

## **Health Advisory for Nitrates in Drinking Water from POWJH, November 14, 2024**

Nitrogen compounds such as nitrates and nitrites are found in all living animals and plants. It is an essential element for life on earth and exists in its various forms in soil and water everywhere. As a consequence of human activity, levels of nitrates have increased considerably over the past 100 years. Serious and potentially life-threatening effects of high nitrate consumption have been recognized since the early 1960's leading the EPA to establish a maximum acceptable level in drinking water at 10 mg/L\*.

There have been dozens of studies worldwide since then attempting to determine more precisely what the risks are to human health and whether there are risks at levels less than 10 mg/L. Studies have not indicated that bathing or other uses of high nitrate water is a health concern. However, it should be noted that cooking with water can concentrate the nitrates and should not be consumed.

\*Nitrate ( $\text{NO}_3^-$ ) concentrations throughout this article are given in units of nitrate nitrogen and as 10 mg/L of nitrate nitrogen which is equal to 44 mg/L of nitrate. The term "mg/L" is common scientific notation and is the same as part per million (ppm). See the note at the end of this document on Well Testing.

### **Short Term Exposures**

In the 1960's, medical scientists and the EPA discovered that high nitrate levels in water were often the cause of Blue Baby Syndrome, which was usually fatal if not treated promptly. Nitrates can interfere with red blood cell's ability to deliver oxygen throughout the body leading to blue coloration and sometimes death. Children and adults with cardiovascular, pulmonary, intestinal, or metabolic diseases are also at risk (1). Other research suggests that short term exposure to nitrates at levels lower than 10 mg/L can be associated with preterm deliveries as well as low full term birth weights (2, 3). These studies are based on short term exposures, such as several months or less. These health concerns are not based on a single day of drinking poor quality water.

Because many water sources with high nitrate levels are also polluted with human or agricultural waste, elevated nitrates can be considered a predictor of the presence of bacteria, viruses and parasites. Consuming or swimming in water with these contaminants can lead to serious intestinal infections.

### **Long Term Exposures**

While long term exposure to nitrates has not been definitively linked to cancers or other systemic diseases, a few studies have suggested an increased risk of several types of cancer. Nitrates and nitrites can be converted to nitrosamines in the intestinal tract by bacteria. Nitrosamines are thought to be carcinogenic giving rise to concerns about long term exposure.

There is a general consensus that more research needs to be done to better understand and quantify the complex biochemistry involved in nitrate exposure through drinking water, specifically how extended exposure to lower levels (3-10 mg/L) impacts human health.

### **Teton County Geography**

Protect Our Water Jackson Hole considers drinking water with greater than 2 mg/L nitrate to be impacted by human activity and advises that water at or above this level should not be consumed.

It is important to consider that many residents and businesses of Teton County get their drinking water from wells not overseen by local, state, or federal government. Outside of public utility water supply, the regulations on well testing can vary and may not be dependable. In Teton County, nitrate levels have been detected at levels as high as 15 mg/L.

### **WHAT YOU CAN DO TO PROTECT YOURSELF AND YOUR FAMILY**

Public water systems are required to regularly test and report water quality. Educate yourself about the quality of your drinking water by reading published water quality results. If you are on a private well, it is recommended that you test your drinking water in both the summer and winter to capture conditions that differ by season. The highest values may occur during the winter when groundwater levels are deeper and less likely to dilute pollutants.

- If you own a septic system, be sure to properly maintain it by having it checked by a licensed technician and having it pumped every 3 years.
- Keep nitrate sources (fertilizer, septic, animal waste) away from your well.
- Regularly inspect your well for potential problems and unsanitary conditions; use a licensed contractor if needed.

If your well tests positive for elevated nitrate (anything above 2mg/L), POWJH recommends installing a filter that will remove nitrate. Reverse osmosis is the most common in-home filtration system that is effective in removing nitrate, nitrite, and ammonia. Carbon filters do not remove nitrates. Boiling water does not remove nitrate and will increase concentrations. Fortunately, properly installed and maintained systems can effectively remove nitrate from drinking water.

**Well testing** must be performed using sanctioned drinking water well test kits and analyzed by a certified laboratory. Test strips that are used for aquarium water tests and for surface water field tests will provide an indication if nitrates are detected. If these strips indicate that nitrates are present, the water should be tested again and sent to a laboratory for precise nitrate levels and other possible contaminants.

- 1) Physiology, Oxygen Transport and Carbon Dioxide Dissociation Curve (March 27, 2023);  
<https://www.ncbi.nlm.nih.gov/books/NBK539815/>
- 2) Nitrate in Drinking Water during Pregnancy and Spontaneous Preterm Birth:  
A Retrospective Within-Mother Analysis in California;  
<https://ehp.niehs.nih.gov/doi/10.1289/EHP8205>
- 3) Stanford Medical Study, Higher levels of nitrate in drinking water linked to  
preterm birth (May 5, 2021);  
<https://sustainability.stanford.edu/news/higher-levels-nitrate-drinking-water-linked-preterm-birth-study-finds#gs.db5m91>