



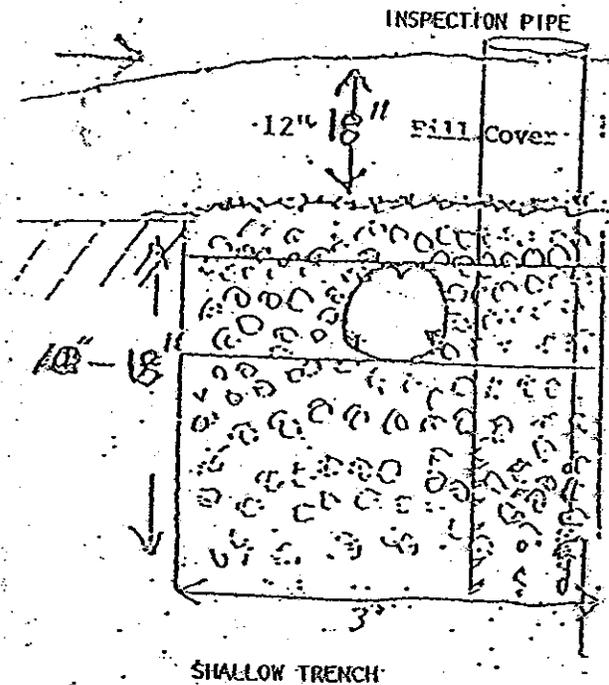
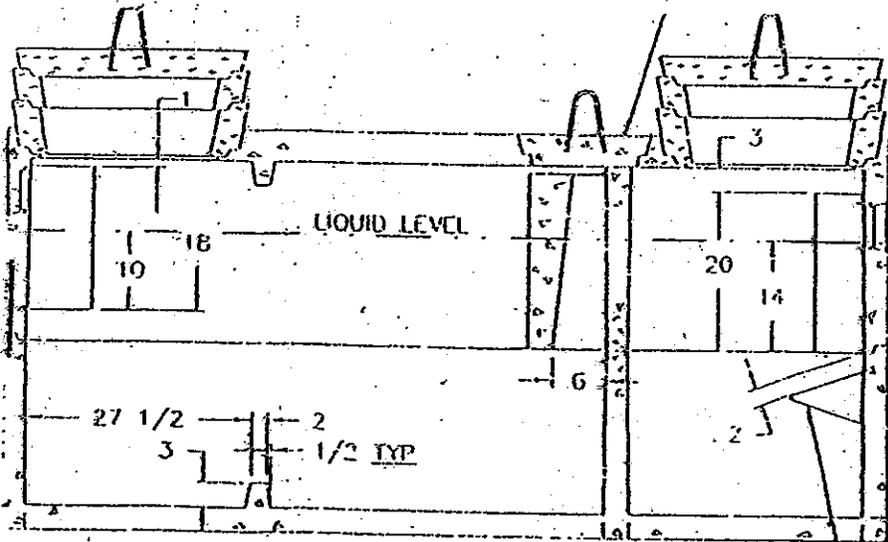
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SEPTIC SYSTEM BOOKLET

Septic System Installation,  
Operation and Maintenance



- I. PRINCIPLES OF SEPTIC TANK OPERATION
- II. HOW SOIL TREATS SEWAGE TANK EFFLUENT
- III. OPERATING & MAINTAINING THE HOME SEPTIC SYSTEM
- IV. USE AND OPERATION
- V. MAINTENANCE RECORD



I.

## PRINCIPLES OF SEPTIC TANK OPERATION

# Home & Environment

## Septic Tanks: The Primary Treatment Device of Your Septic System

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**EXPERT  
REVIEWED**

### Introduction

Septic tanks play an essential role in effectively treating wastewater in areas without municipal sewage treatment. Homeowners often assume that the septic tank in their backyard is their septic system. Actually, the tank is merely the first of a series of components that make up a well-designed septic system.

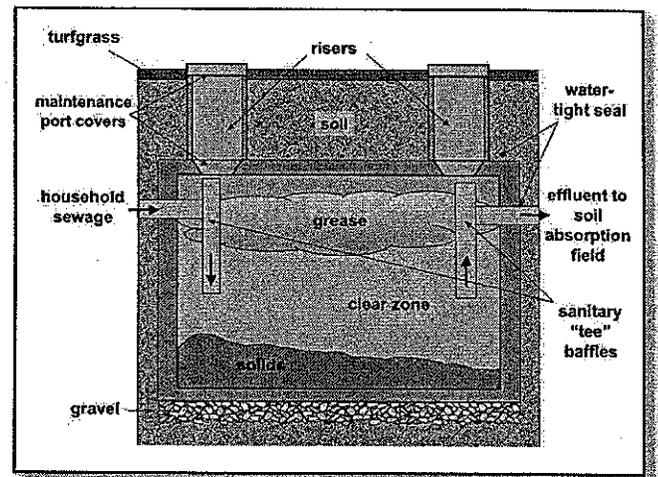
### Purpose of Septic Tanks

A septic tank is a large chamber that collects solids from household sewage while allowing the clarified effluent to move through the tank. The time it takes for the clarified effluent to leave the tank once wastewater has been added from the household is typically 24 to 36 hours. During this short time sewage solids settle or float in the tank, depending on their density. Most of these removed solids break down and are converted to methane, carbon dioxide, and other gases that are released through the household plumbing vent system, usually located in the roof. Typically, 15 to 20 percent of household sewage solids are nondegradable, so the collected solids must be removed from the tank every few years.

To reduce in-tank turbulence and encourage solids to settle, baffles are placed in the tank where the sewage pipe from the house enters the tank and where the discharge pipe takes effluent to the soil absorption field. Older tanks were often fitted with concrete or metal baffles that can corrode over time. A missing or damaged baffle can reduce sewage treatment, or even result in expensive damage to the soil absorption field by allowing solids to overflow the tank. Baffles should be inspected when the tank is cleaned and replaced as needed.

Risers are access ports that extend from the buried tank to the soil surface. Risers aid tank maintenance by providing easy access to the tank for cleaning and baffle inspection.

Risers should be installed on all new tanks and can even be retrofitted for existing tanks. All risers should be childproof and watertight, with the soil surface sloping away from the opening to ensure that surface runoff does not enter the tank.



**Figure 1.** A cross-section view of a septic tank. Dense organic matter sinks while lighter wastewater components (grease and fats) float. The clarified effluent moves from the septic tank to the soil absorption field.

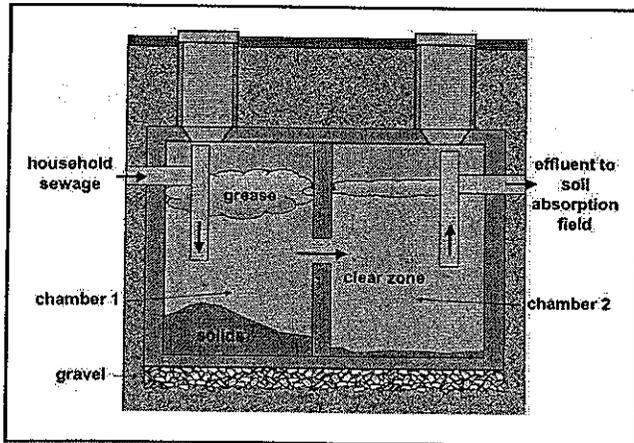
### Types of Septic Tanks

Septic tanks are constructed of concrete, fiberglass, or plastic but all must be watertight and protected from corrosion. Tanks are normally fabricated off-site. Some are transported to the site in one piece, while others are cast in two pieces and reassembled and sealed at the joint on site. One-piece designs are usually preferred because there is a lower chance of leakage.

Septic tanks can be single chambered or multi-chambered. An advantage of multi-chamber tanks includes

## Septic Tanks: The Primary Treatment Device of Your Septic System—HENV-5-W

additional effluent stilling, allowing solids to settle more effectively. A disadvantage is that multi-chamber tanks need to be cleaned more often than comparably sized single chamber tanks because most solids will collect in the first compartment.



**Figure 2.** Dual chamber septic tanks help separate solids from the clarified effluent that will move out to the soil absorption field. These tanks require more frequent maintenance than comparably sized single chamber tanks.

According to Indiana State Department of Health Rule 410IAC 6-8.1, the size of a household septic tank is determined by the number of a home's bedrooms. The more bedrooms, the larger the tank, as shown in the table below.

Bedrooms in Home	Liquid Capacity of Tank (gallons)
2	750
3	1000
4	1250
5	1500
5+	1500 + (150 x each additional bedroom)

**Table 1.** The size of a household septic tank is determined by the number of a home's bedrooms. Indiana State Department of Health Rule 410 IAC 6-8.1 Residential Sewage Disposal Systems

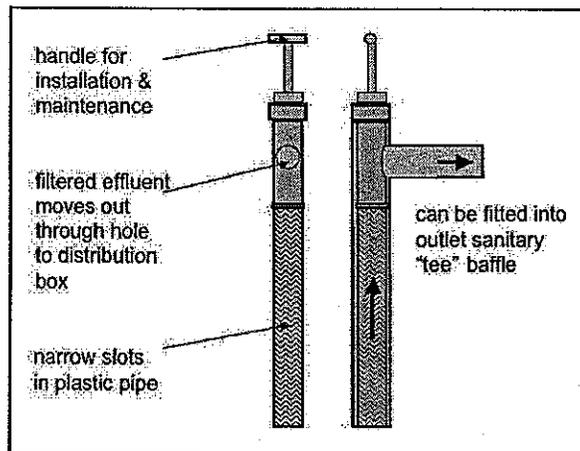
### Maintenance

#### Effluent filters

Although not required by Indiana law it is highly recommended that effluent filter devices be installed at the outlets of new or retrofitted septic tanks. Effluent filters replace the standard outlet baffles of a septic tank. These

devices filter out solids remaining in the tank effluent and help prevent solids from leaving the tank and plugging the soil absorption field. Effluent filters are easily maintained by homeowners or professionals. Solids that collect on the filter's surface can simply be hosed off back into the tank. Filters should be checked every 6 to 12 months and cleaned as needed. If the effluent filter device clogs significantly, the household plumbing drains cannot function properly. When the effluent filter device needs frequent maintenance (like every few weeks or months), this is an indication that the septic tank needs cleaning.

Effluent filters can be installed easily on new or older tanks. If a septic tank does not already have one, a riser should be installed at the same time to make cleaning and maintenance easier. The riser lid must be securely fastened for safety (see "Safety" below).



**Figure 3.** An effluent filter device is essentially a mesh screen that fits into or replaces the outlet baffle of the septic tank. It prevents solids from moving out of the septic tank and being deposited in the soil absorption field trenches.

#### Watertight tanks

Septic tanks must be watertight. Water entering through cracks or leaking risers can cause hydraulic overload of the soil absorption field. Untreated wastewater also could leak out of the tank, contaminating surface or groundwater. The septic tank should be checked for cracks and leaks when it is installed. When cleaning, septic tank cleaners should also make a cursory inspection for obvious leaks or cracks.

#### Vehicle traffic

Do not park on or drive over your septic system with anything heavier than a riding lawn mower. Septic tanks

and soil absorption systems are installed very close to the ground surface. Traffic from large vehicles can collapse the top of the tank, crush a connecting sewer pipe, or compact the soil, irreversibly decreasing the soil permeability in the absorption field.



**Figure 4.** This photograph shows a concrete septic tank lid that has collapsed under a truck's weight. Repair costs were more than \$1,000.

### Safety

Only a trained professional should perform septic tank repairs. Hazards of improperly covered tank openings and careless maintenance include exposure to toxic or explosive fumes, a lack of oxygen, and drowning. Every year, these hazards result in the deaths of children and adults.

### Tank Tips to Remember:

- Always leave septic tank repairs to professionals
- Install waterproof and childproof risers on septic tanks if you don't already have them
- Add an effluent filter device to the outlet end of the septic tank
- Have your tank cleaned and inspected by a professional every 3 to 5 years

For more septic system maintenance tips see HENV-2-W, *Increasing the Life of Your Septic System* (<http://www.ces.purdue.edu/extmedia/HENV/HENV-2-W.pdf>).

For additional septic system information online go to <http://www.ces.purdue.edu/onsite>.

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# SEPTIC TANK: Primary Treatment

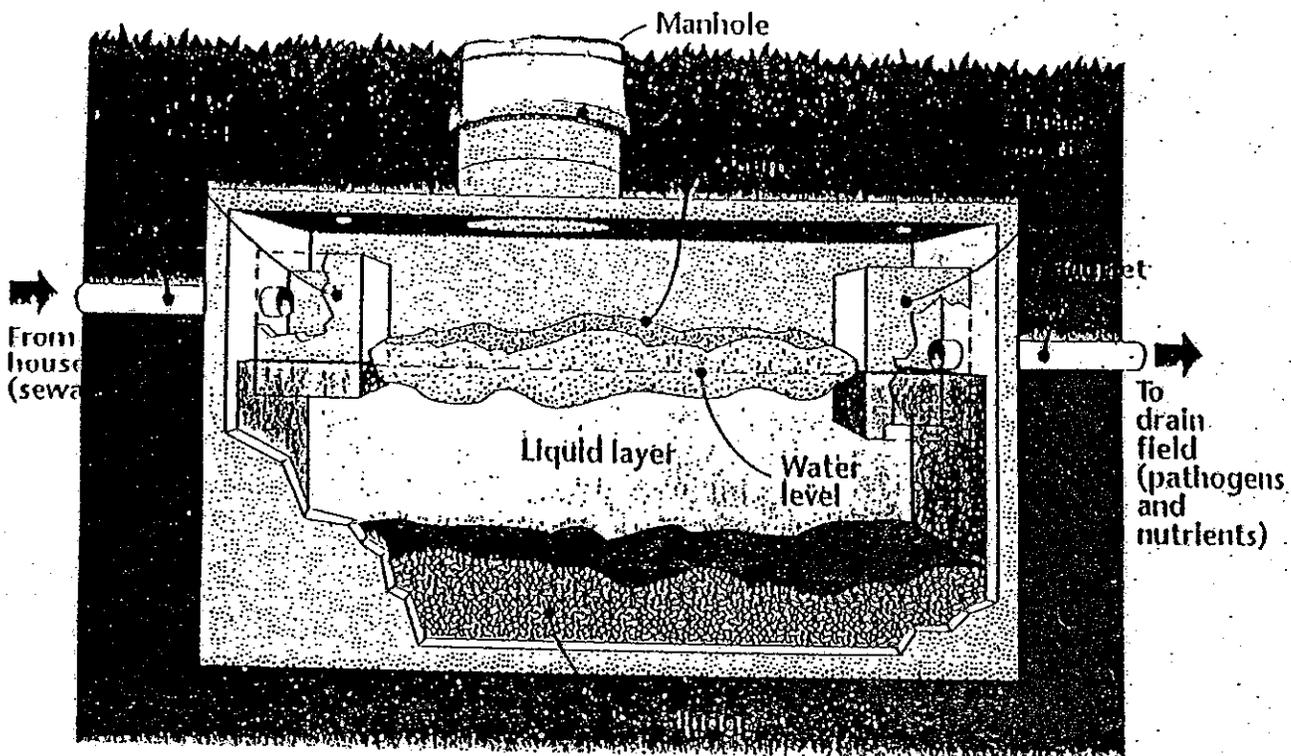
## How the Tank Works

The contents of the septic tank stratify into three layers:

- *Floating scum layer* – soaps, greases, toilet paper, etc.
- *Liquid layer* – water, liquid, and suspended solids
- *Sludge* – Heavy organic and inorganic materials in the bottom of the tank.

Bacteria naturally contained in the sewage entering the tank are necessary to break down organic materials in wastewater. This is often referred to as *primary treatment*. Pathogens in the waste are NOT destroyed in the septic tank. The septic tank and its bacteria prepare the wastewater for final treatment in the drainfield

Figure 1 – Septic Tank



## Safety Checklist

- ***Never enter the septic tank.*** The tank has a manhole for cleaning and inspection from the outside only. the tank contains very little oxygen and has high levels of hydrogen sulfide, methane, carbon dioxide, and other life-threatening gases.
- ***Never use electrical lights, appliances, or tools in or close to the water or wet ground near the septic tank or drainfield.*** This can result in explosion or electrical shock.
- ***Always remember*** that the liquid and solid contents of the septic system are ***capable of causing infectious diseases.*** After working on any part of the septic system, always wash hands thoroughly before eating, drinking, or smoking and change clothes before entering a house, food store, restaurant, etc.
- ***Keep vehicles and other heavy equipment*** away from the septic system. The tank and other components may collapse due to weakness from corrosion.
- ***Never smoke near septic tank openings.*** Gases such as methane that may be present are potentially combustible.
- ***Keep children and other spectators*** away from the septic system when it is being cleaned or excavated.
- ***If there is a smell of sewer gases in your home, immediately call*** a plumber or other qualified person to identify the source and correct it. If the gas smell is very strong, ***evacuate the building*** until the problem is corrected and the gases are removed.

II.

## HOW SOIL TREATS SEWAGE TANK EFFLUENT

## HOW SOIL TREATS SEWAGE TANK EFFLUENT

(This was sent to us through the Indiana State Department of Health's on-site waste disposal research program conducted by Purdue University back in the 1980's. It is basic information that is still applicable.)

The septic tank removes solids that float or settle and stores them in the form of sludges and scums. Soil absorption areas consist of sub-surface trenches, beds, or pits, or mound or fill systems where necessary. Regardless of the configuration or the type of soil the system is installed in, the purpose is the same—to treat the wastewater before it reaches ground or surface waters. The processes of this treatment in the soil are often misunderstood.

Effluent coming from the septic tank to the soil absorption field is partially treated sewage. Some breakdown of the organic constituents has occurred. However, there is still a high load of organic material, nutrients, bacteria, and virus in the effluent.

### HOW THE SOIL TREATS WASTEWATER

In the soil, bacteria break down the solids and incorporate them. Pathogens, either viruses or bacteria, become trapped in the soil, either by being absorbed onto soil particles or by becoming stuck to the microbial slimes laid down by soil bacteria. Once trapped, some pathogens die because of differences in temperature, lack of moisture and food, and other causes. Others are inhibited or killed by antibiotics given off naturally by soil fungi and other organisms. Still others are actually preyed upon and eaten by soil bacteria.

Nutrients are also removed or modified. Nitrogen from the septic tank is usually in the ammonia form in the aerated soil particles, most is converted to nitrate in the aerated soil. Nitrates are soluble and will move with soil water. Nitrate movement is one reason for separating wells from sewage treatment systems.

Phosphates are removed from waste water by being absorbed onto soil particles, particularly particles with high concentrations of iron, manganese and aluminum. Soils with greater percentage of clay particles have more of these minerals than sandy soils do. When absorption sites are filled, phosphates move through the soil. Laboratory studies on coarse sands indicate maximum rate of phosphate movement is about 50 cm (60 inches) per year. Field studies have indicated that the rate is even slower under operating sewage treatment systems. Phosphate movement to surface or ground waters should be minimal.

## UNSATURATED FLOW AND THE BIOMAT

For treatment to be effective, soil bacteria must have air and sufficient time. These conditions will exist if the soil beneath the septic soil treatment system is unsaturated. In unsaturated soil, water moves only through the smallest pores or on a thin film around soil particles surrounding the larger pores, which are usually filled with air.

The reason for this type of movement is that the driving force behind unsaturated flow is not gravity, but a soil tension force (sometimes called capillary attraction, wicking action, or sucking power). If all soil pores are filled with water (i.e., saturated), most of the water would flow by gravity through the larger pores, much the same way one could put more water through a 12-inch culvert than through a one-inch garden hose. However, under unsaturated conditions, the largest pores drain first, since they are able to exert the least tension (or...sucking power...). Water is pulled or sucked through the smaller pores. Because water is moving due to tension or sucking power, it does not have to go down but can move sideways or even up to wherever the soil is driest. The presence of lush, green grass over the drain field is evidence of the capillary movement of unsaturated flow of water.

As sewage tank effluent flows into a drainfield trench, it moves into the distribution pipe and down through the trench rock in the soil, where treatment begins. A biological layer or biomat is formed by soil micro-organisms which secrete a gluey or sticky substance and anchor themselves to the soil or rock particles. This biomat forms first along the trench bottom and as liquid begins to pond in the trench, it forms along the soil surfaces on the sidewalls. When fully developed, the gray-to-black biomat layer is about one half to one inch thick.

Flow through the biomat is unsaturated flow and is considerably slower than flow through natural soil. Thus, the biomat acts as a valve to slow down the flow of waste water into the soil, so unsaturated conditions exist in the soil beneath the drainfield trench. A properly functioning system will have waste water ponded in the trench while the soil a few inches outside of and below the trench will be unsaturated. The unsaturated soil has pores containing both air and water so that micro-organisms living in the soil can effectively treat the waste water moving through the soil system.

A developed biomat is in equilibrium, remaining at about the same thickness and the same permeability, if proper effluent quality and quantity are maintained. The biomat and the liquid ponded within the trench are anaerobic, and the organic materials in the waste water are food for the anaerobic micro-organisms which grow and multiply and increase the thickness and decrease the permeability of the biomat. On the soil side of the biomat, oxygen is present so that conditions are aerobic, allowing soil bacteria to feed on and break down the biomat continuously. These two processes go on at the same rate so that the thickness and permeability of the biomat remain about the same.

If the waste water contains a greater proportion of organic material because of failure to regularly pump the septic tank, the greater amount of food for bacteria will increase the

thickness of the biomat and decrease its permeability. If seasonally saturated conditions occur in the soil outside the trench, aerobic conditions will no longer exist, the biomat will thicken, and its permeability will be reduced.

Soil of suitable texture is an excellent treatment medium for septic tank effluent. The soil is a self-renewing treatment system and will maintain its treatment effectiveness and capacity as long as aerobic conditions exist in the soil outside the trench.

# Soil Treatment System Maintenance

## Overloading

The soil treatment system can become clogged by overloading it with water and solids. Large amounts of water flowing through your system can flush solids out of the septic tank before it has had a chance to separate the solids, scum, and water. For example, washing many loads of laundry on the same day may overload the tank. Space heavy water-using jobs throughout the week to prevent overloading. (See the Use and Operation of the Septic System section for more information.)

Lack of septic tank maintenance can cause biological overloading. Adding "dirtier" water to the soil treatment system forces the biomat to become thicker than desired. This thickened layer slows the soil's ability to accept water, requiring more system than would normally be necessary.

## Compaction

Driving heavy vehicles on the drainfield or mound system before, during, or after construction can damage it. Soil treatment depends on undisturbed, uncompacted soil to treat wastes. This is especially important in winter, when a vehicle's weight can drive the frost deep into the soil and prevent effective treatment from occurring. Nothing heavier than a riding lawnmower should be driven over any part of the septic system. People and vehicles should stay off the area in winter time to prevent deep freezing.

## Vegetative Cover

Good vegetative cover, usually grass, should be planted over soil treatment systems and mowed regularly. Mowing is necessary to encourage growth without using fertilizer. The vegetative cover helps the system remove nutrients, such as nitrogen and phosphorous, by using them for plant growth. Do not plant trees or other plants with deep, invasive roots within 5 feet of the soil treatment system. Be sure to keep gophers and other rodents out of the soil treatment area.



**III.**

**OPERATING & MAINTAINING**

**THE HOME SEPTIC SYSTEM**

## OPERATING and MAINTAINING the HOME SEPTIC SYSTEM

Nearly half of Indiana's population lives in residences having private waste disposal systems. Many of these people moved to their present dwellings from urban areas of communities that provided water and sewer service. And in most cases, when they moved in (even to a newly built house), the septic tank and soil absorption field were already in place.

The result is that many Hoosier homeowners have little understanding of, or interest in, the operation of their waste disposal systems until problems arise. Sewage backed up in the drains or a seeping, smelly area in the yard is an unpleasant and often expensive introduction to the ABC's of septic system maintenance. The following information is designed to aid the homeowner in preventing septic system failure and the consequent expensive repair.

### SEPTIC TANK START-UP

Late spring or summer is generally considered the best time to begin operation. To start, simply begin using the tank. It is not necessary to fill the tank with water before use, although hot water should be added to the system initially as often as possible (particularly if starting up in winter).

As the solids begin to accumulate in the tank, the natural bacterial digestion processes will begin. Commercial products are available for "seeding" the system with desirable bacteria, but this is not necessary for successful operation.

### SEPTIC TANK CLEAN-OUT

Even the best designed and operated septic system eventually fails unless the sludge and floating scum are periodically pumped from the tank. If not removed, solids will overflow into and clog the absorption area or field tile.

Generally septic tanks should be cleaned out every 3-5 years, depending on the size of the tank and the amount and quality of solids entering it. As a rule of thumb, clean-out intervals can be determined on the basis of 100 gallons of tank capacity per person per year. For example, a 1000 gallon tank used by a family of two should be cleaned after five years ( $1000 - (100 \times 2)$ ). Note: use of garbage disposals increases solids loading by about 50 %!) Commercial septic tank additives will not eliminate the need for periodic clean-out.

Septic tank cleaning should be done by reputable septic service companies or otherwise experienced operators with appropriate equipment. Their service usually includes pumping, inspection of tank openings and baffles, and disposal of the sludge in an approved manner. They should leave a few inches of liquid in the tank after pumping as "seed" to speed up decomposition when operation resumes.

## SEPTIC TANK SAFETY

Hydrogen sulfide and methane gases can be generated in a septic tank – and they are extremely dangerous! You could be poisoned by breathing hydrogen sulfide fumes; therefore, never lean into or enter a septic tank, particularly during pumping. Methane is an explosive; so don't use torches or other flames near the opening of a septic tank.

## MANDATORY REQUIREMENTS

FOR

SEPTIC SYSTEM INSTALLATION

OPERATION and MAINTENANCE

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IF YOU ARE INSTALLING A SHALLOW TRENCH ABSORPTION FIELD SEPTIC SYSTEM, THE FOLLOWING REQUIREMENTS MUST BE STRICTLY ADHERED TO OR THE SYSTEM MAY FAIL, CAUSING SEWAGE TO BACK-UP TO YOUR HOME OR BUBBLE-UP IN YOUR YARD. IF THE SYSTEM FAILS, YOU WILL BE REQUIRED TO REPAIR IT. REPAIR COSTS COULD BE IN THE THOUSANDS OF DOLLARS.

- The system must be installed during dry weather to prevent smearing and compacting of the topsoil, which will inhibit percolation and may cause the system to fail.
- Keep the absorption field area dry by diverting surface runoff water from roofs, patios, driveways or other areas away from it.
- Maintain at least 12 inches of soil cover over the trench field to prevent the sewage tiles from surfacing.
- Establish a grass cover over the absorption area immediately after installation to promote plant uptake of water to prevent erosion (which may cause the sewage tiles to surface).
- Keep foot and vehicular traffic off the absorption area as much as possible especially when there is snow cover. Compacting the snow reduces its insulation value and can push the frost line down.
- It is extremely important to have your septic tank pumped clean on a regular basis. In general, the Indiana State Department of Health recommends the tank be pumped clean every 2-5 years but refer to the section under "Septic Tank Clean-Out". (Page 11)
- The use of a garbage disposal may doom your septic system to failure and is NOT recommended. Refer to the section "Garbage Disposals." (Page 14)
- Do NOT flush grease down any drains. Large amounts of grease can plug the system.
- Never discharge water from basement footing drains or other clean water sources, such as large Jacuzzis, into the system. DO NOT CONNECT THE BASEMENT SUMP PUMP TO THE SEPTIC TANK.
- Low-flow toilets and shower heads, faucet aerators and other devices can cut water use significantly and are highly recommended. Home water conservation devices and practices may also be needed to make it through wet springtime and prolonged rainfall periods. Consult with a plumbing contractor.

## SEPTIC SYSTEM CARE AND MAINTENANCE

Your onsite treatment system represents a significant investment that you should protect. "An ounce of prevention is worth a pound of cure" was never truer than it is with onsite system care. With proper operation and regular maintenance, your system will function better and last longer. Committing a little attention to the care of your system is the best way to avoid the nightmare of a failing system. Read and follow the DO's and DON'T's below for trouble-free operation.

### DO

- \* Conserve water to reduce the amount of wastewater that must be treated and disposed of and to avoid overloading the system.
- \* Repair any leaking faucets and toilets.
- \* Only discharge biodegradable wastes into the system.
- \* Divert downspouts and other surface water away from your drainfield. Excessive water keeps the soil in the drainfield from properly treating the waste water.
- \* Keep your septic tank cover accessible for tank inspections and pumping. Install childproof risers and covers if necessary.
- \* Have your septic tank pumped regularly and inspected annually for leaks and cracks.
- \* Call a professional when you have problems or if there are any signs of system failure.
- \* Keep a detailed record of repairs, pumping, inspections, permits issued and other maintenance activities.
- \* Compost your garbage or put in the trash.
- \* Learn the location of your septic tank and drainfield. Keep a sketch handy with your maintenance records for service visits.

**DON'T** go into a septic tank. Toxic gases are produced by the natural treatment processes in septic tanks and can kill in minutes. Extreme care should be taken when inspecting a septic tank, even when just looking in.

**DON'T** use a garbage disposal. Waste from a garbage disposal does not break down properly in a septic system and may doom your system to failure.

**DON'T** flush sanitary napkins, tampons, disposable diapers, condoms or other non-biodegradable products into your system.

**DON'T** dump solvents, oils, paints, thinners, disinfectants, pesticides, or poisons down the drain which can disrupt the treatment process by killing the septic tanks beneficial anaerobic bacteria.

**DON'T** USE SEPTIC TANK ADDITIVES. These products usually do not help and some may even be harmful to your system.

**DON'T** use your toilet as a trash can or poison your septic system and the groundwater by pouring harmful chemicals and cleansers down the drain. In-tank disinfectant tablets can also be harmful to your system. Harsh chemicals can kill the beneficial bacteria that treat your wastewater.

**DON'T** dig in your drainfield or build anything over it and don't cover the drainfield with a hard surface such as concrete or asphalt.

**DON'T** plant anything over the drainfield except grass. The grass will not only prevent erosion, but will help remove excess water. Roots from nearby trees and shrubs may clog and damage the drain lines.

**DON'T** allow anyone to drive or park over your drainfield or compact the soil in any way.

**DON'T** make or allow repairs to your septic system without obtaining the required health department permit. Use only registered professional septic contractors as required by county ordinance.

**DO NOT FLUSH**

Coffee grounds  
Dental floss  
Disposable diapers  
Kitty litter  
Sanitary napkins  
Tampons  
Cigarette butts  
Condoms  
Fat, grease or oil  
Paper towels

or hazardous chemicals  
such as:

Paints  
Varnishes  
Thinners  
Waste oils  
Photographic solutions  
Pesticides

## GARBAGE DISPOSALS

"Out of sight...out of mind" is a phrase often mentioned about residential disposal of wastes. Once the homeowner sees waste disappear down the sink, bathtub, or toilet, he forgets all about its existence. This disconcern can be very costly for homes with on-site waste disposal systems. Even on good soils, with today's excavation costs it may cost as much as to three thousand dollars to replace a new system on the existing lot. On restricted soils this cost could easily double or triple to repair an alternative septic system.

To better understand the operation of the on-site system the homeowner should begin by knowing exactly what is entering his system. He then should examine the wastewater entering the system and make decisions how to improve its quality and lessen the quantity of wastewater.

Many kitchen appliances use water and produce wastes that are disposed of in the kitchen sink. Often disregarded as a kitchen appliance and not thought of as a source of waste is the garbage disposal. This appliance is a great convenience to many homeowners. But is it really a convenience? Many homeowners do not consider what exactly the garbage disposal does; where the waste produced goes; and how these wastes from the garbage disposal affect the septic system.

In the early sixties many people living in cities had garbage disposals. However, in a city where every home is connected to a municipal sewer there is no problem with their operation. But in the late sixties and early seventies came the urban and rural sprawl. With this movement from the city to country came a movement from municipal sewers to on-site septic systems. At this point the garbage disposal became an inconvenience. Research has shown that garbage disposals substantially increase the quantities of BODs, and suspended solids into the daily wastewater load. As a result, the use of a garbage disposal may increase the rate of sludge and scum accumulation and thus produce a higher failure rate for on-site disposal systems under otherwise comparable conditions.

Because of these facts, we advise the elimination of garbage disposals from any household that is served by an on-site waste disposal system. The trouble and costs associated with having handle kitchen wastes in another form is far less than the potential costs associated with the repair or replacement of an on-site septic system.

Mark J. Hampton  
Purdue University

IV.

## USE AND OPERATION

## **USE and OPERATION**

The effectiveness of a septic system in treating sewage depends a great deal on how the homeowner uses and operates the system. Factors involved are water-use practices, fixtures and appliances, and product use including septic additives and cleaners. The septic system is being operated every time wastewater from the bathroom, kitchen, or laundry enters the system.

### **WATER USE**

The amount of water used and the pattern of water use affects the way the septic system works. For the most complete and uniform treatment of wastes, the system needs adequate time to work. The ideal situation would be to have daily and weekly wastewater enter the system as evenly as possible. Every time water is used in the home, wastewater enters the septic tank and an equal amount of water leaves the tank headed for the drainfield. Large amounts of water entering the system in a short period of time may cause sludge and scum to be agitated and resuspended in the liquid contents. If this happens, the liquid carries suspended solids into the soil treatment system, damaging its ability to complete the treatment process, and results in system failure.

Excessive water use places an unnecessary load on the septic system. Allowing faucets to drip and fixtures to leak and using running water to wash and rinse dishes, shave, and brush teeth are wasteful water habits. The amounts of water households use for specific tasks varies with the fixtures and appliances and with individual habits. In most households, toilet flushing is the largest user of water, following bathing, laundry, and dishwashing.

One of the best ways to reduce the amount of water treated by the septic system is to replace old water-using appliances. If a major remodeling is planned, regulations may require upgrades to low water use appliances. For example, local government units may have adapted the new state building codes requiring low-flush toilets in new construction or when replaced by a plumber. Whether remodeling or not, consumers may choose low-flow showerheads, hand-held showers with pause control, and temperature control valves to reduce water use, save energy, and save money. The way appliances are used affects how much water passes through the septic system, as shown in the chart on the next page.

## Typical Ranges of Water Used (in gallons)

<u>ACTION</u>	<u>TYPICAL USE</u>	<u>CONSERVATIVE USE</u>	<u>ULTRA-CONSERVATIVE USE</u>
Toilet-flushing	3.5 (old standard)	1.0-1.6 (low flow)	Composting toilet
Tub bath	30 (1/2 filled)	15 (1/4 filled)	Sponge bath
Shower			
10 min	50 (5 gal/min)	25 (2.5 gal/min)	3 (camper style)
3 min	15 (5 gal/min)	7.5 (2.5 gal/min)	
Laundry - full load			
Top loading	50-60 (older models)	40 (newer models)	
Front loading	33 (older models)	17-28 (newer models)	Laundromat
	(suds-saver reuses most of the "wash fill" for the 2 <sup>nd</sup> load)		
Dishwashing			
Machine	12-15 (old-reg cycle)	6-9 (new-reg cycle)	
	(prerinsing before loading adds 3-5 gal.)		
Hand	16 (faucet rinse)	6 (basin rinse)	
Teeth-brushing	2 (faucet running)	1/8 (wet brush, brief rinse)	
Hand washing	2 (faucet running)	1 (basin; brief rinse)	
Shaving	3-5 (faucet running)	1 (basin; brief rinse)	

## **Controlling Water Use to Improve Septic System Performance**

The average person uses about 50-75 gallons of water per day. About 50 percent is used in the bathroom. Reducing water use preserves the water resource and helps the septic system.

### **Bathroom**

- Install a new low-flush toilet. New units give a complete flush with 15 or 16 gallons per flush. **Caution:** displacing water with bricks or water bottles in old toilet tanks often gives less than a total flush.
- Repair leaky faucets and toilets immediately.
- Flush toilets less often. In most cases, the toilet can be used several times for liquid waste before flushing.
- Take showers instead of tub baths. Showers use less water than tub baths (about 5 gallons per inch in tub).
- Take shorter showers
- Install low-flow shower heads, hand-held showers with pause control; and temperature balance valve controls.
- Shut off water in the shower while lathering and shampooing.
- Shut off water while shaving brushing teeth (save up to 5 gallons per minute).
- Fill basin to wash hands instead of washing under running water.
- Do not use hot water in the shower to warm the bathroom.

## **Kitchen**

- **Install low-flow faucets.**
- **Wash only full loads in the dishwasher.**
- **Install low-water-use dishwasher.**
- **Repair leaky faucets.**
- **Do not dispose of vegetables, meat, fat, oil, coffee grounds or other undigested food products in the garbage disposal. These use water and add significant amounts of sludge and scum to the septic system, resulting in the need for more frequent tank cleaning**
- **Keep a pitcher of drinking water in the refrigerator instead of getting it from the tap.**
- **Hand wash dishes in the basin instead of under running water.**
- **If water treatment is used, be sure there is a shutoff valve so the system doesn't run continuously when reservoir is full. Reverse osmosis sometimes rejects 8 gallons for every 1 gallon filtered.**

## **Laundry**

- **Use a front-loading washing machine that uses 40% less water.**
- **Use suds-saving top-loading washing machine**
- **Wash only full loads. Use partial load water level setting when small loads are necessary.**
- **Distribute loads evenly throughout the week.**

## **Basement and Utility Rooms**

- **Recharge the water softener as infrequently as possible to reduce water use.**
- **Reroute the water softener recharge water outside the septic system. It does not need to be treated.**
- **Route chlorine-treated water from swimming pools and hot tubs outside of septic system to a ditch or separate dry well.**
- **Route roof drains and basement drainage tile water (sump pumps) outside of septic system and away from the drainfield.**

## **APPROPRIATE PRODUCT USE and DISPOSAL**

Many materials used in the home or generated in daily living enter the wastewater system for disposal and treatment. Some are obvious and other much less obvious. Listed below are ways to help improve the performance of the septic system.

### **LAUNDRY & DISHWASHER SOAPS & DETERGENTS**

- Use low-phosphate (less than 11%) dishwasher soaps and no-phosphate laundry detergents.
- Use the minimum amount of soap, detergent, or bleach necessary to get the job done. This may be less than suggested by manufacturers.
- Use ONLY liquid soaps and detergents (powdered detergents add fine particles to the sludge accumulation and may kill beneficial anaerobic bacteria in the septic tank.)
- Use a suds-saver automatic washer. The second load only requires a fraction of the soap needed by the first load.

### **DRAIN & BOWL CLEANERS**

- Use minimal amounts of mild cleaners, as needed only.
- Do not use toilet bowl disinfectants that are placed in the tank or bowl.
- Reduce use of toilet bowl cleaners by doing more scrubbing.
- Reduce use of drain cleaners by minimizing the amount of hair that goes down.
- Do not use caustic drain openers for a clogged drain. Instead use boiling water or a drain snake to open clogs.

### **HAZARDOUS WATER PRODUCTS**

- Dispose of all solvents, paints, antifreeze and chemicals through local recycling and hazardous waste channels. Consult local solid waste officials for proper methods. These materials kill valuable bacteria in the system and may pass through to contaminate drinking water.
- Never let wash water from latex paint on brushes or rollers to go down the drain and into the septic system.

### **PAPER & OTHER PRODUCTS**

- Do not flush facial tissues, paper towels or personal hygiene products down the toilet.
- Do not flush cigarette butts or medications down the toilet.
- Use moderate amounts of white toilet paper. Toilet paper should break up easily in water. Some dyes used for toilet paper are difficult for bacteria to break down.
- Plastics, cat box litter, cigarette filters, condoms, tampons, sanitary napkins, paper towels, and facial tissues should not be disposed of in your septic tank system. These items quickly fill your septic tank with solids, decrease its efficiency, and will require that you pump out the tank more frequently. They will also clog the sewer line to the septic tank causing wastewater to backup into your home.
- NEVER use your septic tank system as a trash can. Do not put grease, disposable diapers, plastics, latex paint, pesticides, solvents, oven cleaners, degreasers, or any hazardous chemicals into your system. Why put a \$10,000-20,000 system in jeopardy with \$10 worth of chemicals.

### SEPTIC TANK ADDITIVES

Indiana State Department of Health (ISDH) staff is frequently asked to comment on the use of septic tank additives. Although their use has not been addressed in our rules for on-septic sewage disposal, we can provide comment on the use of septic tank additives.

A septic tank is a watertight tank designed to slow down the movement of raw sewage so that solids can separate or settle out and be broken down by bacterial action. This action does not purify the sewage, eliminate odors, or destroy all solid matter. The septic tank simply removes enough of the solids so that its effluent can be discharged to a soil absorption system without prematurely clogging the system. The septic tank will provide anaerobic digestion of organic material without the use of any additives to enhance its operation. A new septic tank does not require any special additives, because the sewage it receives contains the organisms necessary to initiate and promote anaerobic digestion.

The effective removal of solids from wastewater is only a part of the consideration in providing an on-site sewage disposal system that will function properly over an acceptable period of years. Although some solids may leave the septic tank and cause a biological mat formation in the trenches, a properly sized, designed and maintained septic tank provides acceptable solids removal without the use of additives. Much more important than the possible use of additives is proper system design and selection based on soil characteristics, careful installation practices, and proper operation by the homeowner. The use of additives will not "cure" the system if these steps are not properly followed. If these steps are not properly followed, the use of additives is worthless, at best, and damaging to the system and environment, at worst.

The use of septic tank additives may be severely detrimental to the system, rather than beneficial. It has been well-documented that one of the causes of septic system failure is the carry-over of solids into the absorption field due to the use of septic tank additives.

The functional operation of septic tanks is not improved by the addition of disinfectants or other chemicals, that such compounds may result in sludge bulking, and may interfere with anaerobic digestion. The addition of chemicals, is, therefore, not recommended.

This office has received no reliable information that would counter the statements by many experts in the field.

ADAMS COUNTY HEALTH DEPARTMENT September 2010

NOTE: We have seen both the good and the bad regarding septic system additives. In one case, an absorption field was severely affected by the addition of an additive. However, we have also seen some enzyme formulations that may be effective in breaking down greases and sludge. Before using an additive, it may be prudent to require the sewage treatment professional to guarantee the formulation will not harm the septic system and will correct the problem.

Regardless of whether one decides to use an additive, it is very important to know one simple fact: **THERE IS NO SUBSTITUTE FOR HAVING THE TANK REGULARLY PUMPED CLEAN BY A LICENSED PROFESSIONAL CLEANER!**

**COMMON PROBLEMS**

Existing septic systems may fail for a number of causes. For the homeowner, the system is failing if it is not treating the household waste water effectively. The most common cause of system failure is excessive water enter the system or an inadequately designed system such as a cesspool. Diagnosing the specific cause may be difficult for the homeowner and often requires the skills of a professional. The following chart shows common problems and their possible causes and remedies.

**SEPTIC SYSTEM TROUBLESHOOTING GUIDE FOR HOMEOWNERS:**

<b>Problem</b>	<b>Risks</b>	<b>Potential Causes</b>	<b>Potential Remedies</b>
Sewage backs up into house And/or plumbing fixtures Don't drain or are sluggish	Human contact with sewage is a serious public health risk. Many waterborne diseases exist in household sewage. <b>AVOID CONTACT</b>	Excess water is entering system Improper plumbing Blockage in plumbing Improper operation Pump failure Improper system design Roots clogging pipes	Fix leaks Install water-saving fixtures Stop using garbage disposal Clean septic tank & check pumps Replace broken or crack pipes and remove roots Seal pipe connections Avoid willow trees near system
Sewage surfacing in yard	Human contact with sewage is a serious public health risk. Many water-borne diseases exist in household sewage. Fence off the area	Excess water use System blockages Improper system elevations Undersized soil treatment system Pump failure or improper operation	Fix leaks Install water-saving fixtures Clean septic tank & check pumps Consult professionals Consult professionals
Sewage odors-indoors	Toxic gasses can cause discomfort & illness	Sewage surfacing in yard Improper plumbing Sewage backup in house Unsealed ejector sump pump Roof vent pipe frozen closed	Repair plumbing Clean septic tank & check pumps Replace water in traps
Sewage odors-outdoors	Major nuisance, but no serious health risk	Source other than homeowner's Sewage surfacing in yard Inspection pipe caps damaged or removed	Clean tank & check pumps Replace damaged caps Repair or replace drainfield
Contaminated drinking or surface waters	The above public health risks are magnified by possible ingestion of contaminated water.  Drinking contaminated water can cause health problems such as Dysentery, hepatitis, and, for Infants, methemoglobinemia.	System too close to well, water table, or fractured bedrock. Cesspool or drywell in use  Sewage discharges to surface or groundwater Improper well construction Broken water supply pipe Source other than homeowner's system Broken sewage lines	Replace your well and/or septic System Contact a local unit of government to investigate other potential sources
Lift station alarm activated	Tank effluent may back up into the house	Pump failed Fuse breaker tripped Pump unplugged Controls malfunctioning	Check breaker & plugs Check controls & pump Make sure professional replaces pump with proper size unit

V.

**MAINTENANCE RECORD**

