

# Nitrate in Drinking Water

## What is nitrate and where does it come from?

Nitrate is a naturally occurring oxide of nitrogen. Nitrogen is present in the air and reacts with oxygen and ozone to produce nitrate. Nitrate is an essential component of living things and is a major part of animal manure, human sewage waste and commercial fertilizers. Nitrates can be associated with septic systems and have been used for centuries as fertilizers, in explosives, and as food preservatives.

## How can nitrate affect my health?

Nitrate is a potential health hazard. Drinking water with high levels of nitrate can cause health effects such as:

- Blue baby syndrome (*or Methemoglobinemia*) which is a decreased ability of blood to carry oxygen to tissues. Blue baby syndrome is shown by blueness of the skin. Symptoms especially in infants can develop rapidly with health deteriorating over a period of days requiring immediate medical attention.
- There is also potential increased risk of:
  - Recurrent respiratory infections,
  - Thyroid dysfunction,
  - Negative reproductive outcomes such as spontaneous abortion, and
  - Certain cancers including cancer of the stomach or bladder.

## When does nitrate in drinking water become a health concern?

Nitrate is measured in milligrams per liter (mg/L)\*. The federal government has established a safe drinking water standard (also called maximum contaminant level) for nitrate as 10 mg/L.

If your water has nitrate levels above 10 mg/l, **do not give the water to infants under 6 months old or use it to make infant formula**. It is advisable to switch to bottled water or other water low in nitrate. If you are

pregnant or have specific health concerns, you may wish to consult your doctor.

Nitrate occurs naturally in surface water and groundwater at concentrations up to 1 to 2 mg/L. At these levels, nitrate is not considered harmful to health.

*\*Nitrate is also measured in parts per million or ppm. For example, 1 mg/L is the same as 1 ppm.*

## **Safely using nitrate-contaminated water**

### **Can I wash my food with nitrate-contaminated water?**

If nitrate levels in your water are above 10 mg/L, do not use water to wash, prepare, and cook food for infants below the age of six months. It is advisable to use bottled water or other water low in nitrate.

### **Can I irrigate or water my garden with nitrate-contaminated water?**

Yes.

### **What about bathing and showering?**

Nitrate does not easily enter the body through the skin. Bathing, swimming and showering with water that has levels of nitrate over 10 mg/L is safe as long as you avoid swallowing the water. Supervise children under six months of age when they are bathing and brushing teeth to ensure they do not swallow the water.

### **What about washing dishes, utensils, and food preparation areas?**

Only a very small amount of water clings to smooth surfaces, such as dishes. Water having more than 10 mg/L of nitrate can be safely used to wash and sanitize dishes, tables and eating utensils.

### **What about general cleaning and laundry?**

Very little water remains on washed surfaces and in laundered fabrics. Because these articles are not placed in the mouth, water with nitrate above 10 mg/L can be safely used for general cleaning and washing of clothing, bedding, and linens.

## What about my pets?

Nitrate affects young animals the same way as human infants and should not drink water with nitrate more than 10 mg/L.

# Learning about nitrate levels in your drinking water

## For people on municipal or public water systems

Public drinking water providers are required to monitor for nitrate and ensure levels remain below the drinking water standard of 10 mg/L. They are also required to make those results public. If your water comes from a public water system, you can find results on the Oregon Drinking Water Services [Data Online](#) website. Your drinking water provider may also be required to provide a Consumer Confidence Report to its customers every year. This report contains the most recent nitrate test results. Contact your drinking water provider for a copy of the most recent consumer confidence report.

## For private well owners

If your drinking water comes from your own well, you will have to find an accredited laboratory that does water testing for private property owners. These labs can provide information and instructions for getting your well water tested. For a list of accredited laboratories for drinking water in Oregon, contact the [Oregon Environmental Laboratory Accreditation Program \(ORELAP\)](#) or view the [Oregon Accredited Laboratory Lists](#) online.

Water containing 5 to 10 mg/L nitrate as nitrogen should be tested every three months for at least one year to determine whether levels are increasing or vary seasonally. Since nitrate levels can vary over time, annual testing is advised at a minimum for all drinking water sources.

# Removing nitrate from drinking water

## Do not boil the water!

Boiling contaminated water does not remove nitrate and can increase nitrate levels.

## For public drinking water system operators

Nitrate can be reduced or removed entirely from drinking water, but treatment processes are expensive and require careful maintenance and monitoring. Current treatment methods include ion exchange resins, reverse osmosis, electro dialysis and either biological or chemical denitrification. If treatment is not possible for your system, you should consider developing a different water source, blending with a different source, or connecting to another safe water source in the area. Water that is to be used for drinking, beverage-making or food preparation should be obtained from a known safe source and used on a temporary basis. Non-ingestion uses of water pose fewer hazards but are not entirely safe if nitrate levels are significantly above the drinking water limit. Before deciding on treatment equipment, contact [Oregon Drinking Water Services](#) for information and advice.

### Private well treatment options:

First, make sure that you are not contributing to the problem. Take action to prevent nitrate sources on your property from contaminating your own groundwater (e.g., properly maintain your septic system, reduce fertilizer use within 100 feet of the well, and move livestock or manure piles away from the well area). Non-treatment options include developing a different water source, blending in water from another source, or connecting to another safe water source in the area.

Several treatment methods can remove nitrate from drinking water, including ion exchange and reverse osmosis; ion exchange is the most common.

Be sure that any treatment system used is certified by a recognized, third-party testing organization that meets strict testing procedures established by the [American National Standards Institute \(ANSI\)](#) and [National Sanitation Foundation \(NSF\) International](#). Proof of certification should be available from the distributor or manufacturer. Alternatively, NSF certification for various treatment units may be verified through NSF or the [Water Quality Association](#).

Treatment equipment must be carefully maintained to work properly and may not be effective if nitrate levels are very high. Treated and untreated water should be tested at least once a year. With treatment, testing should be done

yearly at the point of use (e.g., kitchen faucet) and every three years at the well head.

## For more information

- Private well owners with health-related questions about nitrate in their water may call 971-673-0440 or email [domestic.wells@state.or.us](mailto:domestic.wells@state.or.us).
- [Agency for Toxic Substances & Disease Registry](#) – Nitrate

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Oregon Health Authority – Drinking Water Services  
800 NE Oregon Street, Suite #640, Portland, OR 97232-2162, (971) 673-0405  
<http://healthoregon.org/dwp> | [info.drinkingwater@dhsoha.state.or.us](mailto:info.drinkingwater@dhsoha.state.or.us)