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RV Holding-tank Treatments & Deodorizers in Septic Systems

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If you spend any time in a recreational vehicle (RV), you probably have experienced the problem of unpleasant odors from the graywater and blackwater holding tanks. There are a number of commercial products available to treat and control those odors while traveling or camping in your RV. Some of the products contain chemicals which may also adversely impact the septic systems that receive your holding-tank contents and, as a result, may pollute water resources. These chemicals and their by-products can kill the good bacteria in septic systems and may contribute to the discharge of dangerous, contaminated, health-threatening effluent to the soil surface or into groundwater or nearby surface waters.

Many RV facilities, throughout the country, rely on onsite septic systems to treat sewage, and septic systems are particularly vulnerable to chemical contamination. The purpose of this fact sheet is to explain how a septic system works and how RV holding-tank treatments and deodorizers may harm them.

How Septic System Works

Septic systems are individual (onsite) wastewater treatment systems where wastewater is collected, treated, and disposed of (as opposed to offsite treatment at a municipal wastewater treatment plant). A typical septic system contains two major components: a septic tank and an absorption field, also known as a drainfield or leachfield. The purpose of the septic tank is to allow for separation of solids from liquids and to provide time for naturally occurring microorganisms to partially breakdown organic matter in the wastewater. The absorption field disperses the septic tank effluent and provides the final treatment of the wastewater through physical, biological, and chemical processes in the soil.

RV Treatments & Deodorizers

The two major functions of RV treatments and deodorizers are to facilitate the liquefying of solid wastes and reduce odors in the holding tanks. These RV products may contain enzymes or very toxic chemicals, such as formaldehyde. Most products either mask the odor or kill the bacteria causing the odors. When such treated RV wastewater is dumped into a septic system (or municipal wastewater treatment facility), it can kill the bacteria in the system and ultimately cause the treatment system to fail. Without bacteria, the treatment system cannot adequately treat the waste. There is no (or very limited) breakdown ("digestion") of organic matter, and the primary treatment process (settling of the waste) may be hindered. Inadequately treated wastewater allows solids to pass from the septic tank to the absorption field and clog the soil. Clogged systems will allow inadequately treated sewage to surface or percolate to groundwater. Surfacing effluent can affect the health of people or pets who come in contact with it. Percolated chemicals and untreated wastewater may contaminate nearby drinking water wells, rivers, and streams. Please ***read the labels carefully*** to identify any hazardous ingredients. Table 1 has a list of active ingredients to avoid because of their potential threat to onsite wastewater treatment systems

What You Can Do to Help

Sewage treatment problems make RV living less comfortable and increase the cost of operating a RV park. You can help keep your fees reasonable and protect the environment by taking these basic steps:

- Minimize your use of holding-tank treatments and deodorizers by dumping your holding tanks frequently.
- Leave graywater valves open whenever you are connected to a RV park sewer service line. Leave blackwater tank valves closed and dump when half or more full. NOTE: Dumping with less than a half tank will seldom be an adequate volume to properly "flush" solids, and you could experience a persistent paper/fecal build-up in the tank. Holding tank gauges/monitors are seldom accurate. Therefore, use a flashlight and look down from above the stool to judge the fullness of your tank. Don't dump holding tank contents on the ground.
- Use a tank flushing device after dumping a RV holding tank each time. These in-tank devices can be self-installed or by a RV service center. In-line back-flushing or "wand" type devices are also available.

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NOTE: don't use potable drinking water hoses for such activities.

- When using a holding-tank treatment or deodorizer, read the label and follow the directions carefully. REMEMBER, excessive amounts of RV holding-tank treatments or deodorizers and those not recommended by the manufacturer can and will disrupt the wastewater treatment system you dump into. Consider using only enzyme-based or bacterial-based products. Please note that the term biodegradable does not necessarily mean that the product is safe for humans or the environment. Never use bleach to treat or "sweeten" a tank. Bleach can severely and quickly damage valves, seals, and gaskets.
- Ask questions of your park manager about drinking (potable) water and wastewater management. Sanitation costs can be minimal, but are not free.
- Educate other RVers. Don't be shy about your health or the health of the environment.

The restoration of failed RV-park septic systems ultimately costs you money. The costs to renovate a system will be added to your space fee, and the restoration of contaminated groundwater can be extremely time consuming and costly. Further information is available on household septic systems at the University of Arizona Extension publications web page (http://ag.arizona.edu/pubs).

Table 1. Active ingredients you should avoid using in your RV holding tank deodorizers.

Active Ingredient	Threats to Human and Environmental Health
Bronopol (chemical name: bromo-nitropropane-diol)	bacterial pesticide
Dowicil (chemical name: 1-(3-chlorallyl)-3,4,7-triaza-1-azoniaadamantane chloride)	bacterial pesticide (EPA states "Do not discharge effluent containing this product to sewer systems without previously notifying the local sewage treatment plant authority.")
Formaldehyde (also known as Formalin; degradate of bronopol)	kills or retards bacterial growth, recognized by EPA as probable carcinogen[1]; moderately toxic to humans[2]
Glutaraldehyde (also known as embalming fluid)	Retards bacterial growth and covers sewage odor, eye/inhalation irritant
Paraformaldehyde (polymerized formaldehyde)	very toxic to humans[3] (see formaldehyde)
Para-dichlorobenzene (common ingredient in mothballs, urinal cakes, and toilet bowl fresheners)	known carcinogen[1] and drinking water contaminant; moderately toxic to humans[2]

[1] a carcinogen causes cancer
[2] lethal dose for 150 lb person is between 1 ounce to 1 pint
[3] lethal dose for 150 lb person is between 1 teaspoon to 1 ounce

This fact sheet was adapted from *Alert for RV, Boat and Mobile Home Owners and Park Operators About Safe Wastewater Disposal*, EPA Publication 909-F-99-002, July 1999.

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SEPTIC SYSTEM DO's AND DON'Ts

DO's

Do learn the location of your septic tank and drainfield. Keep a sketch of it handy with your maintenance record for service visits.

Do have your septic system inspected annually.

Do have your septic tank pumped out regularly by a licensed contractor. (*See the table on page 6 for estimated pumping frequencies.*)

Do keep your septic tank cover accessible for inspections and pumpings. Install risers if necessary.

Do call a professional whenever you experience problems with your system, or if there are any signs of system failure.

Do keep a detailed record of repairs, pumpings, inspections, permits issued, and other maintenance activities.

Do conserve water to avoid overloading the system. Be sure to repair any leaky faucets or toilets.

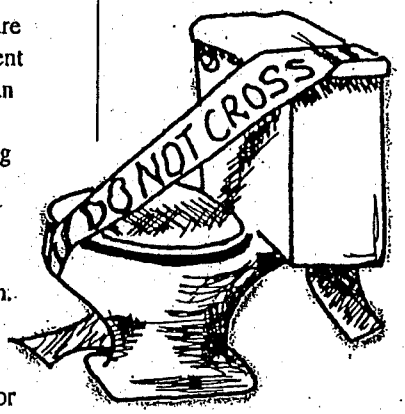
Do divert other sources of water, like roof drains, house footing drains, and sump pumps, away from the septic system. Excessive water keeps the soil in the drainfield from naturally cleansing the wastewater.

WARNING

Be sure to exercise appropriate caution when inspecting a septic tank. Never allow anyone to inspect a septic tank alone or go down into a septic tank. Toxic gases are produced by the natural treatment processes in septic tanks and can kill in minutes—even just looking in the tank can be dangerous.

DON'Ts

Don't go down 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 allow anyone to drive or park over any part of the system.

Don't plant anything over or near the drainfield except grass. Roots from nearby trees or shrubs may clog and damage the drain lines.

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. The area over the drainfield should have only a grass cover. The grass will not only prevent erosion, but will help remove excess water.

Don't make or allow repairs to your septic system without obtaining the required health department permit. Use professional licensed septic contractors when needed.

Don't use septic tank additives. These products usually do not help and some may even be harmful to your system.

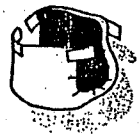
Don't use your toilet as a trash can or poison your septic system and the groundwater by pouring harmful chemicals and cleansers down the drain. Harsh chemicals can kill the beneficial bacteria that treat your wastewater.

Don't use a garbage disposal without checking with your local regulatory agency to make sure that your septic system can accommodate this additional waste.

Don't allow backwash from home water softeners to enter the septic system.

Do not flush

coffee grinds
dental floss
disposable diapers
kitty litter
sanitary napkins
tampons
cigarette butts
condoms
fat, grease, or oil
paper towels



and hazardous chemicals, such as:

paints
varnishes
thinners
waste oils
photographic solutions
pesticides

These items can overtax or destroy the biological digestion taking place within your system.

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Antibacterial Products in Septic Systems

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An onsite sewage treatment system or "septic system" is effective way to safely recycle household wastewater back into the natural environment. As a homeowner or business person with a septic system, you are in the wastewater treatment business.

A septic system with a properly functioning, soil treatment-based, leach field should reduce bacterial and pathogen levels to an acceptable level, if not completely. Potential organic and inorganic nutrient pollutants, those commonly found present in septic wastewater effluent, should also be reduced or eliminated. The key to effective treatment is proper design, system installation, responsible operation, and periodic maintenance. Note: "Operation" refers to everything we do or put into the system.

To achieve proper treatment, a septic system is very dependent on millions of naturally occurring bacteria throughout the system. Daily, we add many beneficial bacteria to our septic systems; bacteria typically found in wastewater, our bodies, and other waste materials we dispose of via our septic system. Two very important types of septic system bacteria are *anaerobic* (do not require oxygen) and *aerobic* (require oxygen). Anaerobic bacteria decompose organic materials inside the septic tank. Aerobic bacteria, in the leach field soils, destroy disease-causing pathogens and finish the breakdown of molecular waste products. Simply stated, we normally and naturally add more than enough of the "right kind" of bacteria to our septic systems; there is no need or reason to use expensive, unnecessary additives.

The use of "antibacterial," "disinfectant,"or "sanitizing" products in the home can and do destroy ***both*** good and bad bacteria in septic treatment systems. "Normal usage" (according to directions) of these products will destroy some beneficial bacteria. Fortunately, the normal bacteria population within the septic system is sufficient and adequate to quickly recover. Significant treatment problems, with conservative use, should not occur. Excessive use of these products in the home can cause significant and even total destruction of the bacteria population. Normally, the use of any single product or single application will not cause major problems.

The University of Arizona Cooperative Extension *Septic System Owner's Guide* suggests:

To improve septic system performance:

- Do not use "every flush" toilet bowl cleaners.
- Reduce ***the need to use*** drain cleaners by minimizing the amount of hair, grease, and food particles that go down the drain.
- Reduce use of cleaners by doing more scrubbing with less cleanser.
- Use the minimum amount of soap, detergent, and bleach necessary to do the job. Frequent use of detergents with bleach additives is considered "excessive amounts" of bleach.
- Choose products that meet your needs safely. When you are shopping, always read the instructions on the product labels. Labels provide information on a product's content, as well as instruction on how to use it safely. Check to see if the product contains ingredients that, when used properly, can harm people or the environment.
- Use minimal amounts of mild cleaners, as needed only.
- Divert chlorine-treated water from swimming pools and hot-tubs outside of the septic system.
- Dispose of all solvents, paints, antifreeze, pesticides (insecticides, fungicides, herbicides, slug bait, moth balls, wood preservatives, and flea and roach powders, to name a few), and other toxic chemicals through local recycling and hazardous waste channels.
- Do not flush unwanted prescription or over-the-counter medications down the toilet.

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However, the accumulative affect of using too many such products and excessive application may cause serious problems and damage to the septic system.

More research is needed to determine what is excessive and which products are more or less harmful to systems. Increasingly, many products are being marketed as "anti-bacterial." Consumers and onsite system professionals working to diagnose treatment system problems have many questions about individual products. Typical questions being asked are: "How antibacterial is antibacterial?" and "Which products are better or worse than others?"

Anecdotally, several professionals have reported problems with low or no bacterial activity in systems. Upon removal of such "antibacterial" products from the home, beneficial bacterial activity returns and the desired treatment functions resume. "Antibacterial" products affect all treatment systems, some more than others.

Special attention is being paid to new "alternative" septic treatment technologies being introduced into the onsite industry. It appears that some alternative systems may be more affected by "antibacterial" products than other systems. Additional and more conclusive research is needed.

What are common "antibacterial," "disinfectant," and "sanitizing" products found and used in homes and businesses that might affect your septic system? The list of products include: "antibacterial" hand soaps; sink/counter top cleaners; tub, tile, and shower cleaners; drain cleaners; toilet bowl cleaners; laundry bleach products; and many industrial strength cleaners used commercially. **Antibiotic drugs** (prescribed medicines) should also be included. These are products that are found in nearly all homes. Such medications often carry a "safe for septic systems" statement printed on the label. A relevant question for using these products and medications may be "how safe?"

All of these practices work toward preventing the loss of beneficial bacteria throughout the system. Bacterial additives (enzymes, starters) are not necessary, may not compensate for excessive use of antibacterial products, and are costly.

It might be that, in an effort to be "super clean" and protective of our family's health through the use of antibacterial products in our homes, we might be compromising our health in another way — by damaging our onsite sewage treatment system!

There is more information on household septic systems at the University of Arizona Extension publications web page (http://ag.arizona.edu/pubs).

This fact sheet was adapted from *Anti-Bacterial Products in Septic Systems*, by Ken Olson, University of Minnesota Extension news release. http://septic.coafes.umn.edu/Homeowner/index.html.

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Understanding Your Household Septic System

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Introduction

As long as people have lived in communities there has been a need for sanitary disposal of human wastes. About three thousand years ago, homes in the Indus Valley had bathrooms with water-flushed latrines that emptied into pits similar to modern septic tanks. In contrast, many Europeans were still dumping human wastes into the streets a little more than two hundred years ago. In the United States, early sanitation consisted of outhouses with earthen-pits. Later, flush toilets were added to homes, but they emptied directly into surface waters, not into sewers. Today, most homes have the convenience of being connected to public sewer systems. Homes not connected to public systems usually have separate on-site treatment systems to handle household wastewater.

This fact sheet is one in a series concerning domestic wastewater treatment. It gives a brief overview on how septic systems work. Knowing how your on-site septic system functions will help you understand how to care for the system to maximize its ability to treat your household's wastewater.

How a Septic System Works

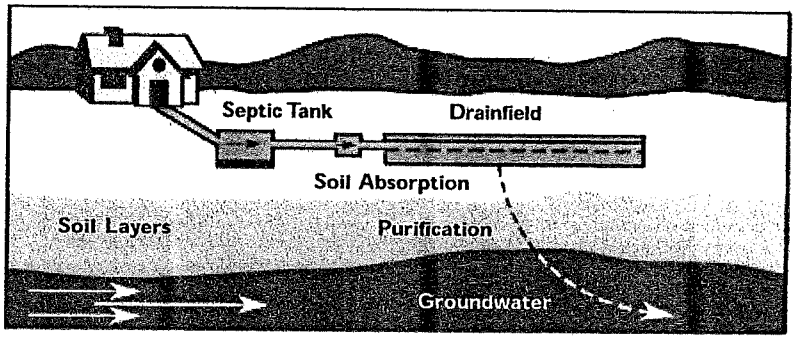
Septic systems are designed to hold, treat, and dispose of household wastewater. The liquid portion of what goes into the system will leave the system and may eventually reach groundwater or surface water. Household wastewater contains bacteria, viruses, household chemicals, and excess nutrients such as nitrates, all of which can cause health problems. Therefore, household wastewater must have adequate treatment to prevent water contamination.

Your septic system has two major parts: a septic tank and a soil absorption system. Wastewater from toilets, sinks, showers, and other drains, flows from the household sewer drain to an underground septic tank. There, waste components separate--the heavy solids settle on the bottom, forming a sludge layer, while grease and fatty solids float to the top, forming a scum layer. Bacteria in the tank partially decompose the solids.

Solids will build up in the tank and must be removed periodically by a professional contractor. The relatively clear layer of wastewater in the middle is called effluent. Effluent flows from the septic tank outlet to the soil absorption system where most of the treatment process occurs.

The Soil Absorption System

The soil absorption system, also known as the drainfield, leach field, or disposal field, consists of gravel-filled trenches containing plastic chambers or perforated plastic pipe. This underground portion of the system accepts effluent from the septic tank outlet. Effluent moves through the pipes and seeps into surrounding soil for final treatment. Soil particles filter out small suspended solids and organic matter, while soil bacteria break down harmful microorganisms and other organic components. Viruses adhere to clay particles in the soil and eventually die. The now treated effluent continues its downward flow through the soil layers.



Conventional septic system with drainfield. Adapted with permission from National Small Flows Clearinghouse,1-800-624-8301. From *Pipeline* Vol. 6, No. 3. Summer 1995.

Managing Your System

As long as your septic system has been properly designed and installed, there are some things you can do to keep it functioning well.

- protect the system from being overloaded with water
- improve the quality of your wastewater
- protect the soil absorption (drainfield) portion of the system

Less water entering the system means better treatment and longer system life. Keep in mind that as water enters the septic tank, an equal amount is displaced and released into the drainfield. When excess wastewater enters the septic tank, settling time is reduced, enabling some solids to enter the drainfield area. Excess solids in the drainfield can cause the system to fail by clogging the soil pores. Clean water from heavy rains or too much lawn watering can also negatively affect the drainfield area. Because it is designed to treat wastewater, any excess clean water that enters the drainfield makes the system work more than is necessary.

You can improve the quality of your wastewater by reducing the amount of suspended solids that go into the system. Suspended solids include grease and fat particles and ground-up foods from the garbage disposal. These small particles don't settle out well in the tank and can end up in the drainfield reducing its useful life-span.

Since the drainfield area is where most of the treatment occurs, it's very important to protect this portion of the system. Soil compaction is a major hazard to the operation of the drainfield because compacted soil cannot treat wastewater. Once compacted, soil can't be restored; the installation of a costly new drainfield is the usual solution to the problem. Examples of things that can cause soil to become compacted include vehicle traffic, heavy objects, and buildings.

A properly designed, installed, and maintained septic system should protect the environment and give your household many years of good service.

For more information on household septic systems, visit the University of Arizona Extension publications web page at ag.arizona.edu/pubs.

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Managing Your Household Septic System

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Maintaining Your Septic System

Onsite/septic system owners need information on how septic systems work, how to maintain them, and precautions to take to decrease the potential for the septic system to contaminate groundwater or surface water. Operation and maintenance of the system are the owner's responsibility. This fact sheet discusses steps you can take to manage your septic system.

Both the septic tank and the drainfield (also known as a leach field or absorption field) must be properly maintained to protect human health and the environment. A properly maintained system should work correctly for many years. The effectiveness of a septic system depends on how the homeowner uses and operates the system. Managing a household septic system requires that you control the volume and quality of wastewater and maintain the septic tank and drainfield.

Controlling Volume of Wastewater

Sending wastewater to the tank too fast can cause solid materials to pass into the drainfield without undergoing the gradual anaerobic digestion that occurs in the septic tank. You should conserve water use in the house to ensure:

- slow movement of wastewater into the tank
- reasonably complete digestion of solids, and
- slow trickling of wastewater from the tank to the drainfield.

No more than two loads of laundry (one in the morning and one in the evening) should be done a day. Avoid marathon showers and other excessive uses that may send big surges of wastewater into the system.

The brine solution and excess water from the backwash of a water softener probably will not harm most septic systems, although they could dictate the need for a slightly larger tank and drainfield. Consider using water-saving devices available for toilets and shower heads.

Do not connect sump pump outlets or roof gutters to the system. Be make sure that any runoff from the roof, driveway, and other impermeable surfaces is directed away from the drainfield. In doing so, you will prevent accumulating water in the drainfield.

Controlling Quality of Wastewater

The quality of your wastewater — not just its quantity — is also important in ensuring that your septic system functions properly. Fats and grease should never be poured down the drain. They can solidify in the lines and cause failure; they can cause excessive buildup of the floating scum layer in the septic tank; and they can get into the drainfield and surrounding soil and seal the system off altogether.

Limit your use of garbage disposals or don't use them at all. Septic systems are intended to be used for the treatment and disposal of human wastes and wash waters that come from the home. Only household cleansers, disinfectants, and bleaches should be allowed into the septic tank and only in moderation. Anything else does not belong in a septic system. Do not put any toxic or hazardous materials, such as paints, thinners, waste oils, photographic solutions, or poisons into a septic system; they will not be treated sufficiently to prevent contamination of water that returns to your local groundwater and or surface water.

Other materials that cannot be decomposed in a septic system include coffee grounds, dental floss, disposable diapers, cat box litter, cigarette butts, sanitary napkins, tampons, plastics, facial tissue, and paper towels. Such materials merely increase the risk of plugging and necessitate more frequent cleaning. Drains should be equipped with strainers or other filtration devices to reduce the amount of food particles, hair, and lint entering the system.

Maintaining the Septic Tank

Slow accumulations of sludge and scum are normal. You should remove these materials through periodic pumping and appropriate disposal. This will protect the adsorption field from materials that will damage its effectiveness.

Annual or biannual inspection of the septic tank is advisable to determine the thickness of the sludge and scum layers.

If you have any doubts about inspecting the septic tank, a private contractor who specializes in septic system cleaning and pumping can be found in your telephone directory. This service will cost you some money, but it is less expensive than digging up a fouled drainfield.

Additives that are marketed as septic tank cleaners, rejuvenators, or primers are not needed. Most of these additives won't harm your system, but they don't help them either. Some of these additives are strong chemicals that *can* harm a septic system.

Maintaining the Drainfield

Activities that help to maintain the septic tank will also maintain the drainfield:

- tank is free of excessive sludge,
- tank is used within its designed capacity, and
- quality of wastewater is proper.

All this assumes that the wet-season water table is at least 5 feet below the bottom of the drainfield and that the soil is adequately permeable.

Additional measures that you can take include:

- keep vehicular traffic off of the drainfield because they can compact the soil and possibly break drain lines
- try to position trees so that their roots will not enter the drainlines and plug them
- keep a healthy grass cover over the system to prevent exposure of the soil and possible erosion around the drain lines.

Properly sited, designed, constructed, and *maintained* septic systems can provide an efficient and economical wastewater treatment alternative to public sewer systems. While septic systems are designed and installed by licensed professionals to meet the needs of individual sites, homeowners are responsible for the system's operation and maintenance. There is more information on household septic systems at The University of Arizona Extension publications web page (ag.arizona.edu/pubs).

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Operation and Maintenance Tips for Your Septic System

What to do...	How to do it...	Why you should...
Conserve water	fix leaks and drips; replace old fixtures with new "low flow" types	Extends life to your system; allows time for the septic tank to digest and separate incoming materials.
Use system below or at capacity	run dishwashers and washing machines at other times of the day besides early mornings and bedtimes; only do 2 loads of laundry a day and spread out the times between loads	This is the primary cause of system failures.
Provide good water quality to the tank	limit use of garbage disposals; put fats and oils in the trash; put paper towels, tissues, cigarette butts, disposable diapers, sanitary napkins, and tampons in the trash; use normal amounts of household detergents, cleansers, bleaches, and drain cleaners	Increasing the load of solids into the tank decreases the capacity and shortens the interval between pumpings.
Additives	don't need	Most additives do not provide any treatment and some may actually harm the system.
Prevent runoff from entering the drainfield	direct down spouts away from the drainfield; slope the drainfield slightly	You want to avoid saturating the area with excess water.
Maintain septic tank	pump the septic tank every 3 to 5 years, depending on its use and size and number of people in the house	If the tank gets too full, particles of scum or sludge will flush out of the tank. This material will clog the drain lines and cause the septic system to fail.
Maintain the drainfield	plant grass or other shallow-rooted plants over a septic field; keep vehicular traffic off the drainfield	Vehicular traffic over the drainfield will compact the soil and may crack pipes. It can cause the distribution box to settle unevenly causing the effluent to flow unevenly through the drainfield.

Item	Question	Yes	No
1. Quantity of wastewater; indoor water use.	**a.** Water-conserving fixtures are used throughout home, fixtures inspected regularly, and leaks repaired quickly.		
	b. No water-conserving fixtures, and no inspections.		
2. Distance of system to well.	**a.** More than 100 feet.		
	b. Less than 100 feet.		
3. Location of disposal system.	**a.** Located more than: 50 feet from property lines, 10 feet from buildings, and surface water drains away from disposal system.		
	b. Located less than the above distances, and surface water drains toward disposal system.		
4. Inspection of disposal system.	**a.** Soil always firm, and no odors.		
	b. Ground wet and/or spongy, and noticeable odors.		

The questions listed above can help you determine whether your household wastewater treatment system may pose a risk to groundwater.

Take a few minutes to complete the questions. If you answered **yes** to mostly **"a"** questions, your groundwater is probably safe from becoming polluted from your wastewater treatment system. If you answered **yes** to mostly **"b"** questions, then your groundwater may be at high risk of becoming polluted.

Worksheet number seven in the Farm*A*Syst book will give you a more complete assessment of your household wastewater treatment system. If you are interested in obtaining a copy of Arizona's Farm*A*Syst workbook, please contact the College of Agriculture's Publications Distribution Center, 4042 North Campbell Avenue, Tucson, Arizona 85721. The office phone number is (520) 621-1713 and the FAX number is (520)795-8508. The cost of the workbook is $5.00 plus shipping. Contact your county extension office or NRCS office if you have questions about how to use the workbook.

Estimated Number of Years Between Septic Tank Pumpings*						
Tank Size (gallons)	Number of people in your household					
	1	2	3	4	5	6
1,000	12.4	5.9	3.7	2.6	2.0	1.5
1,500	18.9	9.1	5.9	4.2	3.3	2.6
2,000	25.4	12.4	8.0	5.9	4.5	3.7

*More frequent pumping is needed if a garbage disposal is used. Source: Karen Mancl, *Septic Tank Maintenance*, Publication AEX-740, Ohio Cooperative Extension Service, 1988.