

ENVIRONMENTAL Fact Sheet



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Hardness in Drinking Water

INTRODUCTION AND OCCURRENCE

Hardness in drinking water is comprised by natural minerals calcium (Ca) and magnesium (Mg), and is expressed as calcium carbonate (CaCO_3) milligrams per liter (mg/L) or Grains per Gallon (gpg). These minerals are dissolved naturally by the groundwater interaction with soil and rocks such as limestone, calcite and some volcanic basalts.

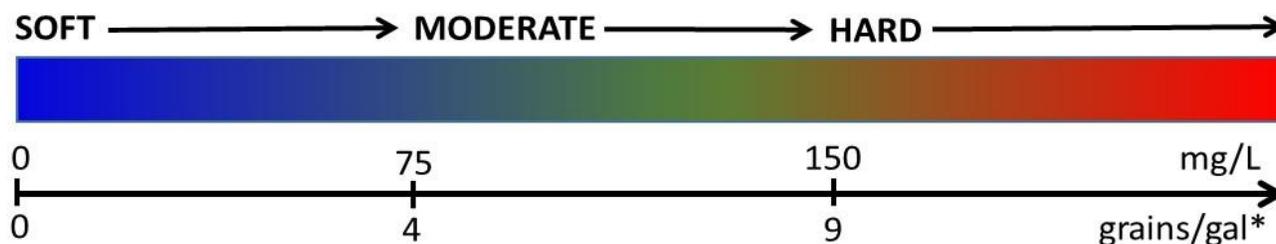
HEALTH EFFECTS

There are no health risks from water hardness. In fact, the presence of these dissolved minerals in drinking water is what gives water its characteristic refreshing taste and provides essential minerals to the body. However, too much hardness creates aesthetic issues including:

- Carbonate scale (lime buildup) in pipes and on plumbing fixtures.
- Reducing the efficiency of water heaters by scale buildup on heating elements.
- Producing soap scum most noticeable on tubs and showers.
- Producing white mineral deposits on dishes and glassware.

HEALTH STANDARDS OR GUIDELINES

The range of hardness concentration in water is commonly referenced to its tendency to cause scaling on pipes and plumbing fixtures. Water that has low hardness is deemed to be “soft” because it does not create scale, whereas water with high hardness is deemed to be “hard” and generally does create scale on pipes and fixtures. In most waters, hardness levels of 150 mg/L (9 gpg) and higher are considered “hard,” as depicted below:



*Grains per gallon = 17.2 mg/L

TESTING

Obtain water sample bottles by contacting an accredited laboratory from the list provided at des.nh.gov, or a web search for “NHDES Private Wells.” NHDES recommends testing for the Standard Analysis suite of parameters which includes hardness, bacteria, arsenic, lead and other important water quality parameters. Hardness is reported as an equivalent concentration of calcium carbonate (CaCO_3) mg/L. If you wish to convert the CaCO_3 to Calcium equivalents, multiply the lab result by the molecular weight of Calcium (40 g/mol) and divide by the weight of CaCO_3 (100 g/mol).

MITIGATION AND TREATMENT

The most common treatment for hard water is cation exchange “softening,” a process which exchanges the calcium and magnesium ions with the “softer” minerals sodium or potassium. The softener is regenerated with standard salt (sodium chloride), with the brine waste discharged to your septic system or a drywell. The advantages of whole-house softening systems are their simplicity and low maintenance cost. Disadvantages include the high volume of brine which contaminates the groundwater including your own well and those of your neighbors, and the increased sodium levels which may be a concern for those on a sodium-restricted diet.

Reducing Salt Use – reducing salt discharge to the environment is extremely important to protect the groundwater and nearby streams. Recommendations to reduce salt discharges are:

- Avoid water softeners unless water hardness is over 150 mg/L AND causing aesthetic issues.
- Use non-salt treatment technologies such as Birm or Greensand filtration for Iron or Manganese.
- Treat only the hot water in your home.
- Use a “demand-based” unit which backwashes based on actual water use rather than on a fixed timer.
- Reduce the brine loading to **6-8 pounds of salt/ft³** instead of **10-12 pounds/ft³**.

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 June 2019. Statutory or regulatory changes or the availability of additional information after this date may render this information inaccurate or incomplete.