

## What is Nitrate?

Nitrate is a chemical made up of a combination of one atom of nitrogen (N) and three atoms of oxygen (O):  $\text{NO}_3$ . The major commercial use of nitrate is as a chemical fertilizer.

## How does Nitrate get into drinking water?

Nitrate can get into well water if the well's surface seal is poorly constructed or missing. A poorly constructed or missing surface seal could allow surface waters contaminated with bacteria, pesticides or fertilizers to seep into the drinking water.

Nitrate can also contaminate ground water aquifers. When nitrogen fertilizers are used to enrich soils, nitrate can be carried by rain or irrigation through the soil and into the aquifer. Other sources of nitrate come from decomposing vegetation and geological deposits.

## Nitrate and Health

High levels of nitrate in drinking water can cause a blood disorder in newborn babies called Methemoglobinemia. Although Methemoglobinemia can affect persons of any age, infants are the most susceptible to this condition.

Some studies also suggest a possible link between nitrate, cancer and birth defects; however, these links have not been confirmed by rigorous scientific study. Since nitrate levels in drinking water are a general indicator of overall water quality, levels above 5 milligrams per liter may indicate the presence of other contaminants which could cause health problems.

## Nitrate, Infants and Methemoglobinemia

In order for nitrate to cause Methemoglobinemia, it must first be changed by the body into Nitrite. Babies younger than four months old have low levels of stomach acid. This low acid environment allows the growth of certain bacteria that are capable of converting nitrate to nitrite. Nitrite changes oxygen-rich hemoglobin to oxygen-poor methemoglobin. The result is an infant being starved of oxygen. Methemoglobinemia usually occurs when water high in nitrate is used to prepare infant formula and foods. Boiling water for infant formula is a good practice for getting rid of bacteria, but it will not get rid of nitrates.

**Symptoms:** An infant with methemoglobinemia shows little distress, but appears ruddy and has a peculiar lavender color. Most often the disease is only recognized in acute stages, when the infant turns blue and has trouble breathing.

**Treatment:** If the condition is not life-threatening, no treatment is needed other than a switch to uncontaminated water. The symptoms will improve within two to three days. For severely affected infants, see your healthcare provider.

**Prevention:** In Washington State, laboratories generally report nitrate levels in drinking water as parts per million (ppm) of nitrogen. Infants under one year of age should not drink water containing nitrogen at a concentration greater than the drinking water standard of 10 ppm.

## Get it tested!

The only way to know if drinking water is contaminated with nitrate is to have it tested by a certified laboratory. Public water systems are routinely tested for the presence of nitrate. You will be informed by the water utility if there are elevated levels of nitrate in your drinking water. If you have a private well, visit [www.tpchd.org/certifiedlabs](http://www.tpchd.org/certifiedlabs) for more information.

## How can I get rid of Nitrate?

Three treatment methods commonly used to remove nitrate include reverse osmosis, anion exchange and distillation. These techniques are expensive to install and require frequent, careful maintenance for effective operation. Simple filtering devices do not remove nitrates. If the problem is caused by a poorly constructed or located well, reconstructing or relocating the well may be the best solution.

## What should I do if my drinking water has more than 10 ppm Nitrate?

If you have children under the age of one year, use uncontaminated water for preparing formula, juice and food. Although no health based standards exist for adult exposures, the following groups may be at risk:

- Individuals with reduced gastric acidity
- Individuals with a hereditary lack of methemoglobin reductase, and
- Pregnant women.

If you have elevated nitrate levels, contact us to help identify the source of contamination.

**If you have additional questions** or want more information about your responsibilities as a public water system manager, please contact Tacoma-Pierce County Health Department's Drinking Water Program at (253) 798-6470, option 2, or email us at [EHDrinkingWater@tpchd.org](mailto:EHDrinkingWater@tpchd.org)