THE AMERICAN WELL OWNER

★ INFORMATION AND ADVICE ABOUT GROUND WATER, WELLS AND WATER SYSTEMS ★

A Quarterly Publication for Well Owners - 2003 Number 1

SOLUTIONS TO WATER HARDNESS PROBLEMS

MESSAGE FROM THE PUBLISHER

Watch out for that hosepipe!

The backflow article in this issue of THE AMERICAN WELL OWNER underscores the need for all homeowners to be vigilant about drinking water safety. Backflow can occur whether a home's water source is a private well or utility supply. It is probably a good idea to disconnect hosepipes when they are not in use.

Citizens and communities can do much to ensure that local aquifers and surface water sources are protected from contamination. However, the need for awareness and concern about water quality does not stop at source protection. Consumer knowledge of potential risks from backflow, however remote, can help ensure that the well system and the configuration of the water distribution system in homes and farms pose no threats.

Licensed plumbers, garden irrigation specialists and water-well professionals are likely to install the right back-flow prevention system on any work they perform for which such a device is needed. Do-it-yourself enthusiasts who fit any kind of water installation outside the house are advised to check that their project is risk-free. The web site www.abpa.org is a good starting point for backflow information.

For general information, and links to information about ground water and water wells. Visit www.privatewell.com, the consumer web site of the American Ground Water Trust.

Andrew W. Stone
American Ground Water Trust

"Hard" water has high levels of dissolved calcium and/ or magnesium minerals. These minerals may occur in ground water passing through limestone rocks, or other rocks with a calcium mineral content. The level of hardness is related to the amount of dissolved mineral in the water. Hard water does not pose a health risk but it can cause "scale" (mineral build up in pipes and plumbing fixtures) and reduce the effectiveness of soap for bathing and laundry. Clothes washed in hard water may not feel soft because the soap does not rinse out properly, dishes may have spots when they dry, and bathroom surfaces may be difficult to clean. A clear sign of hard water is the build up of scale in a kettle. An additional place for the build up of scale is in the hot water heater. Over time, scale accumulation can lead to inefficient water heater operation requiring more energy (and more expense).

Water hardness levels can be established by a laboratory and are measured in milligrams per liter (mg/l) but may also be reported in the archaic form of grains per gallon. [One grain of hardness equals 17.1mgl] Typical water hardness classifications are:

Soft water	less than 17mg/l
Slightly hard	17- 60 mg/l
Moderately hard	60-120 mg/l
Hard	120-180 mg/l
Very hard	180 + mg/l

Hardness at a moderate level of 50 to 120 mg/l may be beneficial because water could become acidic at low hardness levels, which may cause plumbing corrosion or leaching of lead from soldered plumbing joints. (New homes should have lead-free solder).

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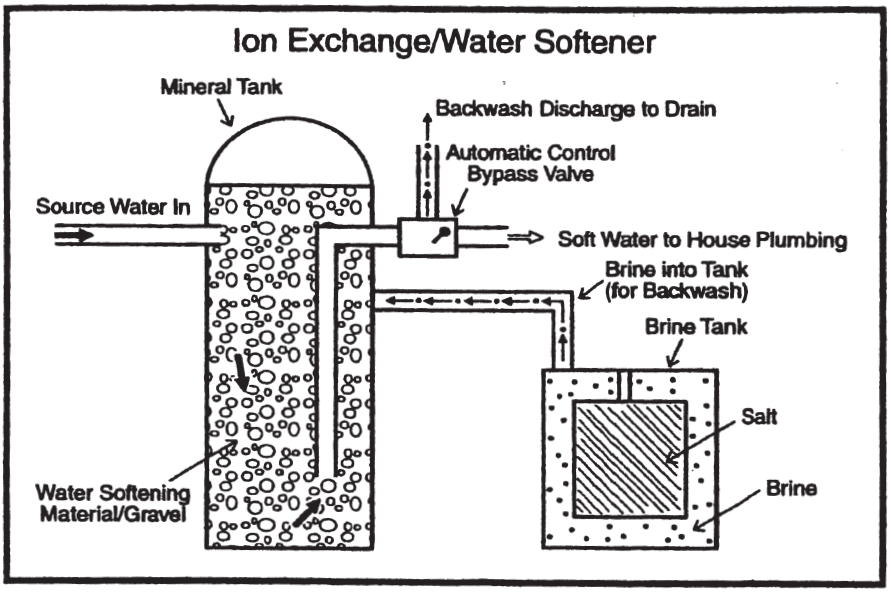
SOLUTIONS TO WATER HARDNESS PROBLEMS . . . *continued from page 1*

Most household hard water problems are solved by the installation of point of entry (POE) equipment. These water-softening units are permanently installed into the home's plumbing system. Water softeners are the most frequently used of all water-conditioning devices and are installed for reducing hardness for private wells and utility supply with high levels of calcium or magnesium.

Most water softeners operate by ion exchange. In this process, the hard water is passed through a cylinder filled with resin beads that have been saturated with sodium. These resin beads have a negative charge, with positively charged sodium ions attached and have a stronger affinity for calcium and magnesium ions than for sodium. When water containing calcium and magnesium passes through the resin, the hardness ions are attracted to the resin and the sodium ions are released. The water softener trades (exchanges) sodium ions for calcium and magnesium ions; hence the term ion-exchange.

Approximately one mg/l of sodium is released for every two mg/l of hardness that is "trapped." When the beads become saturated with calcium and magnesium, the softening cylinder is recharged with sodium by passing a very salty brine solution through the resin beads. The sodium in the brine then replaces the calcium and magnesium that are then discharged as wastewater into the septic system or sewer.



Water softeners may regenerate automatically on a time basis, on a volume of water used basis, or by a sensor on the output side of the system. Large capacity softeners will regenerate less often. There are many water softening devices available. There is NOT a one-size-fits-all water-softening device. When selecting equipment there are other factors such as the iron content of the water that could influence performance.

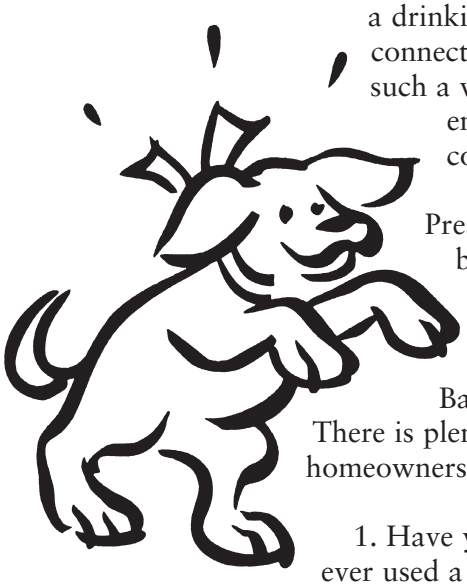
In normal situations, the added sodium from drinking softened water is a small fraction of sodium that is consumed from foods. However, people who may be at risk from ingesting too much sodium may want to have an "unsoftened" water line to the kitchen for cooking and drinking. A sodium based softening system removing 180 mg/l of hardness will add about 80 mg/l of sodium. A non-sodium option is to use potassium chloride.

Some water softening equipment makes use of uses added chemicals to reduce water hardness. So called precipitating water softeners may use washing soda and borax and non-precipitating water softeners use phosphates. Although a water softener has some filtering ability, water with heavy turbidity or particulate matter should be filtered prior to softening. A water softener can remove limited quantities of certain forms of iron, but it should never be used alone when the water is red or rusty (indicating precipitated iron) or when iron bacteria are present.

For more information about water softeners visit.www.wqa.org. This Water Quality Association website has information about conditioning equipment available in North America.

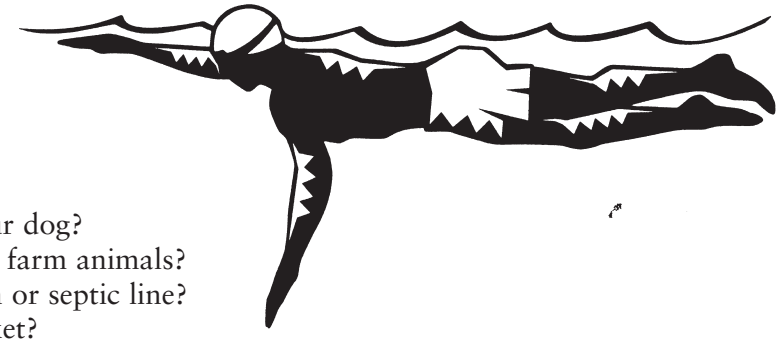
Water Contamination From Backflow?

Backflow is water is flowing in pipes/plumbing/hoses in the opposite direction from its normal flow. If the direction of flow is reversed, because of a change in pressures, backflow could allow contaminants to enter a drinking water system. A similar contamination risk can occur from cross-connections. A cross-connection exists when plumbing systems are configured in such a way that any source of non-drinkable water or other substances can enter the piping system of a drinking supply. [Plumbing and building codes prohibit the cross-connection of well supply and utility supply.]



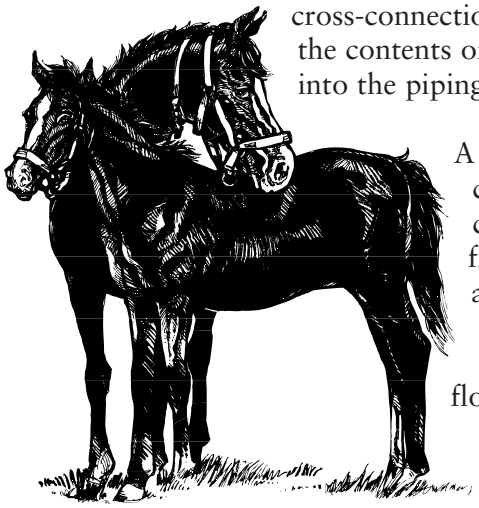
Pressure changes in pipes and water distribution systems can result from breaks in electrical supply, pipe failure or excessive use of water from fixtures connected to the same piping system, (especially if there are down-gradient uses that may cause a siphon-effect).

Backflow risks can easily be avoided by installing simple plumbing fittings. There is plenty of information on the subject that can easily be accessed by homeowners. First ask yourself the following questions:



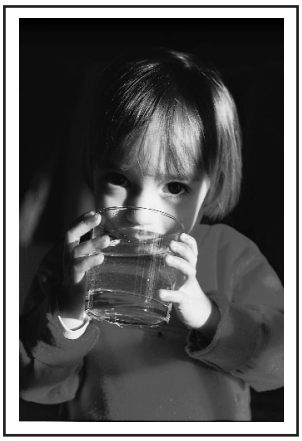
1. Have you ever used a hosepipe to:
   - Fill a swimming pool?
   - Flush a car radiator?
   - Fill a fishpond?
   - Fill a container to shampoo your dog?
   - Supply water to horses or other farm animals?
   - Flush out a blocked water drain or septic line?
   - Mix garden chemicals in a bucket?
2. Do you recycle your home's gray-water (from laundry or shower) to irrigate shrubs or garden beds?
3. Do you have a water well and are you connected to a utility supply?
4. Do you have a lawn sprinkler system?

If the answer is yes to any of the above questions you should check that you have a backflow prevention device between your hose and hose bibb (spigot or outside faucet, tap). The basic means of preventing backflow is by creating an air gap, which provides a barrier to backflow. Probably over half of the reported backflow and cross-connection problems involve garden hoses. Without a backflow prevention device, the contents of the hose and anything it is connected to, have the potential to backflow into the piping system and contaminate your drinking water.



A hose-bibb vacuum breaker is a simple, inexpensive screw-on device that can be purchased at plumbing or hardware stores. Homeowners should check that all taps (faucets, spigots) to which a hose may be connected are fitted with hosebib vacuum breakers. They only cost a few dollars each and can be installed by a homeowner. A more effective backflow prevention device called an atmospheric vacuum breaker costs about $50 and should be installed by a qualified plumber who understands water flow hydraulics.

If you don't have a backflow prevention device – talk to a plumber or water system installation specialist. For examples of backflow occurrences and for more information about prevention, visit the website (and links page) of the American Backflow Prevention Association at http://www.abpa.org



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AMERICAN GROUND WATER TRUST
16 Centre Street, Concord, New Hampshire 03301

TOPICS IN UPCOMING ISSUES

- **Maximizing Yield From Wells**
- **Perchlorate in Ground Water**
- **Hydrofracture of Wells**

PUNISH A DELINQUENT - AWAY THE STINK WENT

What causes water quality problems and how can they be prevented? These questions apply to surface water as well as to ground water. These are not new questions, nor are there really any new solutions. It is a matter of cause and effect. Keep contaminants away from water and the water source is likely to remain usable – for economic and environmental purposes. A safe dependable well supply for a home is an extremely valuable asset. Once contaminated – waters sources may be very difficult to restore. Contamination in water is often very costly to fix. Prevention is much preferable to cure.

The poem below describes in graphic detail the causes of "stink" in a river in17th Century England. They knew back then that "filthy putrefaction" (contaminated water) "bred Infection" (was a health risk) and that clean-up ("saw all made clean") was necessary to put things right. The problem went away when the people causing the problem were "punisht." Perhaps if they had been "punisht" more often than "now and then," river conditions would have improved more rapidly. Changing delinquent behavior to protect the environment is still an ongoing challenge today. Education can be more powerful than punishment. Education should always be a complimentary ingredient of regulation. The more that citizens understand the economic and environmental benefit of protecting water resources – the greater the chance of achieving water supply sustainability for our communities and towns.

Observations from clean-up 359 years ago in England

I was commanded, with the Water-Bailey,
To see the rivers cleaned, both night and daily,
Dead hogges, Dogges, cates and well-flayed carrion horses,
Their noysom Corpses soyld the water-courses,
Both Swines and stable dung, Beasts guts and garbage,
Street durt, with Gardners Weeds and Rotten Herbage,
And from those Waters; filthy putrefaction
Our meat and Drinke were made, which bred Infection,
Myself and partner, with cost paines and Travell,
Saw all made clean, from Carryon, Mud, and Gravell,
And now and then was punisht a Delinquent,
By which good meanes away the filth and stink went.

John Taylor, 1644.

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