
ENVIRONMENTAL Fact Sheet



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Sodium and Chloride in Drinking Water

Many people use the word “salt” when they intend to refer to sodium or to sodium chloride. When a salt such as sodium chloride dissolves in water it breaks up into positively- and negatively-charged ions. Sodium chloride breaks up into sodium and chloride ions in water. Every water supply contains some sodium and chloride.

Occurrence of Sodium and Chloride

Typical background levels of sodium and chloride for pristine locations in New Hampshire are less than 20 milligrams per liter (mg/L) and 30 mg/L, respectively. A milligram per liter is the same as a part per million (ppm). In the immediate seacoast area, elevated levels of sodium and chloride occur naturally due to the proximity to sea water and wind-blown sea spray. Concentrations in groundwater in the seacoast area typically range up to 75 mg/L sodium and 150 mg/L chloride, respectively. Substantially higher levels of sodium and chloride tend to imply contamination by human activities, including road salt storage, use of road salt, discharges from water softeners, human or animal waste disposal, leachate from landfills, and other activities.

Normally the chloride concentration of well water exceeds that of sodium by approximately 50 percent due to the difference in their atomic weights. Any judgment relative to water’s salt concentration should be made only after reviewing the results of several samples that have been taken at different times of the year.

Use of Salt for Road Deicing

The application of deicing salts is an important component of maintaining road safety. The environmental impact of deicing salts can be minimized by use of best management practices. For more information concerning road salt management and the effect of road salt on surface water quality, see DES fact sheet WD-WMB-4 “Road Salt and Water Quality” at www.des.nh.gov/organization/commissioner/pip/factsheets/wmb/index.htm.

Health Implications

The following information concerning health implications has been provided by the DES Environmental Health Program. They can be reached at (603) 271-4608.

At present there are no health-based standards for sodium or chloride under the Federal Safe Drinking Water Act. In the mid-1980s, USEPA had listed sodium in a group of contaminants called the Drinking Water Priority List, for which official maximum contaminant levels (MCLs) would be developed. MCLs are health-based standards that must be met by public water systems. A subsequent review of scientific evidence by EPA showed that the vast majority of sodium ingestion was from food rather than drinking water, and that the linkage between sodium and hypertension (high blood pressure) was still not well documented. Consequently in 1988, EPA removed sodium from the Drinking Water Priority List. In March 1998, EPA reissued the list, now known as the Drinking Water Contaminant Candidate List

(DWCCCL). That list included sodium. In September 2009, the final version of the third edition of the list was published, and sodium was again off the list. Visit the EPA website at www.epa.gov/ogwdw000/ccl/index.html for details.

When considering the health importance of sodium and chloride, EPA assumed that water users consume two liters of water per day, and found that 10 percent or less of a person's daily sodium intake comes from drinking water. The rest is usually from food. Persons on a sodium-restricted diet should evaluate all sources of sodium when attempting to reduce overall sodium intake. It is often much easier, and less expensive, to make a dietary change than to excessively purify drinking water.

EPA has recommended that sodium levels not exceed 20 mg/L for those persons on a physician-prescribed "no salt diet." This is the same level recommended by the American Heart Association. This is a very stringent level. For comparison purposes, regular milk has a sodium concentration of approximately 500 mg/L. The sodium levels of certain other major foods are listed below.

Food Product	Sodium (mg)¹
Tomato sauce, 1 cup	1,482
Ham, 2 oz.	810
Bacon, 3 slices	303
Cottage cheese, 1 cup	851
Red or white wine, 3.5 oz.	5
Club soda, 12 oz.	75

Sodium and chloride are generally not major contaminants in the water served by community public water systems in New Hampshire. Such systems typically have concentrations of sodium and chloride that are less than 75 mg/L each in almost all cases.

Secondary (Aesthetic) Drinking Water Standards

EPA has identified 250 mg/L as a concentration at which chloride can be expected to cause a salty taste in drinking water. Water users typically notice the presence of high chloride before an equal amount of sodium. The secondary level of 250 mg/L is based on aesthetic concerns, and is only advisory in the Federal Safe Drinking Water program.

Control of Sodium and Chloride

Normally, the best method to control sodium and chloride in drinking water is to better manage those activities that add salt in the recharge area of the water supply source(s). The following are the most common sources of salt in water supply recharge areas.

Application of road deicing salts. For more information, see the "Road Salt and Water Quality" fact sheet referenced above.

Water softeners. Sodium is added to drinking water directly during the softening process, and indirectly by the discharge of waste brine (salt dissolved in water) into subsurface disposal systems. The amount of salt added by a water softener is most influenced by the water's hardness. High hardness increases the sodium level of the treated water.

The volume of waste brine generated by the regeneration cycle of a softener can be reduced by using a water meter or ion probe to trigger the regeneration cycle. This method is called demand regeneration. Visit the fact sheets webpage at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm and scroll to WD-

¹ University of Maine Cooperative Extension (2008) Sodium Content of Your Food. Bulletin #4059. Accessed 8/3/10 at www.umext.maine.edu/onlinepubs/PDFpubs/4059.pdf

DWGB-2-12, “Ion Exchange Treatment of Drinking Water.”

Other Sources. Many water treatment chemicals have sodium as a basic ingredient. These chemicals often perform a valued treatment function.

Sanitary Significance of Sodium and Chloride

Sodium and chloride are also present in domestic sewage. Finding the source of elevated sodium and chloride is important since this may indicate the nearby disposal of sewage. The presence of elevated sodium and chloride must initially be considered as an indication of increased risk of more serious bacterial or chemical pollution until a more detailed analysis identifies the origin of the sodium and chloride.

Drinking Water Treatment to Remove Sodium or Chloride

Sodium and chloride are costly to remove from water. Effective treatment types include:

Reverse Osmosis (RO)

This method places water under pressure against a special membrane. The membrane allows water molecules to move through, but retards the passage of salt and other dissolved minerals. RO is not practical for high-volume needs due to the inefficiency associated with the water “reject” rate. For more information on RO, see fact sheet WD-DWGB-2-11 “Reverse Osmosis Treatment of Drinking Water.”

Distillation

This method first boils water to produce steam. The steam is then condensed to produce purified drinking water. Salts and other mineral impurities stay in the boiling chamber. The boiling chamber requires periodic cleaning to remove the accumulated minerals. Distillation is not effective for organic contaminants. Distillation is costly to operate and is only feasible for a few gallons of water produced per day. The reject heat during the summer is objectionable to most people. See fact sheet WD-DWGB-2-15 “Distillation Treatment of Drinking Water.”

De-ionization

This method has similarities to a water softener, but uses strong acids and bases rather than salt to regenerate the system. While it is an effective method, the dangerous chemicals are inappropriate in a residence. See fact sheet WD-DWGB-2-12 “Ion Exchange Treatment of Drinking Water.”

Where treatment is going to be installed, the size of the device can range from an under-the-sink system to a full-house system. If pure drinking water is the only goal, then an under-the-sink system will suffice.

Elevated levels of sodium and chloride somewhat increase the water’s ionic conductance, and thus slightly increase the potential for corrosive water damage to plumbing fixtures. To reduce this damage, a whole-house water treatment system would be needed. Bottled water is also an option to address the health concerns posed by leached lead and copper caused by corrosive water while a long-term treatment solution is being investigated.

For further information concerning the layout of a water treatment system and its purchase, see the fact sheet WD-DWGB-2-5 “Considerations when Purchasing a Water Treatment System.”

FOR MORE INFORMATION

Please contact the Drinking Water and Groundwater Bureau and the New Hampshire Water Well Board at (603) 271-2513 or dwgbinfo@des.nh.gov or visit our website at

<http://www.des.nh.gov/organization/divisions/water/dwgb/index.htm>. All of the bureau’s fact sheets are on-line at www.des.nh.gov/organization/commissioner/pip/factsheets/dwgb/index.htm.