and the elderly may be at a greater risk than the general population.

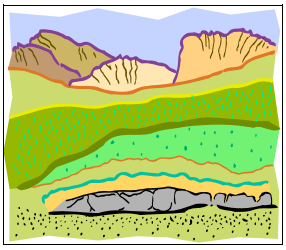
A potential cancer risk from nitrate in drinking water and food has been reported. The possibility exists that nitrate can form nitrosamines, which are known to cause cancer. Nitrate must be converted to nitrite before nitrosamines can be formed. The magnitude of the cancer risk from nitrate in drinking water is not known.

Indications of Nitrate and Nitrite

These contaminants in water are colorless, odorless, and tasteless. Nitrate testing is highly recommended for households with infants, pregnant women, or elderly people. These groups are the most susceptible to health problems due to elevated nitrate and nitrite levels. In addition, if you live in an agricultural area, it is important to test for the presence of these contaminants. Nitrate-nitrogen occurs naturally in groundwater at concentrations below 1.0 mg/l, which is well below the level of concern for drinking water safety. An initial water test for a new well is needed to determine the baseline nitrate concentration in the groundwater source. Nitrate testing should also be part of an annual, routine well water test. Nitrate-nitrogen concentrations above 3.0 mg/l indicate potential land use impacts to water quality.

You should try to identify the potential land use source that is causing the elevated levels in your drinking water. This may include a malfunctioning septic system or improper fertilizer or animal waste use, storage, or disposal. Drinking water with nitrate-nitrogen concentrations greater than 10.0 mg/l should not be used to prepare infant formula. In this case, you can use bottled water or consider installing a point of use treatment system to remove the nitrate-nitrogen.

Sources of Nitrate and Nitrite in Drinking Water



Nitrogen occurs naturally in the soil in organic forms from decaying plant and animal residues. Bacteria in the soil convert various forms of nitrogen to the final nitrate form. This process is part of the nitrogen cycle and is desirable because the majority of the nitrogen required by plants is the nitrate form. However, nitrate is also very soluble and readily moves with water through the soil. If there is excessive rainfall or irrigation water, nitrate can move below the plant's root zone and may eventually reach groundwater.

Sources of nitrate-nitrogen include: commercial fertilizers applied to lawns, gardens, cropland and recreational fields, livestock manure, pet waste, septic systems, leaking sewers, compost facilities, and other waste treatment systems.
Proper well siting, construction, and maintenance reduce potential drinking water contamination. This includes locating the well:

- Up-slope from potential contamination sources
- With adequate separation distances between the well and possible contamination sources.

Testing for Nitrates and Nitrites

To determine if nitrate and nitrites are present, arrange to test your drinking water at a state certified laboratory. Follow the laboratory's instructions carefully to avoid contamination and to obtain a good sample. Although field test kits are available for measuring nitrate-nitrogen concentration, they are not as accurate as laboratory procedures. Results from field test kits can be affected by the presence of certain chemicals and by temperature variation. Use certified laboratory testing to assure the most accurate and reliable results. Refer to Publication #24 *Residential Well Water Testing* for more information.

Interpreting Test Results

The laboratory will report the nitrate or nitrite concentrations as milligrams per liter (mg/l) or as parts per million (ppm), which are equivalent for the concentrations occurring in water (1 mg/L = 1ppm). Most laboratories report nitrate as nitrate-nitrogen and nitrite as nitrite-nitrogen, which is the amount of nitrogen in that particular form. Be careful, when in doubt, ask.

Corrective Action

If a water test indicates the presence of elevated nitrate-nitrogen or nitrate-nitrogen levels, you have several choices: obtain an alternate water supply, connect to a public water system if available, or use a home treatment method to remove or reduce the contaminant.

It may be possible to obtain an alternate water supply by installing a new well in a different location or a deeper well in a different aquifer (a water-bearing, saturated zone beneath the earth's surface). If the nitrate-contaminated water supply is coming from a shallow groundwater source, there may be an uncontaminated deeper aquifer protected by an impervious layer that prevents the downward movement of the contaminated water. A new well should be constructed to allow surface water to drain away from the well. The new well should also be located far (>75 feet) from any potential source of contamination such as septic systems, feedlots, animal pens, or underground fuel tanks.

Purchasing bottled water for cooking and drinking is another option for an alternative source of drinking water. This source may be expensive over the long-term, so you should weigh the costs of this versus installing a new well or a treatment system.

It is also recommended that you determine if any practices in and around the home could be contributing to the elevated contaminant levels in groundwater. These include: lawn and garden fertilizer use, location of animal pens and waste, compost piles, septic system operation and maintenance, cesspools, or leaky sewer pipes. Take necessary steps to address these potential sources.

Three methods can remove or reduce nitrate or nitrite from drinking water: distillation, reverse osmosis, and anion exchange. These home treatment methods are available from several manufacturers.

For more information on these treatment options, please see Publications:

 # 7 Distillation Treatment of Drinking Water Systems
#21 Reverse Osmosis Treatment of Drinking Water Systems
#10 Ion Exchange Treatment of Drinking Water Systems

When choosing a treatment system, consider both the initial cost and the operating costs. Operating costs include the energy needed to operate the system, additional water that may be needed for flushing the system, replaceable filter elements/media, repairs, and general maintenance.

Regardless of the quality of the equipment purchased, it will not operate well unless maintained accordance with the manufacturer's recommendations. Keep a logbook to record equipment maintenance and repairs. Equipment maintenance may include periodic cleaning and replacement of some components. Also consider any special installation requirements that may add to the equipment cost. For more information, refer to Publication #19 *Questions to Ask When Purchasing Water Treatment Equipment.*

Protection of Private Drinking Water Wells

You can protect your private well by paying careful attention to what you do in and around your home as well as your neighbor's activities near your well. Regular testing and adopting practices to prevent contamination can help insure that your well supplies you and your family with good quality drinking water. For more information on well protection see the Publication #26 *Private Drinking Water Wells.*

For more information please click on the following links:
EPA Office of Groundwater and Drinking Water
http://www.epa.gov/ogwdw/
EPA New England
http://www.epa.gov/region01/

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