

Information for private well owners

Know Your Well Water Quality – Nitrate

What is nitrate?

Nitrate is a form of nitrogen that is found naturally in groundwater, and in plants such as fruits and vegetables. Other sources include fertilizers, industrial waste water, mining activities (explosives), and septic system leaks. Nitrates may also be added to foods such as cold cuts as a food preservative.

How can nitrate get into well water?

Nitrates can get into groundwater and into your well water through many sources, including: surface runoff from agricultural activities like fertilizer use from farming or animal manure, into a poorly constructed or damaged well; leaking septic systems; and the natural decay of organic matter in groundwater. Elevated concentrations of nitrate in groundwater are often localized and due to human activities. This means that you could have high nitrate in your water even if your neighbour does not.

Can nitrate affect me or my family's health?

Potential health effects of nitrate depend on a number of factors, including how much nitrate a person was exposed to, how long they were exposed and factors such as age and pre-existing illnesses. For most Ontario residents, the primary source of nitrate exposure is through food, followed by drinking water.

Most people are not exposed to levels of nitrate in drinking water that would cause health problems. Consuming high levels of dietary nitrates can be harmful especially for infants under 6 months of age. Exposure to high concentrations of nitrate can cause a condition called methemoglobinemia. In infants this has also been called blue baby syndrome. Methemoglobinemia interferes with oxygen delivery to cells in the body. The most obvious symptom is bluish skin colour, particularly around the eyes and mouth. Excessive nitrate exposure is not the only cause of methemoglobinemia, most cases occur as a result of factors other than nitrate exposure. There is also some evidence linking nitrate exposure to adverse pregnancy outcomes; pregnant women can also be considered a special risk group.

Nitrates have been classified as probably carcinogenic by the International Agency for Research on Cancer (IARC) if they undergo changes in the body that result in the formation of N-nitroso compounds. The extent to which this reaction occurs is influenced by the overall composition of the diet, including the vitamin C intake. Vitamin C likely has a protective role in reducing the formation of N-nitroso compounds.

Are there standards for nitrate in drinking water?

Ontario's drinking water standard for nitrate is 10 milligrams per litre (10 mg/L) measured as nitrogen (N), this is equivalent to 45 mg/L of nitrate.

How do I know how much nitrate is in my well water?

In drinking water, nitrate has no taste, odour or colour. It can only be detected through chemical testing.

Have your well water tested by an accredited laboratory to find out how much nitrate, if any, is in your well water. A list of laboratories licensed to perform drinking water tests in Ontario is available at: <https://www.ontario.ca/page/list-licensed-laboratories>. The laboratory will provide you with a sample bottle and instructions on how to take a sample.

You should test your well for nitrate:

- At least twice initially – once in the spring and once in the fall because concentrations will vary with weather and the season
- More frequently if nitrate levels are near the drinking water standard or if you have a dug well (less than 6 m deep)
- If your well always shows no signs of nitrate, you can test less often (every 2 to 3 years)
- If you have a treatment system to remove nitrate from your water, test the treated water annually to ensure it is working properly.

What should I do if nitrate is found in my drinking water?

You are responsible for ensuring your well water is safe to drink.

If your well water has levels of nitrate above the Ontario standard and there is an infant (under 6 months) or a pregnant woman in the home, you should use another source of water for drinking and preparing food (including formula). Boiling water will not reduce or remove nitrate. Other steps you could take include:

- Seek advice from a licensed well contractor or a licensed groundwater consultant to ensure your well is properly constructed and maintained to minimize the risk of contamination.
- Remove or reduce potential sources of nitrate near the well:
 - Do not apply nitrate-containing fertilizers near the well,
 - Have your septic system inspected by your local building code official,
 - Ensure manure or other animal or plant waste is not stored or applied near the well.
- Consider options for a long-term safe water supply, such as obtaining water from a public (municipal) water system or installing a water treatment system. For treatment options, you should consult with a water treatment professional.
- Test your well for bacteria. High nitrate levels could indicate potential contamination from human or animal waste; therefore, harmful bacteria may be present as well.

For more information, contact your local public health unit. Contact information is available at <http://www.health.gov.on.ca/en/common/system/services/phu/locations.aspx>.

How can I find out if nitrate has been found in private well water supplies in my community?

Nitrate in well water can vary widely from one well to the next, even within a relatively small area. Where available, groundwater monitoring information could provide information on the presence of nitrate in an area.

More information on groundwater monitoring in Ontario may be found on the following websites:

- <https://www.ontario.ca/environment-and-energy/map-provincial-groundwater-monitoring-network>
- <http://www.mndm.gov.on.ca/en/mines-and-minerals/applications/ogsearth/ambient-groundwater-geochemistry>