www.nhwaterwell.com

Information: New Hampshire Water Well Association

Information in this document is provided in good faith to inform the public about groundwater and water wells. Well owners should ensure that their well contractor has obtained permits (if required) and has referred to local codes, rules, regulations and laws for site selection, construction, maintenance and operation of water wells and water system equipment.

NITRATE IN GROUNDWATER

Testing for nitrate in is one of the commonly recommended measurements for well water.

Nitrate is found naturally in air and soil and is an essential nutrient for plant and animal growth. Nitrate sources in the environment include the decomposition of plants and animal wastes, human sewage and the application of fertilizer. Nitrate (NO_3) is a common constituent of groundwater. It is made up of nitrogen and three oxygen atoms. The median level of nitrate in ground water in the U.S. is generally less than 2 parts per million. The recommended maximum level for drinking water is 10 parts per million. This is more accurately described as milligrams per liter (mg/L). The New Hampshire Water Well Association recommends that you check the level nitrate in your well water. If the level is more than 5ppm, test again in a few months to check if the level is increasing.

The amount of nitrate in groundwater is typically related to the land use activities in the upstream watershed or on the land over the aquifer. Nitrate levels are generally highest in agricultural areas or downwind of coal-fired power plants. About 11 million tons of nitrogen is applied annually in the agricultural industry as commercial fertilizer. Another 6.5 million tons of nitrogen is applied each year as manure. Septic systems that are overloaded or not properly maintained (pumped regularly) are a likely a source of nitrate for home wells in New Hampshire. The level of nitrate in groundwater generally decreases with depth below ground, indicating that deeper groundwater is somewhat insulated from surface conditions by intervening rock layers and/or that the deeper groundwater resource resulted from precipitation that entered the ground before the widespread use of fertilizers.

High concentrations of nitrate may cause a medical condition commonly known as "blue baby syndrome" or methemoglobinemia. Methemoglobinemia is a blood disorder that impairs the ability of the blood supply to carry oxygen throughout the body. It primarily affects infants less than 6 months of age. Most instances of this problem can be traced to babies drinking milk formula mixed in water with very high nitrate levels. The most serious problems often result from dug wells or drilled wells that have casing that is not sealed properly for the first 20 feet down from the surface. It is virtually impossible to keep nitrate contamination out of dug wells.

The Environmental Protection Agency has determined an enforceable Maximum Contaminant Level (MCL) of 10 mg/L for nitrate (reported as nitrogen, N) in public water supplies. This would be equivalent to 44 mg/L of nitrate reported by a laboratory as NO_3. (Check how your lab has reported nitrate levels before you rush out and buy conditioning equipment). Private well owners with high nitrate levels should ask their local health departments or their family doctor for advice. The presence of nitrate in groundwater may also indicate that there is a potential for other contaminants to be present. Testing for nitrate is not expensive. Always use a certified laboratory. The NH Department of Environmental Services operates a testing laboratory in Concord, NH.

Nitrate levels in groundwater are easily treated through ion-exchange, reverse osmosis (RO) or distillation processes to provide safe drinking water. Before choosing a treatment option, a homeowner should explore the benefits of each system. Ion-exchange systems are usually best for "whole-house" systems, but require special resins to be most efficient in contrast to resins used in typical "water softener" exchange units. RO systems are very effective, but typical residential systems can treat only a limited volume of water. Distillation is also effective, but has a relatively high operational cost.