

wellcare[®] information for you about Nitrate and Nitrite & Groundwater

What are 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 ground water 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.

What are the health effects of Nitrate and Nitrite?

Ingestion of water containing high nitrate or nitrite concentrations can be fatal to infants. When ingested, nitrate is converted to nitrite by bacteria in saliva and in the digestive tract. In babies, this process can interfere with the ability of the child's blood to carry oxygen, which can lead to a blood disorder called methemoglobinemia or "blue baby syndrome." Symptoms include shortness of breath and blue-tinged skin. Water containing nitrate or nitrite should not be used to prepare food or formula for infants.

Nitrate and nitrite are rarely a problem for people older than six months. However, some individuals are more susceptible to health problems from nitrate or nitrite, due to certain health conditions. These include:

- Women who are pregnant or trying to become pregnant, as some studies have shown an increased risk of spontaneous abortion or birth defects.
- Persons without sufficient stomach acids to metabolize and excrete nitrate or nitrite.
- Persons who lack the enzyme, methemoglobin reductase, which converts affected red blood cells back to normal.

In addition, long term exposure to nitrate and nitrite can lead to diuresis, starchy deposits, and hemorrhaging of the spleen.

How do I test for Nitrate and Nitrite?

The amount of nitrate and nitrite in ground water is closely related to the land use activities in the upstream watershed or on the land over the aquifer that serves your well. Contact a certified laboratory to have your water tested for nitrate and nitrite.

Your test results may show levels of nitrate, nitrite, and a total nitrate/nitrite level. The EPA's maximum limit for nitrate in drinking water is 10 milligrams per liter (mg/L), or 10 parts per million (ppm); for nitrite, the limit is 1 ppm. In addition, the sum of the amount of nitrate and nitrite in drinking water should not total more than 10 ppm. For example, if the nitrate level of your well is 10 ppm and the nitrite level is 1 ppm, the total nitrate/nitrite level is 11 ppm, which exceeds the maximum safe limit set by the EPA and should be treated.

Contaminant	EPA Limit
Nitrate	10 parts per million
Nitrite	1 part per million
Total (Nitrate + Nitrite)	10 parts per million

You should test for nitrate and nitrite yearly, as their levels can fluctuate over time. In addition, if the initial test reflects nitrate levels of more than 5 parts per million, or nitrite levels of greater than 0.5 parts per million (50 percent of the EPA's maximum limit), the EPA recommends that you test your water every 3 months to see if the level is increasing.

What are the treatments for Nitrate and Nitrite in drinking water?

Three treatments to reduce nitrate and nitrite include ion exchange, electrodialysis and reverse osmosis processes. Distillation may also be used for smaller quantities of water. These technologies may have a wide range of effectiveness based on the amount of nitrate or nitrite in the water supply and the balance of other ions in the water. A well professional can help you select the right treatment. Boiling your water WILL NOT remove nitrate or nitrite, and in fact will increase their concentration in your water due to evaporation during heating.

For more information about Nitrate and Nitrite

Agency for Toxic Substances & Disease Registry. Nitrate/Nitrite Toxicity Physiologic Effects. Retrieved January 5, 2007 from www.atsdr.cdc.gov/HEC/CSEM/nitrate/physiologic_effects.html

American Academy of Pediatrics Press Release. (September 6, 2005). New Report Outlines Dangers of Well Water in Infant Nitrate Poisoning. Retrieved September 7, 2005 from www.aap.org/advocacy/releases/sept05wellwater.htm

Jennings, Gregory D and Sneed, Ronald E. North Carolina Cooperative Extension Service. (March 1996). Nitrate in Drinking Water. Retrieved January 12, 2007 from www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag473_4.html

NJ Department of Health and Senior Services, Division of Environmental and Occupational Health Services, Consumer and Environmental Health Services. (August 1997). FACTS: Nitrate and Nitrite in Drinking Water. Retrieved January 9, 2007 from www.state.nj.us/health/eoh/hhazweb/nitrate.pdf

U.S. Environmental Protection Agency. (November 28, 2006). Consumer Factsheet on: NITRATES/NITRITES. Retrieved December 29, 2006 from www.epa.gov/safewater/contaminants/dw_contamfs/nitrates.html

Washington State Department of Health. (September 2006). Nitrate in Drinking Water. Retrieved January 4, 2007 from www.doh.wa.gov/ehp/dw/Programs/nitrate.htm

Water Quality Association. Nitrates Awareness – A Health Issue. Retrieved December 29, 2006 from www.wqa.org/sitelogic.cfm?ID=471

For more information on your drinking water

The following websites provide up-to-date information on efforts to protect drinking water supplies and steps you can take as a private well owner. In addition, you may contact the **wellcare®** hotline at 1-888-395-1033.

Underwriters Laboratories Inc. Drink Well™ Well Water Testing
U.S. Environmental Protection Agency
Water Quality Association

www.uldrinkwell.com
www.epa.gov
www.wqa.org

Other information about wells and well water can be found in the following **wellcare®** information sheets:

General Information about Wells:

- Determining the Depth of a Well
- Determining the Yield of a Well
- Ground Water
- Selecting a Well Contractor
- Sizing a Pressure Tank
- Sizing a Well Pump
- Wells
- Your Well & Septic System
- Coping with Low Water Levels
- Managing a Flooded Well
- Protecting Your Wellhead
- Protecting Your Well
- Well Maintenance
- Wells and Fire Protection
- Wells: What to do When Power Fails
- What To Do if the Well Runs Dry
- Boiling Your Drinking Water
- Disinfecting Your Well
- Drinking Water Testing
- Drinking Water Treatments
- Home Drinking Water Treatment Devices
- Testing Water for Gardening and Lawn Irrigation
- Understanding Drinking Water Test Results
- Buying a Home with a Well
- Closing an Abandoned Well
- Dillon's Rule
- Ground Water Withdrawals
- Real Estate Professionals: Buying or Selling a Home with a Well
- Sanitarians – Closing a Well
- Sanitarians – Inspecting a Well
- Sanitarians – Wells & Septic Systems
- Shared Well Agreement
- Sharing a Well
- Water Conservation
- Who Owns the Water

Well Components:

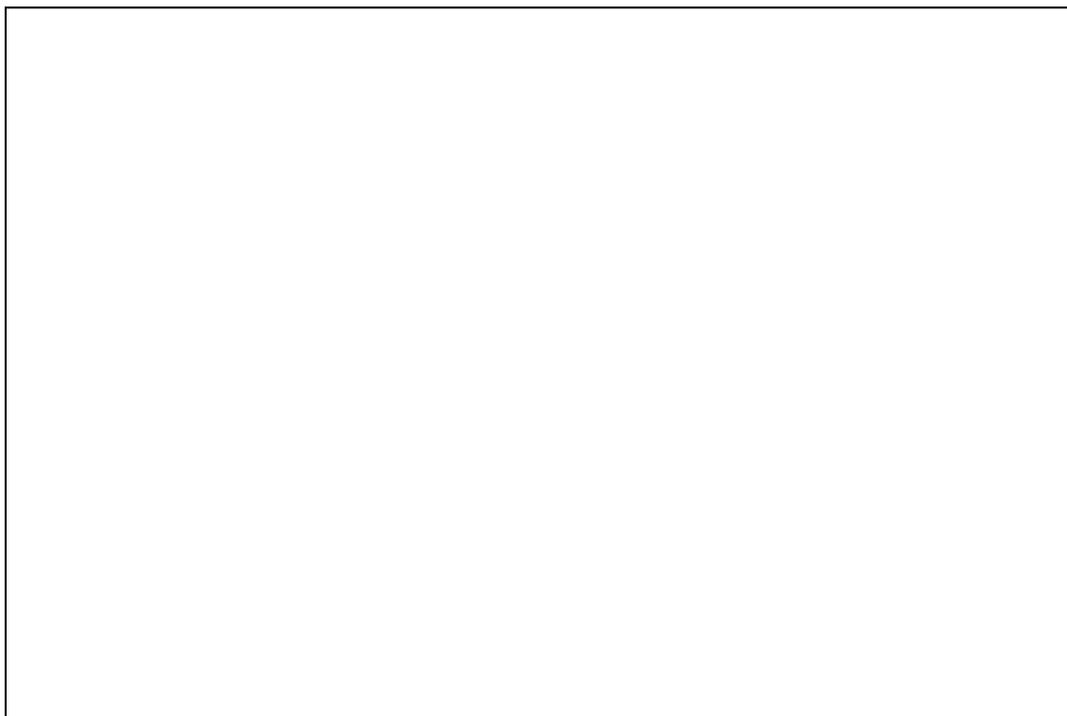
- Your Pitless Adapter
- Valves
- Your Well Cap
- Your Well Casing
- Your Well Pump
- Your Well Tank

Possible Contaminants You May Find in Your Well Water:

- | | | |
|---|------------------------|-------------------------------------|
| ▪ Arsenic | ▪ Iron | ▪ Sulfur |
| ▪ Bacteria | ▪ Lead | ▪ Trichloroethylene (TCE) |
| ▪ Benzene | ▪ Mercury | ▪ Total Dissolved Solids (TDS) |
| ▪ Chlorine Disinfectants & Their Byproducts | ▪ MTBE | ▪ Turbidity in Drinking Water |
| ▪ Chromium | ▪ Nitrate and Nitrite | ▪ Uranium |
| ▪ Copper | ▪ Perchlorate | ▪ Volatile Organic Compounds (VOCs) |
| ▪ Emerging Water Contaminants | ▪ Pesticides | |
| ▪ Hardness in Drinking Water | ▪ pH in Drinking Water | |
| | ▪ Radium | |
| | ▪ Radon | |
| | ▪ Sodium | |

For more information about wells and other wellcare® publications

wellcare® is a program of the **Water Systems Council (WSC)**. WSC is a national nonprofit organization dedicated to promoting the wider use of wells as modern and affordable safe drinking water systems and to protecting ground water resources nationwide. This publication is one in a series of wellcare® information sheets. There were more than 60 available at the time this document was published. They can be downloaded FREE from the WSC website at www.watersystemscouncil.org. Well owners and others with questions about wells or ground water can also contact the wellcare® hotline at **888-395-1033** or visit www.wellcarehotline.org



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