

Water Softener Discharges DO Harm Septic Systems—And the Problem is Easy to Solve

This article was written by Mark Gross, Ph.D., Training Manager at Orenco Systems, Inc. Mark was formerly a professor of civil engineering at the University of Arkansas and has more than 20 years of experience in the decentralized wastewater field as a teacher, researcher, and designer.

Contrary to what some people say, water softener backwash poses a problem, not only to septic tanks and drain fields, but also to advanced treatment systems. When the water softener resin is backwashed two or three times a week, concentrated brine enters the wastewater stream as a slug of 38 to 112 gallons each backwash cycle. This causes two problems. One problem is that the septic tank discharges solids into the drain field, which can cause the soil to plug and the drain field to fail. Also, if there is a secondary treatment component, such as a media filter or ATU, it will perform abnormally. The simple solution to these problems is to route backwash brine directly into the drain field.

Although research on the effects of softener brine was performed at NSF and the University of Wisconsin, this research did not include septic tanks and did not reflect real-world conditions. The NSF study used complete-mix activated-sludge ATUs, not septic tanks. In studies with septic tanks, which are quiescent (not mixed), the high concentration of salt introduced by backwash brine causes stratification in the tank. The salt water dives to the bottom of the tank, and the fresh water rides across the surface of the brine layer. The heavy salt water can actually lift the sludge from the bottom of the tank, washing it

into the downstream components. Septic tanks that receive water softener brine have been observed to have no distinct layers of sludge, scum, and clear zone, as they should have in order to perform primary treatment.

The 1978 University of Wisconsin study, which dealt only with the soil dispersal component, not septic tanks, did not conclude whether or not water softener backwash brine is harmful to septic systems, and the study suggests—at least five times—that additional research is needed. Since that study, researchers have found evidence of both good and bad effects of water softener backwash brine upon soil dispersal systems. However, field observations of side-by-side dispersal systems in a shared mound showed that the trenches receiving the effluent with water softener brine formed a thick, gelatinous slime layer that clogged the infiltrative surface, while the trenches receiving no salt water discharge remained open with a normal microbial clogging layer.

Until conclusive research is performed, the evidence of observation and common sense must be trusted. Sodium concentrations over 3500 mg/L inhibit anaerobic digestion. Chloride concentrations over 180 mg/L also inhibit microbial growth. Over the course of history, all cultures have used salt as a preservative and disinfectant. It simply makes common sense that high concentrations of salt will inhibit the growth of microorganisms used for wastewater treatment. Observation supports this assumption: a field study of 18 wastewater treatment systems in Virginia clearly showed that nitrogen removal was inhibited in systems receiving water softener backwash brine. For these reasons, just as managers of municipal systems prohibit the discharge of salty wastes into their systems, most of the manufacturers of advanced wastewater treatment systems have clauses in their warranties voiding the warranty if water softener backwash brine is discharged to the treatment system. Homeowners who want to avoid this by rerouting the backwash brine away from the septic tank are often told that it would require cutting of concrete footings and floors at a cost of "thousands of dollars." Yet, in the Virginia field study, five water softener backwash discharges were routed out of the wastewater system for less than \$100 per home using simple plumbing components. A pipe from the softener can lead directly to the distribution box or discharge basin. This simple, inexpensive measure prevents septic tank and treatment system failure and keeps the system warranty in effect.

Given the abundant evidence for the harmful effects of brine, and given how easy it is to keep these discharges out of septic systems, it makes sense for regulators to require water softeners to be installed in such a way that they pose no problems for wastewater treatment systems. ■