ENVIRONMENTAL Fact Sheet

NEW HAMPSHIRE DEPARTMENT OF Environmental Services

29 Hazen Drive, Concord, New Hampshire 03301 • (603) 271-3503 • www.des.nh.gov

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# Nitrate and Nitrite in Drinking Water

**INTRODUCTION AND OCCURRENCE**

Excessive nitrate or nitrite in drinking water is an acute health concern for infants through 6 months of age and for women during pregnancy. Nitrate is a component in fertilizers, and both nitrate and nitrite are found in sewage and sanitary wastes from humans and animals. Shallow and dug overburden wells are the most vulnerable to this contamination, though bedrock wells are also vulnerable from nitrate spikes derived from blasting explosives during construction activities.

The presence of elevated *nitrite* suggests that the contamination source is very recent and/or nearby since nitrite oxidizes quickly to nitrate in the environment. If either nitrate or nitrite are elevated, testing for bacteria is also very important.

**HEALTH STANDARDS**

The federal and state maximum contaminant levels (MCLs) are 10 milligrams per liter (mg/L) for Nitrate and 1.0 mg/L for Nitrite.

Excessive levels of nitrate or nitrite in drinking water can cause serious illness and even death in infants less than six months of age, due to nitrate reduction to nitrite within the body, which interferes with the oxygen-carrying capacity of blood. Symptoms include shortness of breath and blueness of the skin, called methemoglobinemia or Blue Baby Syndrome. This is an acute disease in which symptoms can develop rapidly in infants even with short-term exposure. Expert medical assistance should be sought immediately if these symptoms occur.

**TESTING**

Obtain water sample bottles by contacting an accredited laboratory from the list provided at des.nh.gov, web search for "NHDES Private Wells." NHDES recommends testing for the "Standard Analysis" suite of parameters which includes nitrate/nitrite, Bacteria and other important water quality parameters. Nitrate/nitrite alone can also be tested for $12 to $15 per sample and is recommended annually for raw water sources and quarterly if treatment is installed.

**MITIGATION / TREATMENT**

The following mitigation and treatment options may be used to reduce nitrate/nitrite in water:

**1) Locate and Abate the Contamination Source**

Before or in addition to implementing any treatment solutions, it is important to locate and abate the source of the elevated nitrate and/or nitrite. If the source is fertilizers, these should be avoided altogether at least 75 feet around the wellhead. If the source could be from human or animal waste or wastewater septic systems, the well should be filled in and abandoned as there is additional concern of bacteria and viruses contamination reaching the well. If blasting has occurred in the area, the nitrate spike will be temporary such that treatment can be installed until levels subside.

**2) New Water Source**
If the contamination source cannot be addressed, a new well source or water main extension from an adjacent public water system may be necessary. A new well should be located in a protected area away from any contamination sources. A bedrock well is preferred to reduce vulnerability to nitrate, nitrite and bacteria, but must be tested for common bedrock contaminants including arsenic, radon and uranium.

**3) Water Treatment**

**POINT OF USE (POU)** – POU or under the sink treatment is the preferred treatment option as only the water that is used for consumption needs to be treated for nitrate/nitrite. POU treatment may be via Nitrate-selective resin cartridges or via Reverse Osmosis (RO). Equipment cost for the Resin Cartridge is $100-$150 while the RO equipment is $150 to over $1,000 depending on the equipment features. Although treatment is effective, the RO process has very low water efficiency wasting about 75% of water treated, though water waste is returned to the ground via your septic system or drywell. Look for equipment certified under NSF/ANSI 58 for RO systems, or NSF/ANSI 53 Health Effects for nitrate selective cartridges.

**POINT OF ENTRY / WHOLE HOUSE –** Whole house nitrate/nitrite removal may be accomplished by standard, strong base Anion Exchange resin or by Nitrate-Selective resin, as long as it is followed by a Calcite Neutralizer to correct water corrosivity for lead and copper. Whole house anion exchange is regenerated with a salt tank similar to a standard softener, but removes the negatively charged ions including carbonate alkalinity, nitrate, nitrite and sulfate. Regeneration frequency is based on the raw water sulfate loading, and therefore requires much less frequent salt regeneration typically every 3 to 4 weeks, depending on the water demand and the sulfate concentration. If a neutralizer is not installed, extreme water corrosivity results following each regeneration cycle due to stripping of all the water alkalinity and ensuing pH drop until the carbonate ions are saturated again. The corrosion effect continues even after restoration of the alkalinity and therefore must be avoided to prevent leaching of toxic lead and copper from home plumbing.

Typical costs for whole-house anion exchange/calcite treatment are approximately $2,500 to $3,500. Annual maintenance cost for salt and calcite replenishment is about $100 per year.

**For More Information**
Contact the Drinking Water and Groundwater Bureau at (603) 271-2513 or dwgbinfo@des.nh.gov, or visit us at des.nh.gov. You may also input your water test results to the NHDES Be Well Informed water treatment application (available via a web search) to interpret your results and identify appropriate treatment options.

Note: This fact sheet is accurate as of July 2019. The availability of additional information after this date may render this information inaccurate or incomplete.