



# STATE OF CONNECTICUT

DEPARTMENT OF PUBLIC HEALTH  
ENVIRONMENTAL HEALTH SECTION  
PRIVATE WELL PROGRAM

## HARDWATER/SOFTENERS FACTS AND ISSUES

When water is considered “hard,” it means that the water is highly mineralized and contains high amounts of total dissolved solids, e.g. various salts and dissolved minerals. The principal contributing ions are calcium and magnesium. Hard water doesn’t lend itself to lathering and makes laundering difficult. The water is not necessarily harmful but aesthetically it can be unacceptable to the taste. The groundwater in Connecticut is basically soft to moderately hard with one of the exceptions being a large fault line along the Ridgefield, Connecticut/New York border where the groundwater is highly mineralized.

Historic Department of Public Health (DPH) guidelines have recommended softening when the hardness level exceeds 150 parts per million (ppm) or 8.8 grains per gallon (gpg) hardness (1 gpg = 17.1 ppm). There is no regulatory nor generally recognized standard or maximum contaminant level for hardness in water.

The American Water Works Association has recommended 80 ppm hardness in the past “as the best level, considering all the quality factors, and the necessity for striking a balance between mineral deposition and corrosion characteristics”.

Commercially available water softeners are available that use zeolite resin to remove the hardness (calcium and magnesium) from water. These units use either sodium or potassium chloride to regenerate the resin. Thus for every 100-ppm hardness removed, 46-ppm sodium or 76-ppm potassium will be added to the treated water.

A properly sized and maintained softener will produce water with no (zero) hardness. Water with no hardness when combined with other factors such as pH, temperature and alkalinity can be corrosive to home plumbing. Water with no hardness can also attack glassware resulting in a hazy surface sheen or “rainbow etching”.

**If one feels that the hardness in their water is becoming problematic there are solutions:**

### Non-Treatment Remedies

- Instead of soap alone use sequestering (polyphosphate) detergents e.g. “Calgon”
- Keep hot water temperature <140 °F
- Hard water in Connecticut is caused mostly the presence of calcium carbonate (temporary hardness) that can be removed from heater elements and boiler tubes by treatment and flushing.



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### Treatment Hints:

- Those on a low sodium diet should consider using potassium chloride over sodium chloride to regenerate the resin. Note that there are no regulatory criteria for potassium in drinking water, however Connecticut is unique in that we have a Notification Level for sodium of 28-ppm for public water systems (PWS). PWS must notify their customers on an annual basis if their treated water exceeds 28-ppm. This notification mainly targets people who are on a severely restricted sodium diet and is also a *de facto* annual sodium-monitoring requirement for the PWS.
- Only treat (soften) hot water and boiler feed lines. This would greatly reduce the amount of water softened especially since there is no need to soften water for flushing toilets!
- Use a softener that backwashes by volume of water treated vs. automatic timer regeneration. This would reduce regeneration cycles and make the treatment system more cost effective. One cubic foot of high capacity zeolite resin can exchange 30,000 grains, or about 500,000-ppm of hardness. This means if water has 100-ppm hardness, one cubic foot of resin will soften approximately 5000 gallons of raw water before requiring regeneration. For a family of four that uses 300 gallons of water per day, this resin bed would require regeneration approximately every 17 days.
- Using dealer-supplied canisters that are regenerated off-site should be considered over on-site regeneration.
- Check quality control of dealer regenerated off-site units. Use a simple swimming pool hardness test kit to see if the new unit has been properly regenerated i.e. softened water with zero hardness. Newly regenerated units should result in zero hardness water.

### **The Problem:** (with on-site regeneration)

Backwashing softener regenerant to a septic system is specifically prohibited by the Connecticut Public Health Code *Technical Standards for Subsurface Sewage Disposal Systems*. The homeowner is usually unaware of the prohibition however, and it often happens that such backwash discharges are plumbed directly to the septic system, potentially leading to the following problems:

- hydraulic overloading of marginally sized septic systems,
- spalling of cement in concrete septic tanks, baffles, drywells and D-boxes, due to the introduction of salt or potassium chloride contained in the backwash discharge, and
- sludge buildup in the leaching system when significant levels of iron and manganese are present in the raw water, possibly leading to leaching field failure.

Discharging the backwash to a separate dedicated system, such as a dry well, is a viable option and is under the authority of the Connecticut Department of Environmental Protection (DEP), pursuant to Section 22a-430 of the Connecticut General Statutes. For information on recommended disposal alternatives call DEP at (860) 424-3018. It is common practice in

Connecticut to use softeners for iron/ manganese removal, which this office does not support. There are better treatment techniques available for iron/manganese removal without the addition of any chemicals.

Any questions on this or other private well issues can be addressed to Cliff McClellan, RS or Ray Jarema, PE at (860) 509-7296.

**CAMJ**  
**(4/28/05)**