To Soften or Not To Soften

Certainly Shakespeare didn't have the problem of deciding whether or not he should use soft water with his septic disposal system. However, with 20 million on-site household disposal systems, this question has been asked by many homeowners: Can softened water cause problems for consumers on a septic system? After targeted research, the answer is **NO** -- soften with confidence.

On-site household sewage disposal systems work simply. The main soil pipe from a home's plumbing system empties into a concrete or steel tank buried a prescribed distance from the house and beneath the frost line. The common single-compartment tank has a baffle near the inlet pipewhich prevents the effluent from backing up, and reduces the turbulence of the incoming waste. Once the effluent enters the tank, the heavier solids sink to the bottom, while more buoyant substances rise to the surface. Various bacteria present in the effluent, as well as other organisms which have been introduced to the tank, digest the waste material and chemically change it. The bacterial action, working in the absence of oxygen, is referred to as an anaerobic process. Another vented system is operationally similar, but the decomposition is aerobic, i.e., requires air.

After the bacterial action occurs, a relatively clear water is discharged through the outlet pipe of the tank. It flows to a distribution box, whee it is diverted to the drainage field through perforated, loosely connected pipes. The loose joints and perforations permit seepage into the surrounding soil. To enhance the water dispersion, the pipes are generally laid in beds of gravel or loose rock.

This covers the disposal system side of the story. The other side concerns water before it gets to the tap, and features the water softening system.

A typical water softener uses a resinous material that attracts sodium ions. The ion exchange resin reacts with the influent water exchanging the sodium ions for the calcium and magnesium ions. Calcium and magnesium are naturally occuring minerals present in many water sources. The presence of these ions make water "hard." Exchanging the calcium and magnesium ions for sodium or potassium ions "softens" the water. During the regeneration cycle, the hardness ions are removed from the softener exchange resin, and discharged with the backwash and some excess regenerant salt (sodium chloride or potassium chloride) that is necessary to drive the regeneration reaction.

Faulty Assumptions
In the 1970s, a number of counties and states became concerned about the effects of the softened water on septic systems. Although the assumptions proved wrong, there were three primary reasons for what turned out to be unfounded concerns and false assumptions. It is commonly known that bacterial life forms are threatened if their surroundings have too much or too little salt. It was feared that the higher concentration of salt in the effluent or softened water would be harmful or fatal to the tank's bacterial action.

The second concern was that the backwash flow rate during regeneration would introduce water faster than the tank could handle. This would force effluent out of the tank before the bacterial action could be completed. In other words, "unprocessed waste water" would be sent out into the drainage field.

Finally, it was feared that the salt brine produced by the softener would lower the drainage field's ability to absorb water. This assumption came from agricultural studies on irrigation systems with a high sodium content.

These were "common sense" arguments about a suspected problem, and weren't verified facts resulting from scientific testing. As a result of these assumptions, legislation was passed in some areas preventing softened water from being used on a septic system. To address this situation, the Water Quality Association (WQA) sponsored research at the University of Wisconsin (Madison) and at the National Sanitation Foundation (NSF). These groups conducted comprehensive studies to confirm or reject these assumptions.

Results Favor Softening
The opposite of the assumptions listed above were shown to be true as a result of scientific testing.

First, the effect of softened water on bacteria was actually beneficial rather than detrimental. The normal salt content found in "unsoftened" effluent is less than ideal for bacterial growth. The addition of sodium to the system was found to bring the bacterial environment closer to the optimal range. Soft water was, in effect, "healthy" for the organisms.

Second, the volume of backwash during regeneration did not disrupt the time involved in bacterial processing of effluent; it was easily within the limits that the tank could handle. It was noted that an automatic dishwasher would pose a greater threat on these grounds than would a water softener.

Concerns about salt and soil absorption rates were also dispelled. The increased sodium content in the tank's discharge was shown to have no detrimental effect on the soil's ability to absorb water in a normal drainage field. Interestingly, certain soil conditions benefitted from it. Additionally, when the softener's calcium-rich regeneration backwash emptied into the septic system, the discharge could actually improve the soil's percolation. (Gypsum, a high calcium mineral, has long been used to increase the porosity of clay soils.)

The conclusions drawn from these tests is that softened water is NOT harmful to a normally operating septic system or drainage field. Obviously, this is good news to anyone who has suffered through dingy dishes or clothes, or struggled with precipitate build-up in pipes due to hard water. Homeowners can enjoy all the benefits of soft water without worrying that it will disrupt the efficiency of the household septic system.

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