Onsite Wastewater Treatment Systems

Special Issues Fact Sheet 3

Water Softeners Description

Home water softeners, which periodically generate a backwash that is high in sodium, magnesium, and calcium concentrations,
can affect wastewater treatment processes and the composition and structure of the infiltration field biomat and the
underlying soil. However, attempts to predict whether impacts will occur and to estimate their severity are difficult and
often inconclusive.
Water softeners remove “hardness” (dissolved calcium and magnesium) through ion exchange processes. Incoming hard
water passes through a tank of containing high-capacity ion exchange resin beads supersaturated with sodium. The
calcium and magnesium ions in the water attach to the resin beads, replacing the sodium, which is released into the water.
The softened water is then distributed for use throughout the house.
Over time, the ion exchange resin beads become saturated with calcium and magnesium ions. When this occurs, the tank
must be recharged by flushing with a salt brine solution. Sodium ions reclaim their position on the resin beads, and the
calcium and magnesium ions are released into the backwash water. The backwash water then exits the tank and is discharged
to the wastewater treatment system. The number of times the tank is recharged and the amount of wastewater
generated depends on a number of factors, including the hardness of the water, the amount of water used, the size of the
water softener, and the capacity of the resins to remove calcium and magnesium. The wastewater generated during the recharge phase of the water softening process mixes with other household wastewaters,
enters the septic tank, and eventually moves to the soil adsorption field Studies

conducted by soil scientists at the

University of Wisconsin and the National Sanitation Foundation conclude that the

wastewater effluent generated from

properly operating and maintained water softeners will not harm onsite systems that

are designed, operated, and maintained

appropriately. Specifically, the studies conclude the following:

• High concentrations of calcium and manganese in the softener backwash water

have no deleterious effect on the

biological functions occurring in the septic tank and may, in some cases, be helpful.

• The additional volume of wastewater generated (typically about 50 gallons per

recharge cycle) is added slowly to the

wastewater stream and does not cause any hydraulic overload problems.

• Soil structure in the soil absorption field is positively affected by the calcium and

mangnesium ions in water softener

effluent (Corey et al., 1977).

Regarding the last conclusion, some people have the misconception that the salt

brine that enters the ion exchange tank

also exits the tank as wastewater. In fact, the influent with its high concentration of

sodium ions is very different than the

effluent, which has a high concentration of calcium and magnesium ions.

Consequently, the potential for chemical clogging

of clayey soil by sodium ions is reduced. The calcium and magnesium input may

even help improve soil percolation.

Risk management issues
The human health impacts of ingesting softened water are increasingly discussed in addition to the traditional benefits of
reduced use of surfactants and plumbing repair requirements. The choice of the homeowner to soften or not to soften will
SIFS-8 (Click Here to Return to Bookmarks Page)
factor into all arguments. Also, the preceding descriptions are predicated on whole- house-supply softening. Today pointof-
use devices designed for use with specific features in the house make the traditional advantages and disadvantages less
clear.
References
Andress, S., and C. Jordan. 1998. Onsite Sewage Systems. Virginia Polytechnic Institute and State University, Civil
Engineering Department, Blacksburg, VA.
Corey, R.B., E.S. Tyler, and M.U. Olotu. 1997. Effects of Water Softner Use on the Permeability of Septic Tank Seepage
Fields. In Proceedings of Second National Home Sewage Treatment Symposium. Pub. no. 5-77. American Society of
Agricultural Engineers, St. Joseph, MI.
Mancl, K.M. 1998. Septic Tank Maintenance. Ohio State University Extension publication AEX-740-98. Ohio State
University, Food, Agricultural and Biological Engineering. Columbus, OH.