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FACTSHEET: NITRATE AND NITRITE

INTRODUCTION

This factsheet provides basic information for private water well owners regarding nitrate and nitrite in their well water. To determine if water is generally safe to drink, water test results are compared to the US Environmental Protection Agency (EPA) **Primary Drinking Water Regulations** table of contaminants and the EPA **Secondary Drinking Water Standards**. The above standards only apply to public water systems, but the quality and health implications are the same for private well owners. In addition, the Wyoming Department of Environmental Quality (WDEQ) has a set of standards (Water Quality Rules and Regulations (WQRR) Chapter 8 Table 1) for water quality based on class of use, including domestic, agriculture and livestock. Keep your analytical results and your sampling documentation with your well information for future reference if there is a question about change in water quality.

WHAT IS NITRATE AND NITRITE?

Nitrate and nitrite are both nitrogen-based chemicals which can be found in water, soil, plants, and food. Nitrate is an essential nutrient for plant growth, and is the more stable of the two nitrogen compounds. Nitrite is not usually found in significant concentrations in the environment.

WHAT CAUSES NITRATE OR NITRITE IN MY WATER?

Nitrate can be found naturally in groundwater, surface water, and even rainfall at low concentrations due to reactions of nitrogen in the atmosphere with precipitation. Nitrate and nitrite are both highly soluble in water and can easily pass through soils to enter groundwater. Nitrate can persist in groundwater for decades, and concentrations can continue to increase if there is an ongoing nitrogen source.

High levels of nitrate in water wells often results from improperly constructed or located wells, overuse of nitrogen-containing fertilizers, aging or improperly constructed septic systems, areas of dense septic system installation, or disposal of human or livestock waste. Excess ammonia entering groundwater can also be converted to nitrate and nitrite.

Nitrite is not usually found in appreciable concentrations in the environment unless the groundwater is also a reducing (low oxygen) environment. Nitrate can be converted to nitrite by biological activity.

WHAT IS THE STANDARD FOR NITRATE AND NITRITE IN GROUNDWATER?

Nitrate and nitrite are both regulated under the US EPA Primary Drinking Water Regulations. The US EPA has set a maximum contaminant level for nitrate at 10 milligrams per liter (mg/L), and 1 mg/L for nitrite.

Wyoming Water Quality Rules and Regulations Chapter 8, Table 1 has the same standards as the EPA for Class I (domestic) water quality, and has set a nitrite level of 10 mg/L for Class III (livestock) water uses.

IS NITRATE OR NITRITE IN MY WATER A HEALTH CONCERN?

Ingestion of water containing high levels of nitrate or nitrite can be fatal for infants, especially bottle-fed infants under 6 months of age. Bacteria in the saliva and digestive tract convert nitrate to nitrite, this can interfere with the ability of blood to carry oxygen. In serious cases, this can lead to a disorder called methemoglobinemia, or 'blue baby syndrome'. Symptoms include shortness of breath or a blue coloring to the skin. Water containing nitrate or

nitrite should not be used in food or formula preparation for children under 6 months of age. Nitrate and nitrite are not usually a problem for people over 6 months of age, although people with certain health conditions may be more susceptible to problems from nitrate or nitrite ingestion, such as:

- Pregnant women
- People with low stomach acid
- People with gastrointestinal infections
- People lacking the methemoglobin reductase enzyme

People who consume unusually high levels of nitrates can experience decreases in blood pressure, increased heart rate, headaches, abdominal cramps, and vomiting.

HOW DO I TEST FOR NITRATE AND NITRITE IN MY WATER?

A list of certified labs can be found on the WDEQ Know Your Well Webpage (deq.wyoming.gov/wqd/know-your-well). Contact your selected laboratory for testing procedures and sample bottles.

The WDEQ suggests that well water be tested annually for nitrates and/or nitrites since concentrations can fluctuate. Due to holding time issues, the WDEQ recommends that your water be tested for the combined total of Nitrate + Nitrite. If the concentration is greater than 10 mg/L then your water should be treated. Additional testing can be conducted for nitrate or nitrite individually to determine which compound is the problem.

WHAT CAN BE DONE TO TREAT MY WATER FOR NITRATE OR NITRITE?

The information below is intended as an information source only. The WDEQ suggests you discuss appropriate water treatment options with a qualified water treatment specialist, since other constituents in your water may affect the selection of the appropriate water treatment method.

Nitrate or nitrite issues can be treated by point-of-use systems (i.e. reverse osmosis or distillation) for cooking or drinking water quantities. Larger volumes of water can be treated using ion exchange treatment systems.

REFERENCES

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United States Geological Survey, *Nutrients National Synthesis Project,* Water Conditioning and Purification, January 1998, v. 39, no. 12, pp 76-79.

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