

Lake Shore Alternative Wastewater Treatment Systems

by Jim Cunningham

Lake properties that are not served by a centralized wastewater collection and treatment system rely on the use of small onsite wastewater treatment systems. For many decades the use of septic systems has provided onsite treatment around lake shores.

Lake shores quite often have steep slopes and poor soil conditions that can make the performance of septic systems not all that effective. Recent studies of several central New York lakes found that lake front property owners' systems are as much as 70 percent in failure. The old method of dye testing is not always conclusive of a system's actual condition. Lake managers have found that a comprehensive evaluation of the onsite system is necessary to determine its functionality. Uncovering the tanks to determine if they are water tight, the baffles are intact, and piping is properly sloped to the distribution boxes is the first step, if anyone even knows where the system is located! Lake managers are finding numerous rotted tanks, missing baffles and sometimes old 55 gallon drums that have been used for septic systems. Further evaluations of the distribution box for water tightness, level, and proper flow to all soil adsorption fields are essential. Often old cesspools have been used instead of soil adsorption fields which is not an acceptable practice near a lake or a well. Soil adsorption fields may not be functioning due to excessive ground water, tree root intrusion, poor soil conditions, solids plugging the laterals, and soil adsorption capacity overloaded with nitrogen.



Waterfront properties all with alternative wastewater treatment systems: no room here for a soil adsorption system

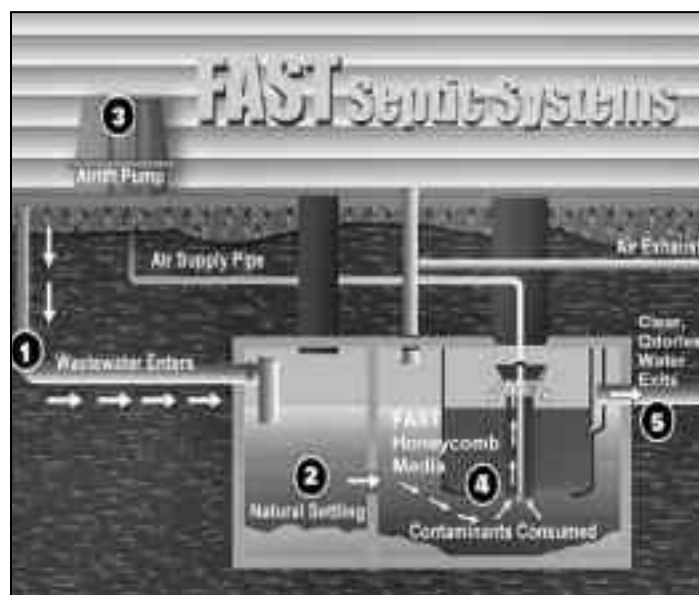
Many lake front properties have much too small land areas to accommodate proper set backs from the lake and nearby wells. For these and a number of other conditions, such as those that are inaccessible (i.e., located under a new porch or driveway), systems are being required to be replaced by new more efficient alternative systems. Alternate systems are similar to mini full-scale municipal activated sludge (suspended growth) or trickling filter (attached growth) systems. These systems can provide better performance but demand much more system attention to maintain and, in some cases, a continuous power supply that the old septic system did not require. What level of performance should be required in designing alternative systems?

Modern wastewater treatment technologies are capable of converting wastewater to drinking water quality. Numerous municipalities around the world turn sewage into public drinking water, especially where water is in limited supply. Most of our southern states recycle water for irrigation or groundwater recharge. Industrial and municipal wastewater plants typically discharge into rivers, streams and lakes, only to have downstream municipalities withdraw water from that same waterbody for public drinking water supplies. Water leaving the International Space Station's purification system is cleaner than the water most of us drink back on Earth. Wastewater from urine, oral hygiene, hand washing and condensation is reclaimed on the space station for drinking. In reality, on Earth people are consuming tomorrow what is flushed today because all the water on the globe is recycled.

It just makes sense then to treat all wastewater to total pollution-free levels like the space station does. The simple truth why we do not is the increased cost and complexity involved. The higher level of treatment efficiency a system has, the greater the capital construction costs and the expenses for long-term operation and maintenance. Small, onsite systems, such as septic tanks and leach fields, are relatively simple, inexpensive systems that require little maintenance. They are not, however, very efficient at removing all the pollutants humans dump down the drain and, ultimately, into our lakes and streams. Today there are an ever-increasing number of onsite systems that use a wide range of technologies previously tested and used in full-scale wastewater treatment systems with a balance of improved performance and reasonable cost considerations.

Testing Performance Efficiency

Small, onsite, homeowner managed systems have been designed in the last decade to improve wastewater treatment efficiencies for nitrogen and phosphorus by using proven technologies employed in larger full-scale municipal wastewater facilities. Which of the many advanced new systems on the market work the best? Studies around New York State lakes are testing to validate whether these systems can



Alternative septic system used around lakes for improved treatment



Phosphorus removal system at Otsego Lake, NY

achieve lower levels of nitrogen and phosphorus to protect water quality. The Skaneateles National Community Decentralized Wastewater Demonstration Project is evaluating alternative, onsite systems around Skaneateles Lake, which provides unfiltered drinking water for the City of Syracuse. The Skaneateles program has held numerous training seminars and onsite visits so lake managers can see the effectiveness and maintenance required by these various systems.

The Environmental Technology Verification (ETV) Program was created by the United States Environmental Protection Agency (USEPA) to facilitate the use of innovative environmental technologies through performance verification. It seeks to provide high quality, peer reviewed data on technology performance to those involved in the design, distribution, permitting, purchase and use of



Attached growth bioreactor: foam blocks with settled wastewater sprayed over the top. Attached growth microbes live on the foam blocks, which provide increased surface area for more biomass to grow.

environmental technologies. All ETV evaluations are conducted in accordance with rigorous quality assurance protocols to ensure that the data generated and the results are defensible. National Sanitation Foundation International (NSF), in cooperation with the USEPA, operates the water quality protection centers (WQPC). NSF Standard 40 pertains to residential wastewater treatment systems. Lake managers and waterfront homeowners who are interested in nitrogen reductions will find that NSF Standard 245 has useful information about advanced nitrogen removal.

The Buzzards Bay Massachusetts Alternative Septic System Test Center is another ETV partner that has been validating the performance of onsite treatment technologies. These testing centers operate various onsite systems under a wide range of conditions, including normal loading, spike loading, cold temperatures, warm temperatures and what happens when the homeowner goes on vacation and there is little or no flow entering the system. Systems are tested for efficient removal of pollutants and also are evaluated for electrical use, chemical use, noise, odors, mechanical components and electrical/instrumentation components. They are also studied to determine how difficult the systems are to operate and maintain, how much sludge they produce and how often the homeowner needs to remove the sludge that has accumulated. The ETV program has illustrated that some manufactured systems do not live up to their performance claims and can be difficult to maintain. Alternative treatment units were once banned in Texas because of the lack of maintenance and the failures that resulted. NSF standards 40 and 245 now require vendors of certified systems to provide a two-year initial service policy, including four site visits. They also must:

- extend the policy if the homeowner desires additional service
- have standby parts in stock
- be able to provide service within 48 hours

NSF will withdraw their certification if vendors are not compliant.

This publication could not begin to review all the new systems available, so before purchasing an expensive new system (\$20,000 to \$35,000 installed) check the USEPA's ETV reports, as well as the work by the Massachusetts Alternative Septic System Test Center. Then go out and find an experienced wastewater operator to maintain the system.

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