

by pregnant women and is essential for any well that serves infants under six months of age. It is recommended that wells with nitrate levels between 5 and 10 milligrams per liter be tested annually. Additional testing may also be useful if there are any known sources of nitrate or if high nitrate levels are detected in nearby wells.

What should I do if my water is high in nitrate?



If the nitrate-nitrogen level in your water exceeds the 10-milligram per liter standard, the following actions are recommended:

- Do not give the water to infants less than 6 months of age or use the water to prepare infant formula.
- Avoid drinking the water during pregnancy.
- Do not attempt to remove the nitrate by boiling the water. This will only concentrate the nitrate making the levels even higher!
- Seek medical help immediately if the skin of an infant appears bluish or gray in color. Sometimes the color change is first noticed around the mouth, or on the hands and feet.
- Try to identify the nitrate source and see whether there are things you can do to reduce further contamination. By reducing the amount of fertilizer you use, improving manure-handling methods, maintaining your septic systems and pumping septic tanks regularly to prevent overflow, you may be able to protect your water supply.
- A longer-term remedy is to drill a new well that is deeper and has more casing.
- Limit your daily intake if you have chronic health problems that increase your sensitivity to nitrate, or if you are concerned about scientific uncertainty regarding the health effects of long-term exposure to nitrate-contaminated water.

Where can I get more information?

The Wisconsin Department of Health and Family Services (DHFS), Division of Public Health can give you more information on the potential health effects of nitrate exposure.

Call (608) 266-0923
or visit the DHFS Web site at www.dhfs.state.wi.us.

The Wisconsin Department of Agriculture, Trade and Consumer Protection (DATCP) can give you more information on nitrate and where and how it may be used in Wisconsin.

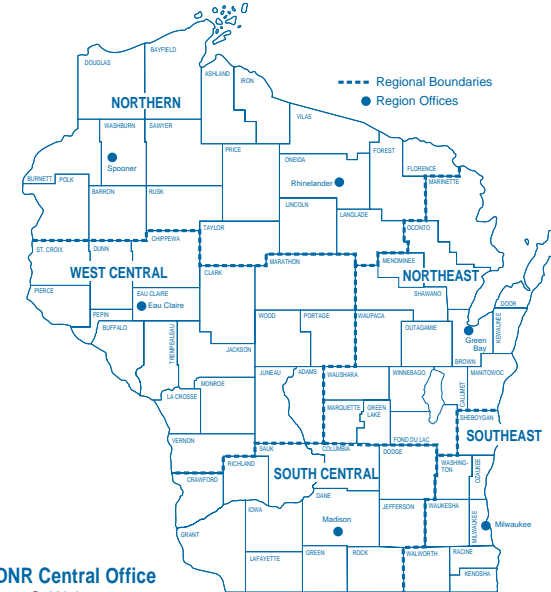
Call (608) 224-4500
or visit the DATCP Web site at www.datcp.state.wi.us.

A list of certified labs is available from your DNR drinking water and groundwater specialist or online at www.dnr.state.wi.us/org/water/dwg/WELLTEST.htm. You may also find laboratories listed in your telephone book.

The DNR has five regional offices statewide to serve you. Talk to your drinking water & groundwater specialist at one of the DNR regional offices or visit the DNR web site at www.dnr.state.wi.us. Choose "Drinking Water & Groundwater from the drop-down menu, and select from a variety of listed topics.



Department of Natural Resources Offices



DNR Central Office

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P.O. Box 7921
Madison, WI 53707-7921
(608) 266-0821

Northern Region

810 W. Maple Street
Spooner, WI 54801
(715) 635-2101

107 Sutliff Avenue
Rhinelanders, WI 54501
(715) 365-8900

Northeast Region

1125 N. Military Avenue
P.O. Box 10448
Green Bay, WI 54307-0448
(920) 492-5800

Southeast Region

2300 N. Dr. Martin Luther King, Jr. Drive
P.O. Box 12436
Milwaukee, WI 53212
(414) 263-8500

West Central Region

1300 W. Clairemont
P.O. Box 4001
Eau Claire, WI 54702-4001
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South Central Region

3911 Fish Hatchery Road
Fitchburg, WI 53711
(608) 275-3266

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This brochure is available in alternate format upon request. Please call 608/266-0821.



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Nitrate In Drinking Water

This brochure explains how nitrate can enter drinking water supplies, the health effects of nitrate exposure, when to test a private well, and things you can do to reduce the nitrate level in your drinking water. The brochure also provides sources of information and assistance that may be useful to private well owners.

The Wisconsin Department of Natural Resources Bureau of Drinking Water & Groundwater would like to thank the Groundwater Coordinating Council (GCC) Education Sub-Committee for their part in the development and editing of this publication. For more information on the GCC, it's member organizations and programming, please visit www.wisconsin.gov. Choose "Government," "State Agencies," followed by "List of Agencies" then select "Groundwater Coordinating Council."

Wisconsin Department of Natural Resources
Bureau of Drinking Water & Groundwater

What is nitrate?

Nitrate (NO_3^-) is made up of nitrogen and oxygen. It is formed when nitrogen from ammonia or other sources combines with oxygen in water. Nitrate is naturally found in plants and in vegetables at varying levels depending on the amount of fertilizer applied and on other growing conditions. According to the US Environmental Protection Agency, most adults who are eating a balanced diet consume 10-25 milligrams of nitrate-nitrogen per day. Most of this nitrate comes from leafy vegetables like lettuce, cabbage, celery, and spinach. Additional exposure to nitrate through contaminated drinking water may be a significant health risk.

How does nitrate enter groundwater?



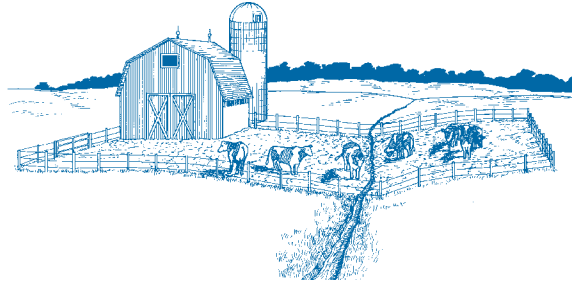
In nature, water usually contains less than 1 milligram of nitrate-nitrogen per liter and is not considered a major source of exposure. Significantly higher levels indicate that the drinking water supply has been contaminated.

Common sources of nitrate include fertilizers, barnyard runoff, septic tanks, municipal sewage treatment systems, and decaying plant debris. Nitrate dissolves

easily in water and can be carried into the groundwater by rainwater and melting snow as they percolate down through the soil and bedrock into the underlying aquifer.

Is my well at risk?

The only way to know if your drinking water contains excessive nitrate is to have a water sample tested by a certified laboratory. However, there are several factors that may be used to help determine a well's vulnerability to nitrate contamination.



- Location. Nitrate-contaminated wells are often located near farm fields, barnyards, feedlots, septic systems, municipal wastewater treatment systems or "sludge" spreading sites.
- Well depth and construction. Since nitrate enters the well from the ground surface, wells that are shallow or have short casings are more likely to be affected than deeper wells.
- Geology. Areas with highly porous, sandy soils, fractured bedrock, natural caves and sinkholes, and shallow depths to groundwater are especially vulnerable to contamination. Areas with exposed creviced bedrock or specific geologic conditions known as "karst" geology, such as certain areas of Door County, may also be more vulnerable to nitrate contamination.
- Time. Groundwater usually moves very slowly, so it can take years for nitrate to reach a well. A well that tests safe for nitrate today could show contamination in the future.

What are the health risks of consuming high levels of nitrate?

State and Federal laws set the maximum allowable level of nitrate-nitrogen in public drinking water at 10 milligrams per liter (10 parts per million). State and Federal laws do not apply to private systems but 10 milligrams per liter is recommended as an advisory level for private wells.

Nitrate-contaminated water should never be fed to an infant under 6 months of age. In young infants, nitrate can reduce the blood's ability to carry oxygen and cause a condition that doctors call methemoglobinemia. The condition is also called "blue baby syndrome" because the skin appears blue-gray or lavender in color. This color change is caused by a lack of oxygen in the blood.

All infants less than six months of age are at risk of nitrate poisoning, but premature babies and babies with other health problems are more sensitive than others. **Infants suffering from "blue baby syndrome" need immediate medical care because the condition can lead to coma and death if it is not treated promptly.**



When nursing mothers ingest water that contains nitrate, the amount of nitrate in breast milk may increase slightly. Although no confirmed cases of "blue baby syndrome" have been associated with nitrate in breast milk, it may be advisable for nursing women to avoid drinking water that contains more than 10 milligrams nitrate per liter of water.

Some scientific studies have found evidence suggesting that women who drink nitrate-contaminated water during pregnancy are more likely to have babies with birth defects. This may be because nitrate ingested by the mother may also lower the amount of oxygen available to the fetus.



Additionally, people who have heart or lung disease, certain inherited enzyme defects, or cancer may be more sensitive to the toxic effects of nitrate than others. Some experts believe that drinking nitrate-contaminated water may increase the risk of certain types of cancer.

How do I know if my water is safe to drink?

Public Water Systems

All public water systems are required to notify consumers if any regulated contaminant, including nitrate, exceeds the maximum contaminant level (MCL) that is set by the federal Safe Drinking Water Act. In addition, municipal systems (such as city, town, or sanitary districts) and Other-Than-Municipal (OTM) systems (such as mobile home parks or condominium associations) are required to report *any* detection of a regulated contaminant that occurred in the previous year in their annual Consumer Confidence Report (CCR). If you would like to view your community's CCR, contact your local water supplier or visit the Wisconsin Department of Natural Resources (DNR) web site at <http://www.dnr.state.wi.us>. Choose "Drinking Water & Groundwater" from the drop-down "Bureau" menu. Then choose "Drinking Water System" followed by the "Public Water System" link. A query, or search, can then be made by city or individual system.



Treatment methods are available that will reduce the levels of nitrate in the drinking water supply, but some methods may be more appropriate or cost-effective than others. In some cases the best option for a community is to drill a new well.

Private Well Owners

The only way to know if your drinking water contains nitrate is to have a water sample from your private well tested by a certified laboratory. A list of certified labs is available from the Department of Natural Resources (DNR) or online at www.dnr.state.wi.us/org/water/dwg/WELLTEST.htm. A nitrate test is recommended for all newly constructed private wells and wells that have not been tested during the past 5 years. Testing is also recommended for well water used