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HENV-1-W

Home & Environment

Septic System Failure

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Introduction

When properly designed, maintained, and used, septic systems can provide adequate treatment for most pollutants. There are approximately 800,000 septic systems in Indiana, and the Indiana State Department of Health (ISDH) estimates that approximately 200,000 of these residential wastewater disposal systems are inadequate and have failed or are failing to protect human and environmental health.

This publication examines the various types and causes of septic system failures and their environmental effects.

In 1990, the ISDH adopted Rule 410 IAC 6-8.1 (http://www.in.gov/isdh/regsvcs/saneng/laws_rules/410_iac_6-8_1/410_iac_6-8_1.htm), which established guidelines for septic system construction and repair. A study that examined septic system permits issued by one Indiana county suggests the rule has improved new septic system performance (Stout, 2003). The study shows that nearly one in three of all septic systems built between 1950 and 2001 required repairs, typically within 12 years of construction. But between 1990 (the year the ISDH rule was adopted) and 2001, less than 3 percent of new septic systems required repairs, significantly fewer than in previous decades.

Still, more than half the occupied homes with septic systems are more than 30 years old, according to the U.S. Census. Many of the aging septic systems in these homes — built long before the ISDH rule — report the most problems and failures.

The most commonly reported cause of septic system failures is soil wetness (seasonally high water table), according to a survey of Indiana county sanitarians and environmental health specialists (Taylor, et al.; 1997). Other common causes were undersized systems, system age, and limited space for the soil absorption field.

While improved septic system designs and more stringent oversight have resulted in fewer failures, homeowners may mistakenly believe their septic systems are working properly so long as the toilets flush properly and there is no smell in the yard or adjacent ditches. However, septic systems fail in other, less obvious ways, so homeowners (especially those with septic systems built before 1990) should learn to recognize the most common types and causes of septic system failures.

Types of Failures

There are four basic categories of septic system failure (modified from Brown, 1998):

Sewage Backflow

Sewage backflow — septic system rejects sewage until it backs up into a home — is the most commonly reported failure category. Such failures are obvious and typically command a homeowner's immediate attention. Because they are usually noticed and addressed so quickly, sewage backflow failures seldom cause much harm to the environment. However, if the system is not quickly repaired, it can become a health hazard.

Sewage in the Yard

Another common category of septic system failure is when poorly treated sewage surfaces on the surface of the yard, in nearby ditches, on the neighbor's lawn, or elsewhere in the immediate environment (Figure 1). When it occurs in densely

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Figure 1. *This image shows an example of a failing septic system. Effluent can be seen surfacing on top of the lawn at left.*

populated neighborhoods, such failures are usually obvious. Sewage in the yard can degrade surface water and is a health hazard.

Decline in Water Quality

A home's plumbing and septic system drainfield may appear to be working properly and nobody in the neighborhood will notice foul odors or excess wetness around the drainfield. But with this category of septic system failure, water supply sampling indicates a significant degradation in groundwater quality. Frequently, a downhill neighbor's water supply well will be affected, not the water supply of the failing system's owner. Such failures are not obvious and homeowners may perceive that their septic systems are working satisfactorily.

Gradual Environmental Degradation

There is little scientific evidence indicating that septic system failures are causing Indiana's waters to degrade at such a rate that it would pose a problem to this or the next generation. However, computer modeling and long-term monitoring indicate that septic system use in certain areas will result in gradual environmental degradation. This is a very difficult problem to identify, especially without extensive and costly long-term monitoring. Because such septic system failures are difficult to identify and quantify, there are no regulations regarding them.

Environmental Impacts

A septic system's effect on the environment can be difficult to measure. We can estimate that every failing septic system can discharge more than 76,650 gallons of untreated wastewater into Indiana's groundwaters and surface waters per year. That means that the 200,000 failing systems in Indiana estimated by the ISDH are introducing approximately 15.3 billion gallons of raw sewage into the environment annually.

Untreated wastewater contains excessive nutrients (nitrogen and phosphorus) that can harm native plant and fish populations in Indiana's surface waters. Wastewater's excessive organic matter content also can choke off the oxygen supply in streams and rivers. Microbial populations in these surface waters can exceed the U.S. Environmental Protection Agency's body contact standards, abruptly halting recreational use of beaches, lakes, and streams.

Common Causes of Failures

One of the most critical factors in septic system performance is the nature of the soils used for the septic system soil absorption field (see Purdue Extension publication HENV-7-W, *Indiana Soils and Septic Systems*, http://www.ces.purdue.edu/extmedia/HENV/HENV-7-W.pdf). ISDH Rule 410 IAC 6-8.1 now requires a professional soil scientist to carefully evaluate a home site before a new septic system permit is issued (see Purdue Extension publication HENV-11-W, *Obtaining a Septic System Permit*, http://www.ces.purdue.edu/extmedia/HENV/HENV-11-W.pdf).Other common causes of failure include improper design, and poor system use, management, and maintenance by the homeowner. Minimize failures by carefully and deliberately considering all aspects septic system construction: site selection, design, installation, maintenance, and use.

Hire reputable individuals to design and install your septic system. County health departments will provide you with the names of registered soil scientists and installers who work in your county. After contacting a septic system professional, ask for references from previous customers and contact these homeowners to ask them about their septic system's performance.

Once built, be sure to maintain the septic system. Use water conservatively, avoid driving over the septic system, and have your septic tank pumped and cleaned every 3-5 years. For more information, see Purdue Extension publication HENV-2-W, *Increasing the Longevity of Your Septic System*, http://www.ces.purdue.edu/extmedia/HENV/HENV-2-W.pdf.

When Problems Occur

If your septic system needs repair, it is imperative that you contact your local county health department and report the situation (a list of Indiana health departments is available at http://www.in.gov/isdh/links/local_dep/index.htm). The county health department can help you identify the problem and provide a list of professionals in the area who can assist you. In addition to helping you, health departments use reports of failing systems to develop future septic system designs that will better function in Indiana soils.

References

Brown, R.B. 1998. Soils and Septic Systems. University of Florida, Gainesville.

Stout, H.M. 2003. Soils and Onsite Wastewater Treatment System Performance in Northern Indiana. Master's thesis, Purdue University, West Lafayette, IN.

Taylor, C., J. Yahner, and D. Jones. 1997. An Evaluation of Onsite Technology in Indiana. A report to the Indiana State Department of Health. Purdue University, West Lafayette, IN.

Visit the Home & Environment Web site for science-based information about homes and the home environment: http://www.ces.purdue.edu/HENV.

Other Purdue Extension bulletins in this series

HENV-1-W, *Septic System Failure*, http://www.ces.purdue.edu/extmedia/HENV/HENV-1-W.pdf.

HENV-2-W, *Increasing the Longevity of Your Septic System*, http://www.ces.purdue.edu/extmedia/HENV/HENV-2-W.pdf.

HENV-3-W, *Turfgrass Color: Indicator of Septic System Performance*, http://www.ces.purdue.edu/extmedia/HENV/HENV-3-W.pdf.

HENV-4-W, *Septic System Distribution Boxes: Importance of Equal Distribution in Trenches*, http://www.ces.purdue.edu/extmedia/HENV/HENV-4-W.pdf.

HENV-5-W, *Septic Tanks: The Primary Treatment Device of Your Septic System*, http://www.ces.purdue.edu/extmedia/HENV/HENV-5-W.pdf.

HENV-6-W, *Grandfathered Septic Systems: Location and Replacement/Repair*, http://www.ces.purdue.edu/extmedia/HENV/HENV-6-W.pdf.

HENV-7-W, *Indiana Soils and Septic Systems*, http://www.ces.purdue.edu/extmedia/HENV/HENV-7-W.pdf.

HENV-8-W, *Gravel and Gravelless Trench Soil Absorption Fields*, http://www.ces.purdue.edu/extmedia/HENV/HENV-8-W.pdf.

HENV-9-W, *Water Use and Septic System Performance*, http://www.ces.purdue.edu/extmedia/HENV/HENV-9-W.pdf

HENV-10-W, *Septic Systems in Flooded and Wet Soil Conditions*, http://www.ces.purdue.edu/extmedia/HENV/HENV-10-W.pdf.

HENV-11-W, *Obtaining a Septic System Permit*, http://www.ces.purdue.edu/extmedia/HENV/HENV-11-W.pdf.

HENV-12-W, *Seasonally High Water Tables and Septic Systems*, http://www.ces.purdue.edu/extmedia/HENV/HENV-12-W.pdf.

HENV-13-W, *Septic System Additives*, http://www.ces.purdue.edu/extmedia/HENV/HENV-13-W.pdf.

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