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Risk Management Research



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## Onsite Wastewater Treatment Systems Special Issues Fact Sheet 1

## Septic Tank Additives

### Description

Because of the presence of significant numbers and types of bacteria, enzymes, yeasts, and other fungi and microorganisms in typical residential and commercial wastewaters, the use of septic system additives containing these or any other ingredients is not recommended. The benefits of consumer products sold as septic system cleaners, degraders, decomposers, deodorizers, organic digesters, or enhancers are not significant or have not been demonstrated conclusively, depending on the product. Some of these products can actually interfere with treatment processes, affect biological decomposition of wastes, contribute to system clogging, and contaminate ground water. The septic tank/soil absorption field system is the most commonly used onsite wastewater treatment system in the United States. It is relatively low in cost, has no moving parts, and requires little maintenance.

Septic tanks have a number of important functions, including:

- *Remove oils, grease and settleable solids*. The septic tank is designed to provide quiescent conditions over a sufficient time period to allow settleable solids to sink to the bottom of the tank and floatable solids, oils, and grease to rise to the surface. The result is a middle layer of partially clarified effluent that exits the tank to the soil absorption field.
- *Store settleable and floatable material*. Tanks are generously sized according to projected wastewater flow and composition to accumulate sludge and scum at the bottom and top of the tank, respectively. Tanks require pumping at infrequent intervals (e.g., 1 to 7 years), depending on sludge and scum accumulation rates.
- *Digest/decompose organic matter*. In an anaerobic environment, facultative and anaerobic bacteria can reduce retained organic molecules to soluble compounds and gases, including $H_2$, $CO_2$, $NH_3$, $H_2S$, and $CH_4$. This digestion can significantly reduce sludge volume in warm climates.

## Types of additives and effects on treatment processes

There are three general types of commonly marketed septic system additives:

- *Inorganic compounds, usually strong acids or alkalis*, are promoted for their ability to open clogged drains. Product ingredients (e.g., sulfuric acid, lye) are similar to those used in popular commercial drain cleaners. These products can adversely affect biological decomposition processes in the treatment system and cause structural damage to pipes, septic tanks, and other treatment system components. Hydrogen peroxide, once promoted as an infiltration field reconditioner, has been found to actually degrade soil structure and compromise long-term viability of soil treatment potential. Its use to unclog failed infiltration fields is no longer recommended.
- *Organic solvents*, often chlorinated hydrocarbons (e.g., methylene chloride, trichloroethylene) commonly used as degreasers and marketed for their ability to break down oils and grease. Organic solvents represent significant risks to ground water and wastewater treatment processes. These products can destroy resident populations of decomposer and other helpful microorganisms in the treatment system. Use of products containing organic solvents in onsite treatment systems is banned in many states. Introduction of organic solvents into onsite systems located in states that ban the use of these products may trigger liability issues if ground water becomes contaminated.
- *Biological additives*, like bacteria and extracellular enzymes mixed with surfactants or nutrient solutions, which mirror but do not appear to significantly enhance normal biological decomposition processes in the septic tank. Some biological additives have been found to degrade or dissipate septic tank scum and sludge. However, whether this relatively minor benefit is derived without compromising long-term viability of the soil infiltration system has not been demonstrated conclusively. Some studies suggest that material degraded by additives in the tank contributes to increased loadings of BOD, TSS, and other contaminants in the otherwise clarified septic tank effluent.

Other products containing formaldehyde, paraformaldehyde, quaternary ammonia, and zinc sulfate are advertised to control septic odors by killing bacteria. This objective, however, runs counter to the purpose and function of septic tanks (promoting anaerobic bacterial growth). If odor is a problem, the source should be investigated because sewage may be surfacing, a line might have ruptured, or another system problem might be present. Another variety of consumer products is marketed for their ability to remove phosphorus from wastewater. These products are targeted at watershed residents who are experiencing eutrophication problems in nearby lakes and streams. Phosphorus is an essential nutrient for aquatic plant growth and limiting its input to inland surface waters can help curtail nuisance algae blooms. Aluminum (as alum, sodium aluminate, aluminum chloride, and activated alumna), ferric iron (as ferric chloride and ferric sulfate), ferrous iron (as ferrous sulfate and ferrous chloride), and calcium (as lime) have been proven to be effective in stripping phosphorus from effluent and settling it to the bottom of the tank. An important side effect of this form of treatment,

however, can be the destruction of the microbial population in the septic tank due to loss of buffering capacity and a subsequent drop in pH. Treatment processes can be severely compromised under this scenario.

Finally, baking soda and other flocculants are marketed as products that lower the concentration of suspended solids in septic tank effluent. Theoretically, flocculation and settling of suspended solids would result in cleaner effluent discharges to the subsurface wastewater infiltration system. However, research has not conclusively demonstrated significant success in this regard.

## References

Andress, S.; Jordan, C. 1998. *Onsite Sewage Systems*. Virginia Polytechnic Institute and State University, Civil Engineering Department, Blacksburg, VA.

Angoli, T. 2000. *Hydrogen peroxide not recommended to unclog failed drainfields*. Small Flows Quarterly Vol. 1 No. 2, p. 42-44.

Clark, G.H. 1999. The Effect of Bacterial Additives on Septic Tank Performance. Master's thesis, North Carolina State University, Department of Soil Science, Raleigh, NC.

Dow, D., and G. Loomis. 1999. *Septic Tank Additives*. University of Rhode Island Cooperative Extension Service Onsite Wastewater Training Center, Kingston, RI.

Hairston, J.E., G. Speakman, and L. Stribling. 1995. *Protecting Water Quality: Understanding Your Septic System and Water Quality*. Alabama Cooperative Extension Publication wq-125.al, June 1995. Developed with support from Auburn University, Auburn, AL.

Olson, K., D. Gustafson; B. Liukkonen; and V. Cook. 1977. *Septic System Owner's Guide*. University of Minnesota Extension Services Publication PC-6583-GO. University of Minnesota, College of Agricultural, Food, and Environmental Sciences, St.Paul, MN.

Rupp, G. 1996. *Questions and Answers About Septic System Additives*. Montana State University Extension Service, Bozeman, MT.

Virginia Polytechnic Institute and State University (Virginia Tech). 1996. *Septic System Maintenance*. VTU publication no. 440-400, October 1996. Water Quality Program Committee, Virginia Polytechnic Institute and State University, Blacksburg, VA.