

ATS: PROBLEM OR SOLUTION?

AN ESSAY ON AN UNMENTIONABLE SUBJECT

Since 2001, the terms "Alternate Treatment Systems," "Advanced Treatment Systems," "Advanced Technology," and their acronyms "ATS" and "AT" have been appearing with increasing frequency in Connecticut policy discussions. They all refer to technologically complex on-site sewage treatment systems. The purpose of this technology is to allow development or remediation on sites that do not have access to a public sewer and that lack the space or the right soil for a conventional septic system.

Waste Treatment by Nature and Beyond

Nature provides good treatment of biological waste. In a pristine environment, say, the Garden of Eden, excrement is deposited randomly on the ground, perhaps covered with a thin layer of soil. Anaerobic and aerobic bacteria from the gut and the soil break down the organic matter; rain dilutes the material as it leaches through the soil; and pathogenic viruses and bacteria are killed off by sunlight and conditions in the soil.

As civilization progressed, it became customary to deposit excrement in one place designated for the purpose, and, with the advent of plumbing, to wash the waste away with considerable volumes of water. Waste was (and sometimes still is) transported through sewer pipes to rivers or the sea; or it may be disposed locally to an in-ground collection site, such as a cesspool. But simple sewers and cesspools have limited capacity to handle large volumes of waste. As populations grew, sewage entering aquifers and surface water caused disease and environmental degradation.

Technology came to the rescue. For onsite disposal, unregulated cesspools have been replaced with more sophisticated septic systems. Wastewater is transported to one or two closed septic tanks, where solids settle to the bottom and anaerobic bacteria begin the work of breaking down organic material. The effluent then flows through a distribution box into several parallel pipes running through trenches in a leaching field. This disperses the waste (as nature intended) and exposes it to aerobic bacteria in the soil that further break down the organic matter. "Bad," pathogenic bacteria and viruses that are adapted to anaerobic conditions in the gut fare poorly in healthy soil and die off. The system is simple (gravity provides the motive power) and, when pumped periodically, should last for decades.

For discharge to surface water, a more complex technology is needed. There are no trenches or soil to provide filtering, and the bacteria are diluted or not present. The wastewater is clarified to a considerable extent in tanks (pre-treatment and primary treatment); then sent into a closed structure containing the bacteria necessary to complete the digestion of organic matter (secondary treatment); and, finally the effluent is sterilized with ultraviolet light, chlorine, or some other sanitizing agent to kill remaining pathogens (tertiary treatment).

Sewage treatment plants are complicated systems in which mechanical and biological processes must be maintained and synchronized. Mishaps of numerous sorts can disrupt the system, the most commonly reported being surges of stormwater that overwhelm the plant's capacity and kill the needed bacteria. An emergency response to this situation is to bypass the secondary treatment stage allowing the release of inadequately treated sewage. In these cases, shellfish beds and beaches may have to be closed. Presently in Connecticut, many millions are being spent to separate stormwater sewers and wastewater sewers in order to avoid flooding mishaps.

Lethal Nutrients

The first concern in sewage treatment is to protect human health. But an increasingly urgent concern is to protect the ecological health of the receiving soil or waters. It is especially important to limit the nutrient nitrogen. In a properly functioning onsite system, the transformation of organic materials by anaerobic and aerobic bacteria eventually yields pure nitrogen that disperses to the air or is taken up by plant roots. If this process falls short, nitrogen travels through groundwater to surface water, causing algae blooms and algae die-offs that deplete oxygen in the water. Nitrogen is the key factor in salt-water algae blooms and the chief cause of the large dead zones in L.I. Sound. New York state and Connecticut have a joint commitment to limit nitrogen in sewer discharges.

Sewage treatment should also remove phosphorus, a nutrient that, with nitrogen, is essential to plant growth and that is the key factor in fresh water algae blooms and other disturbances in plant growth in wetlands. Until recently, phosphorus removal was a secondary concern because phosphorus binds to soil and travels less readily than nitrogen. But the damaging effects of excess phosphorus have prompted an EPA-led, nationwide effort to reduce excess phosphorus. The Connecticut Department of Environmental Protection (DEP) is developing a phosphorus-reduction policy.

No Space and No Sewer: Turning to ATS

Connecticut and other New England states have numerous communities where antiquated septic systems have broken down, and

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there is inadequate space to replace these systems. Frequently these are shoreline communities. There are also numerous properties that have potential for ripe intense development but have neither access to a sewer line nor sufficient space for a conventional in-ground system. Building a public sewer may be deemed too expensive or undesirable. Many municipalities have sewer-avoidance ordinances intended to curb development.

ATS offers a solution. AT systems are packaged mini-sewage treatment plants that promise advanced treatment of effluent in a compact system requiring less land. They provide secondary treatment by passing the wastewater through one or more closed boxes containing “good” bacteria. This treated effluent then enters a leaching medium, which may be soil or peat or other medium that can be contained in a small space. If there is not even a small space, almost the entire process can be moved indoors.

On the down side, the technology is delicate and prone to failure. The good bacteria require a steady diet of nutrients: too much flow and the bugs can’t handle it, too little and they starve. This is obviously a problem for schools and vacation homes, where flows are highly variable. The bacteria also succumb to caustic cleaners, various solvents, antibiotic products, and so forth. They don’t function well in the cold. They need lots of oxygen. In theory, these problems can be solved by good engineering and vigilant management. In practice, as long as flows don’t back up, these problems may not even be noticed. Large treatment plants have fulltime staff. Monitoring and maintenance of small plants varies from good to almost non-existent.

In the past 20 years, thousands of ATS were installed on “problematic” sites in Massachusetts, Rhode Island, and New York. Connecticut was more cautious. In 2002, lawmakers banned construction of ATS in drinking-water watersheds, with exceptions for public schools and remediation. The state has not, until this year, permitted ATS for single-family residential use. Connecticut has permitted only about 60 systems, primarily in commercial and public buildings and condominium complexes. Performance has been mixed/. A few facilities have functioned very well, especially recently. Several have been prominent and costly failures. A large number of ATS in Connecticut do not consistently meet today’s standards for nitrogen reduction. Few treat phosphorus. Fecal coliform exceedances are fairly common.

Regulatory Confusion

Since 2000, local and state officials have been faced with growing numbers of applications for development and remediation projects dependent on AT technology. At the same time, there was an obvious need for enforcement of existing permits but insufficient resources and conviction to act. Then and now, purchasers and facilities managers are on their own, dealing with a multiplicity of vendors, installers, and operators -- and a scarcity of guarantees.

In 2003, DEP’s reluctance to permit residential ATS was challenged in a law enabling municipal Decentralized Wastewater Districts. The process requires costly studies and approvals, but, in the end shifts authority from the state to the local Water Pollution Control Authorities and Health Districts. Old Saybrook has just become the first municipality to implement the law, inspired by a court order requiring remediation of some 1,700 properties with failing septic systems. Under the proposed plan, some 400 residential property owners will be required to install ATS. Old Saybrook officials and the DEP are struggling to come up with a regulatory program for this novel project. Meanwhile, the rest of the state is in regulatory confusion.

The DEP has no regulations for ATS, only individual permits in which standards and conditions vary considerably. In 2007, legislators attempted to improve matters by transferring authority for the household-size treatment units (under 5,000 gallons per day) to the Department of Public Health (DPH) and the local Health Districts. It was a good bill, until the funding was stripped out. As a result, DPH has declined to proceed, and DEP remains the dominant permitting authority for ATS of all sizes.

What’s a Town to Do?

Local officials, including volunteer land-use commissioners, have been in a quandary concerning land-use applications that propose to use AT technology. In Greenwich, Westport, Madison, Weston, New Milford, and elsewhere, applications have come forward for intense development in locales where such development was assumed to be impossible due to limited space for a septic system. With a packaged treatment plant as an option, a property that might normally accommodate small-scale development is instantly eligible for extensive development generating tens of thousands of gallons of wastewater daily.

Local officials are assailed by experts and advocates testifying that AT technology has a high failure rate and by other experts and advocates testifying that it works fine, even better than Mother Nature. Their discomfort is compounded by the fact that, even though they are charged with protecting water resources or upholding town planning principles, they do not officially have a say in the permit for the AT system. If DEP approves the permit, it is difficult and perhaps impossible for local officials to rule that the packaged unit poses a threat to water resources. And if the town has been counting on sewer-avoidance ordinances to limit development, it will find that just about anything that can be built using a sewer can be built using a packaged AT system.

Rivers Alliance has received a grant from the Geoffrey C. Hughes Foundation to review the status of ATS and provide information and recommendations for town commissioners and local water advocates on how to respond to applications involving ATS. We are partnering with The Nature Conservancy, Connecticut Fund for the Environment, and others. We have taken the opportunity of this newsletter to touch on some of the issues. The full report is due after the first of the year. A good introduction to AT technology is *The Nature Conservancy's 2007 White Paper* which can be found on their website: http://www.nature.org/wherewework/northamerica/states/connecticut/files/ats_white_paper.pdf.

One conclusion, however, is already clear. Towns and cities should address how they want to handle the use of ATS within their borders before the issue arises in applications, litigation, court orders, or legislation.

State officials and our law researchers have suggested three different approaches that are worth investigation. One is to use the authority of the local Water Pollution Control Authority or Board of Selectmen to pass an ATS ordinance similar to a sewer-avoidance ordinance. The point would be to determine where use of ATS is appropriate and where it is not. Another possibility may lie in action by a regional health district; the districts have more authority over septic systems than is generally known or used. A third possibility is to consider setting up a Decentralized Wastewater District. This is expensive to do and then may require more local work and expertise than is realistic to expect.

We, at Rivers Alliance, are advocating for regulations and guidelines for the safe use of ATS. Safe use will require higher standards, and far more monitoring and enforcement than is currently contemplated by most regulators. We also recommend adoption of certification standards for both products and operators, similar to programs in other states, with financial guarantees in cases of failure to achieve promised performance. The certification process itself must be reviewed regularly. For example, it seems logical to certify as acceptable a brand-name product that tests well. But, in fact, one of the most dangerous AT systems installed in the state and one of the best performing are the same brand. Quality and performance depend on site-specific design, trained personnel, and constant attention. In reviewing the Old Saybrook project from an environmental perspective, Sally Harold from The Nature Conservancy and Eric Annes from Connecticut Fund for the Environment have proposed important improvements.

The use of alternate and new sewage-treatment technologies has potential environmental benefits. It provides for local recharge of wastewater. It can enable more intense use of already developed areas, such as village centers, where sewers may be impractical. Unfortunately, it can also be used to shoehorn harmful projects onto sensitive lands. It can promote smart growth or defeat it.

BUFFERS WILL BE BACK

For some fifteen years, Connecticut water advocates have tried to achieve passage of legislation to protect vegetated buffers alongside wetlands, headwaters, streams, rivers, and Long Island Sound. Natural vegetation is by far the most cost-effective means to protect water quality.

The spread of lawns and impervious surface across our state has caused a rise in water temperature and contamination. As rainfall and snow meet pavement and lawn, the result is accelerated down-slope flow, with little recharge of groundwater. That means more flooding in wet weather and more droughts in dry weather. The water flowing over smooth surfaces carries all kinds of pathogens, toxins, sediment, nutrients and other contaminants into surface water. And if shorelines trees are cut down, the water is deprived of the shade and woody debris need for healthy habitat.

Scientists advise us to expect more intense storm events in coming years. This will magnify the negative effects of smooth surfaces.

Advocacy for buffers has been met with extremely strong opposition from development interests. Town officials, too, worry about effects on the grand lists of taxable properties and difficulties associated with enforcement.

A coalition of environmental groups, led by Connecticut Fund for the Environment and Rivers Alliance of Connecticut, continues to press for the conservation of vegetated buffers. The reasons for taking on this fight are the spread of dead zones in L. I. Sound, the disappearance of native fish habitat in our rivers, the contamination of recreational waters, and the disappearance of frogs, salamanders, and turtles. It's sad.

Champions in the legislature have included the Co-chairs of the Environment Committee, Sen. Ed Meyer and Rep. Dick Roy, as well as longtime environmental leader Rep. Mary Mushinsky. With their help and the help of concerned people around the state, we will protect our shorelines with the free, green infrastructure provided by nature to protect our waters.