

Nitrate in Well Water

What is nitrate?

Nitrate is a chemical compound and the most common form of nitrogen found in water. Other forms of nitrogen include nitrite and ammonia. Nitrate occurs naturally and is widespread in the environment.

Nitrate is essential for plant growth and is present in all vegetables and grains. Nitrate is colourless, tasteless and odorless.

Nitrate should not be confused with nitrite. Nitrite can also be found in the environment, but is mainly used as a food and drink preservative, especially in cured meats. Both nitrate and nitrite can be a health hazard when consumed at concentrations above health guideline levels.

Nitrate concentrations in drinking water are a concern when levels are above the Guidelines for Canadian Drinking Water Quality. The maximum acceptable concentration (MAC) for nitrate in drinking water has been established at 45 mg/L. This is equivalent to 10 mg/L measured as nitrate-nitrogen.

The nitrate level in most ambient groundwater in British Columbia is very low, generally much less than 1 mg/L. Therefore, the presence of nitrate in groundwater greater than 3 mg/L usually reflects the impact of human activities on well water quality.

How does nitrate get into well water?

Decomposition of organic matter and biological nitrogen fixation by microorganisms in the soil and plants, or lightning strikes are the natural origins of Nitrates. In addition to these sources, nitrate makes its way into well water through other sources such as:

- Agricultural activities (including application of chemical fertilizers and animal manure, storage and feedlots)
- Leaking sewage lines or improperly functioning septic systems
- Industrial processes
- Motor vehicles
- Some de-icing agents used at airports

How do I know if there is nitrate in my well water?

Since nitrate is colourless, tasteless, and odorless, you cannot tell if you have nitrate in your well water unless you test for it.

Nitrate is more often found in groundwater than in surface water. Nitrate is commonly found in shallow wells that are located in agricultural areas. Nitrate levels in ground water may change over time, especially after a heavy rainfall. Nitrate concentrations above guideline levels have been found in well water samples throughout B.C., especially near heavily farmed areas. In some cases, wells located near each other may have different levels of nitrate, so you cannot rely on test results from a neighbour's well.

Who is most at risk?

Nitrate levels above the guidelines are particularly a health concern for:

- Pregnant women
- Developing babies
- Babies less than 6 months old
- The elderly
- Individuals with weakened immune systems
- Individuals with chronic heart, lung or blood conditions

What are the health risks of high nitrate levels?

Exposure to high levels of nitrate reduces the amount of oxygen in the blood. This condition is called methemoglobinemia. When this condition occurs in infants it is also known as "blue baby syndrome".

Babies under 6 months are particularly at risk, although breast-fed infants have less exposure to nitrate than bottle-fed infants. In severe cases, high levels of nitrate can cause an infant to turn a grey-blue colour, mainly around the eyes and mouth due to the lack of oxygen in their blood. Immediate medical attention is necessary, as this serious condition can be fatal.

New studies suggest that the thyroid gland function in school-age children may be affected by exposure to high levels of nitrate. There may also be an associated link between cancer and exposure to nitrate in drinking water.

What precautions should be taken for babies or women who are pregnant?

The safest choice for pregnant women is to drink water below the guideline levels of nitrate in drinking water. To help keep your family safe:

- Have your well water tested for nitrate
- Never give your baby well water, or infant formula mixed with well water, unless it has first been tested safe for nitrate levels. If possible, breastfeed your baby

Boiling your water can increase the amount of nitrate in it. Therefore, be extra careful if you are boiling water to prepare infant formula. Boil for no more than two minutes; extended boiling time is not recommended. Ready-to-feed formula is recommended if you are not breastfeeding and you do not have access to a safe water source.

For more information on preparing infant formula, see [HealthLinkBC File #69b Feeding Your Baby Formula: Safely Making and Storing Formula](#).

How can I get my well water tested?

Testing your well water for nitrate can be done by a private laboratory. Laboratories can be found by searching “Laboratories – Analytical” online. Your local environmental health officer may also be able to give you a list of labs in B.C. that test drinking water.

Laboratories can report nitrate levels in two different ways: mg /L nitrate, or mg/L nitrate-nitrogen. If your results are higher than the recommended guideline levels, or you’re unsure how to read the results, please contact your local health authority.

All wells should be tested for nitrate. For more information on well water testing, see [HealthLinkBC File #05b Well Water Testing](#)

What if my water is high in nitrate?

If you have nitrate levels consistently above the guideline levels, consider the following:

- Install a drinking water treatment device that is rated for nitrate removal, and has been tested and certified by NSF International to effectively reduce nitrate

- Use an alternative drinking water source, e.g., bottled water
- Use an alternative water source (e.g. bottled water) or point-of-use treatment device (NSF certified) for food and beverage preparation, hygiene (e.g. bathing/showering) or washing dishes
- Relocate or drill a deeper well that has been tested or verified and deemed to be a safe supply

Alternative sources of water include:

- Water from a municipal distribution system
- Water from a nearby well that has tested safe for nitrates
- Commercially bottled water
- Water that has been treated using a treatment system specifically designed to remove nitrate, and where possible, should be certified under ANSI/NSF Standard 53 or 58 by an accredited testing agency

It is important to note that boiling water will not remove nitrate, nor will most counter-top filtration units. There is no substitute for having your water tested.

You should monitor your well water for nitrate at least once per year in the spring and/or fall, when concentrations are the highest. This should be done in addition to other parameters such as total coliform.

For More Information

For more information, see the BC Ministry of Environment Nitrate in Ground Water Fact Sheet: www2.gov.bc.ca/assets/download/3BDB4CA4A3614F66BEA3BC4B06E88B7A (PDF 967 KB) or contact the environmental health officer at your local public health authority:

www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/health-authority-contacts

- First Nations Health Authority 1 866 913-0033
- Fraser Health 604 870-7903
- Interior Health 250 851-7404
- Island Health 250 755-6215
- Northern Health 250 565-2150
- Vancouver Coastal Health 604 815-6841