## Sewage, Environment, and Drinking Water

# Save the Source, Save Some Money

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*"A drop of sewage does more to a bucket of clean water than a drop of clean water does to a bucket of sewage," says Matthew Hudson in his article* "Magical Thinking," Psychology Today, March 2008. *While Hudson was talking about the implications of assigning magical powers to inanimate objects, he just as easily could have been talking about source water protection.*

Sources of clean, safe, reliable drinking water are what make a community healthy and viable. But compromise those sources, and a community can be sentenced to doom. Contamination not only threatens human health, it can jeopardize a community's ecology and economy. Given these realities, it only makes sense to protect the source.

Source water protection is nothing new to drinking water and wastewater professionals. More than a decade after the Safe Drinking Water Act (SDWA) Amendments of 1996 were passed, all states should have completed a source water assessment. These assessments are an analysis of existing and potential threats to the quality of public drinking water. One of the possible threats to a community's source water comes from onsite wastewater treatment systems.

Nationwide, decentralized wastewater treatment systems (septic systems, private sewage systems, onsite sewage disposal systems) collect, treat, and release about four billion gallons of effluent per day from an estimated 26 million homes and businesses, according to the U.S. Environmental Protection Agency (EPA).

Half of these systems were installed more than 30 years ago when rules were nonexistent, substandard, or poorly enforced. EPA estimates that anywhere from 10 to 30 percent of onsite systems are failing annually. The failing systems can pollute drinking water sources with nitrates and other nutrients, chemicals, pathogens, and pharmaceuticals. Once they are in the water, these pollutants can cause numerous diseases, including gastrointestinal illness, cholera, hepatitis A, and typhoid. Nitrates can cause methemoglobinemia (blue baby syndrome) in infants, which reduces the ability of the blood to transport oxygen. If left untreated, this condition can cause death. Fortunately there are a number of measures that communities can take to safeguard their source water.

One of the first things to recognize is that onsite wastewater treatment systems must be maintained. "Preventative maintenance is key," says Jennifer Hause, National Environmental Services Center (NESC) technical assistance (TA) manager. "It's the same as changing the oil in your car. Regular maintenance prevents serious—and expensive—problems with your engine.

"The same goes for onsite systems, regular maintenance thwarts major problems that can be even more expensive to remedy," Hause continues. "It is cheaper in the long run to maintain and manage onsite systems properly before they fail."

Having a plan to deal with onsite systems is in a community's best interest—for its population's health, and environmentally and economically. An adequate supply of drinking water ensures a community's sustainability.

"Availability drives development," says Hause. Overflowing drainfields can quickly pollute what was once a reliable drinking water

source. If a community has an area with many failing systems, the odds are stacked against its drinking water source. And a situation like this not only lowers the existing property values, it halts any new development, leaving the community's economic prospects in doubt.

An area's ecology also affects its economic future, and polluted water has a widespread effect on wildlife. Failing systems significantly contribute to the eutrophication of ponds, lakes, and coastal estuaries. Eutrophication often leads to changes in animal and plant populations and degradation of water and habitat quality. Once changes like these occur, a water source loses its capacity as a drinking water supply and recreational activities gradually disappear. The consequence is the collapse of economic growth and development.

Because a community's vitality depends of a reliable drinking water source, it should have effective strategies in place to make onsite systems safe, efficient, and economical.

## Available Prevention Strategies

Septic systems can be a major contributor to source water contamination for a variety of reasons, including improper siting, poor design, faulty construction, and incorrect operation and maintenance.

Siting is typically addressed using minimal horizontal and vertical setback distances. What these setback distances do is keep septic systems a safe distance from drinking water sources to avoid potential contamination. To meet these requirements, system designers should take into account soil permeability, drinking water well locations, residential housing, and other considerations such as septic tank and drain field size.

To avoid design and construction tribulations, have no doubt about the credentials of engineers, septic system installers, or other construction workers. "Remember, you can verify qualifications now, or you can fix the system later," says Craig Mains, a member of the NESC technical assistance team.

Proper operation and maintenance is perhaps the most crucial pollution prevention measure. Even if systems are designed and constructed to regulation, inadequate operation and maintenance can lead to system failure. Hydraulic overloading, infrequent septic system pumping, and improper disposal of household chemicals stress system performance. Annual system inspections, water conservation, and frequent system pumping prevent system failures and source water contamination.

"If a community promotes these strategies, it's halfway to protecting its source water," says Mains.

To get the rest of the way, a community should develop a good management program. "A good management program requires discipline and ability," says Mains. "It won't be easy, but it will have its rewards."

Historically, the responsibility of taking care of an onsite system is typically left to untrained and often uninformed system owners. "Out of sight, out of mind is the usual reaction to an onsite system," says Hause. "Most homeowners will only do something if their system fails. And then it may be too late."

But community management of these systems can improve their performance and ease source water protection burdens. Fortunately, local governments have a number of options for creating good management programs. The New England Interstate Water Pollution Control Commission (NEWPCC) offers the following alternatives.

## Enforce an Ordinance

Initiating a septic system maintenance ordinance helps ensure that septic systems are inspected and pumped periodically. According to the NEWPCC, a maintenance ordinance could require system owners to be responsible for a number of issues, but more specifically to:

- Hire a certified inspector to inspect their systems,
- Send inspection results to the town or local health department,
- Use trained, certified system installers,
- Have systems inspected during installation, and
- Close out cesspools.

## Set Up a Septic System Tracking Program

Use available geographic information system (GIS) software to accurately depict the septic systems in the source water area. Once systems are located, other software is available to keep track of inspection reports, monitoring, and other data. Some systems can even send automated reminders about preventive maintenance schedules to system owners.

## Municipal Maintenance Program

Rather than assigning maintenance responsibility to system owners, the community can take over this obligation. The community charges system owners a fee and sets a pumping and maintenance schedule. This kind of management program frees system owners from maintenance responsibility and provides them with the security that they won't be fined.

If a community cannot take on this kind of responsibility, however, another option is to set up a voluntary community-sponsored pumpout program. In this kind of program, the community can negotiate a reduced rate that system owners can take advantage of, ensuring that a large number of owners will participate in the program.

## Set Standards for New System Installation and Siting

These standards should minimize any potential threats, including siting systems away from floodplains, surface waters, shallow water tables, public water supply wells, poorly drained soil, and areas where effluent can't be sufficiently treated before it reaches

a water body. These standards should be routinely reevaluated and improved to protect the public health and environment.

And to truly be effective, the standards should include criteria for alternative onsite technologies, such as mound systems, aeration systems, and constructed wetlands. The standards also should include information about how to reduce site disturbance, minimize runoff, and preserve open space.

### Educate the Public

No good management program will get off the ground without a concerted public education effort. Public involvement is critical to the success of a management program. But to get them involved, they will need to know what they are getting into. Every system owner should have the facts about onsite system management, including the knowledge that they are protecting their investment—a failing system can quickly lower property values. EPA and NESC have resources for public education tools.

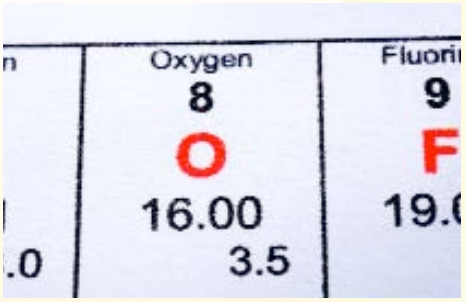
### The Last Word

Nothing speaks louder than money to a struggling community. Managing onsite systems protects source water and reduces the cost of producing drinking water later. "It all comes down to cost," says Mains. "The better the quality, the less expensive the treatment is going to be."

And treatment is only one issue related to cost. "If the source becomes too contaminated the community may have to abandon that source and develop a new one," says Mains. And that can be an expensive endeavor. Drilling, installing new lines, and testing all come with a hefty price tag—one that a community may not be able to afford. So it just makes sense to prevent problems before they arise. After all, it's the community's future that's on the line.

*For more information about source water protection and onsite system management and maintenance, contact NESC at (800) 624-8301.*

## What is eutrophication?




Eutrophication is a process whereby water bodies, such as lakes, estuaries, or slow-moving streams receive excess nutrients that stimulate excessive plant growth, such as algae, periphyton attached algae, and weeds. This enhanced plant growth, often called an algal bloom, reduces dissolved oxygen in the water when the dead plant material decomposes causing other organisms to die. Water without enough dissolved oxygen is hypoxic.

Source: U.S. Geological Survey at *toxics.usgs.gov/definitions/eutrophication.html.*

## What is hypoxia?

Hypoxia means "low oxygen." In estuaries, lakes, and coastal waters low oxygen usually means a concentration of less than 2 parts per million. In many cases hypoxic waters do not have enough oxygen to support fish and other aquatic animals. Hypoxia can be caused by the presence of excess nutrients in water. Excess nutrients can cause intensive growth of algae. The consequences of this enhanced growth are reduced sunlight penetrating the water, a decreased amount of oxygen dissolved in the water, and a loss of habitat for aquatic animals and plants. The decrease in dissolved oxygen is caused by the degradation of dead plant material (algae), which consumes available oxygen.

Hypoxia can cause fish to leave the area and can cause stress or death to bottom dwelling organisms that can't move out of the hypoxic zone. Nitrogen promotes algal and attendant zooplankton growth. The associated organic matter, such as dead algal cells and other debris from the algae, sinks to the bottom where it decomposes, consuming available oxygen.

Source: U.S. Geological Survey at *toxics.usgs.gov/definitions/eutrophication.html.*