PRIVATE DRINKING WATER IN CONNECTICUT

Publication No. 29: 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 CT is basically soft to moderately hard with one of the exceptions being a large fault line along the Ridgefield, CT/New York border where the groundwater is highly mineralized.

Historic DPH guidelines have recommended softening when the hardness level exceeds 150 parts per million (ppm) or 8.8 grain per gallon (gpg) hardness. (1gpg = 17.1 ppm) There is no recognized standard or maximum contaminant level for hardness.

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".

For every 100 ppm hardness removed, 46 ppm sodium will be added to treated water, using salt as a regenerative agent. With potassium chloride (KCl), 76 ppm potassium will be added.

Over softened water is potentially aggressive to metallic piping. A water with zero hardness can be corrosive to home plumbing and will also attack glassware resulting in a hazy surface sheen or "rainbow etching". It is important to have your water tested by an approved laboratory to determine hardness levels so an appropriately sized water softener treatment system can be installed.

All of the standard indices for a water's aggressiveness i.e. Langelier, Ryznar and the Aggressive Index, require the level of calcium carbonate, $CaCO_3$, hardness for computation, so we know hardness plays a major role in the aggressive (corrosive) quality of water. Other factors include pH, alkalinity, chlorides and temperature.

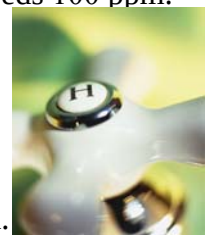
Non-Treatment Remedies

- Instead of soap alone use sequestering (polyphosphate) detergents.
- Keep hot water temperature <140 ^{o}
- Hard water in CT is mostly Calcium Carbonate (temporary hardness) that can be removed from heater elements and boiler tubes by treatment and flushing.

Produced by The State of Connecticut Department of Public Health
Environmental Health Section, Private Well Program
410 Capitol Avenue, MS#11PWP P.O. Box 340308, Hartford, CT
06134 Phone: 860-509-8401 Fax: 860-509-7295

Treatment Considerations:

- Using potassium chloride (KCl) over sodium chloride (salt) will minimize sodium in the treated water. Potassium has no maximum regulatory levels. CT is unique in that we have a Notification Level for sodium of 100 ppm for CT's public water systems. It is not a health regulated MCL but Public Water Systems (PWSs) must notify their customers on an annual basis if their treated water exceeds 100 ppm. This notification mainly targets people who are on a severely restricted sodium diet.



- Only treat hot water and boiler feed lines. This would greatly reduce the amount of water softening especially since there is no need to soften water for flushing toilets.

- Use softener that backwashes by volume of water treated vs. automatic timer regeneration. This will 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 5,000 gallons of raw water before requiring regeneration with salt. For a family of 4 (typical use of 300 gallons per day) this resin bed would require regeneration every 17 days.

- Using dealer-supplied canisters that are regenerated off-site can be considered to eliminate the need for on-site regeneration and on-site water treatment wastewater discharges.

Considerations for on-site regeneration:

Backwashing water softener wastewater to a septic system is specifically prohibited by the CT 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 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.
- groundwater contamination.

Regulatory Requirements:

Backwashing of water softener treatment discharges to a septic system is specifically ***prohibited***. Refer to CT Public Health Code section 19-13-B103. Section X of Technical Standards for Subsurface Sewage Disposal Systems provides for acceptable ways to discharge water softener backwash wastewater.

Any questions on this publication or other private well issues can be addressed to the DPH Private Well Program at 860-509-8401 or by email: DPH.PrivateWellProgram@ct.gov

For more information please click on the following links:
EPA Office of Groundwater and Drinking Water
http://www.epa.gov/ogwdw/
EPA New England
http://www.epa.gov/region01/

Adapted from *Healthy Drinking Waters for Rhode Islanders*, University of Rhode Island Cooperative Extension, *April 2003*.