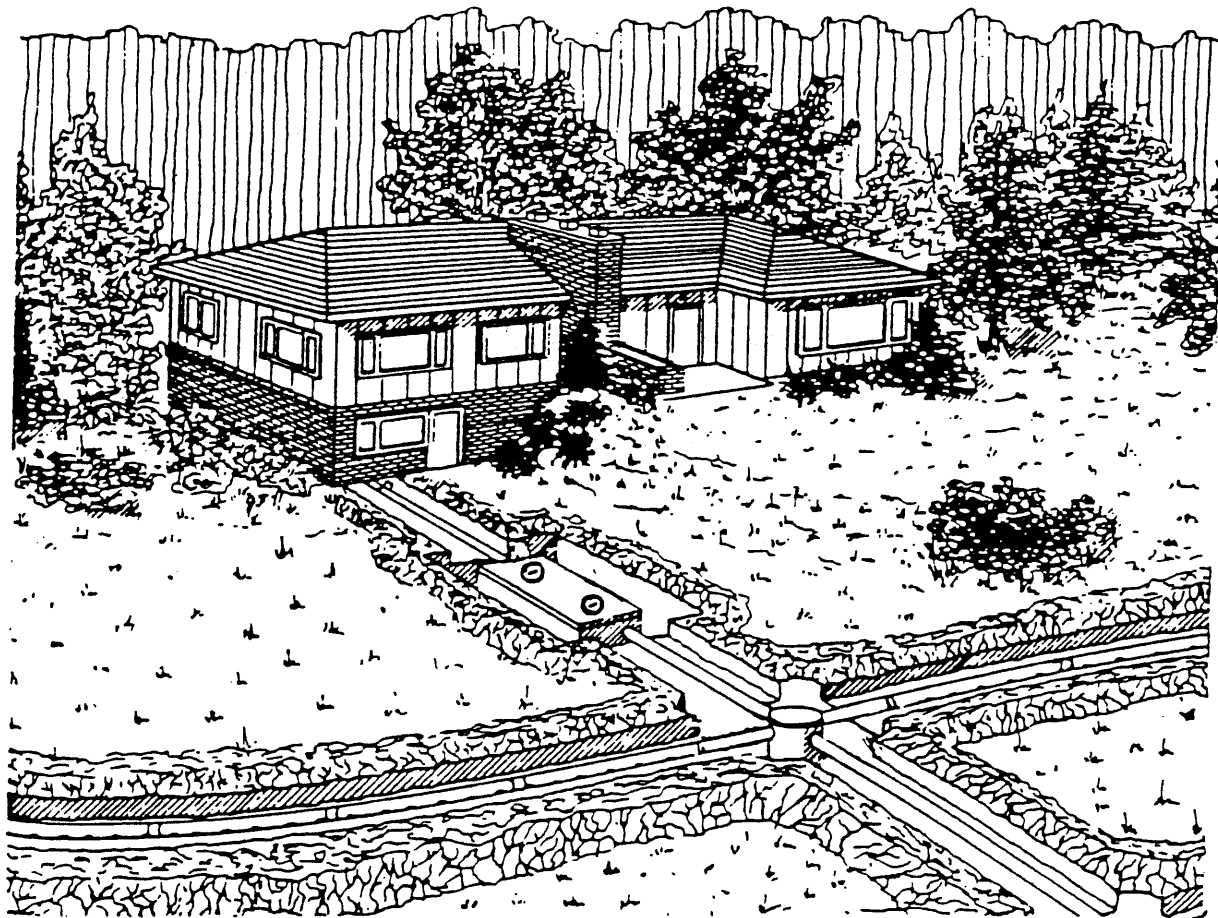


A HOMEOWNER'S GUIDE TO SEPTIC SYSTEMS



County of Sonoma
Permit and Resource Management Department
Well & Septic Section

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I. Introduction

Many areas of the County utilize septic tanks and soil absorption systems. Properly designed, installed, and maintained, such systems may give 20-40 years of good service. However, these systems can malfunction if not properly maintained, and a major failure could cause repairs ranging from \$2,000 to \$10,000. It makes good economic and environmental sense to ensure that the system operates properly.

The problem is that household liquid waste can contain disease bacteria, infectious viruses, putrescible organic matter, household chemicals, and excess nutrients (nitrogen, phosphorus, etc.). If discharged untreated, these constituents can be a health and environmental problem. A properly installed and maintained septic system goes a long way in addressing these concerns.

II. What is a Septic System and How Does It Work?

The Septic Tank is a biological treatment unit where solids are reduced by bacterial activity. Its purpose is to protect the soil absorption system, like a filter, from the clogging solids suspended in wastewater.

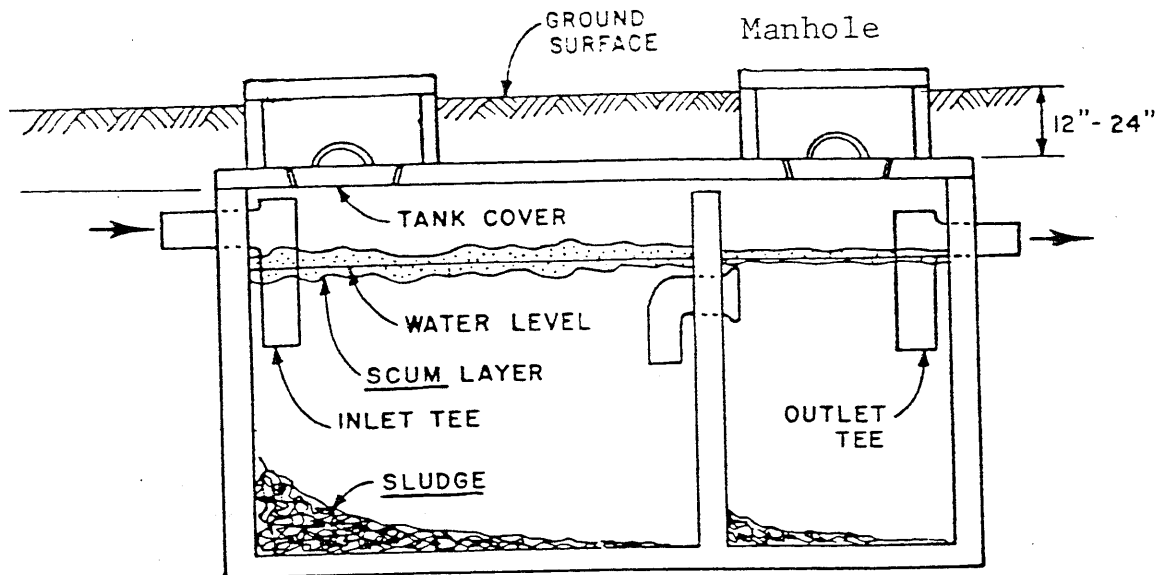
A modern septic tank is usually a two compartment tank made of concrete, plastic or fiberglass, and holding from 800-1500 gallons of liquid and solids. With normal household use, an empty tank will fill in 2-4 days and then begin discharging into the soil absorption field, or leachfield.

As you can see in the septic tank diagram, the heavier solids in wastewater sink to the bottom as "sludge". Here, anerobic bacteria feed on the organic matter, reducing its volume by up to 40%, and producing by-products such as stable solids, liquids, and gases (carbon dioxide, methane, etc.). The solids, like ashes left from a larger volume of firewood, eventually build up and need removal.

The lighter solids (grease, oils, soaps, and lighter particles) float on the water surface as "scum". This scum builds in volume just as the sludge does. If these sludge and scum layers are not removed by pumping, they can eventually flow into the soil absorption field, clogging the pipe, rock and soil pores, causing failure of the system. Not pumping the septic tank can be compared to not changing your car oil and filter.

The relatively clarified water remaining in the middle flows into the soil absorption field, and is more easily absorbed without its former oils and solids. It remains, however, a carrier of bacteria, viruses, detergents, chemicals and dissolved solids, all of which must be safely disposed of by the soil absorption system.

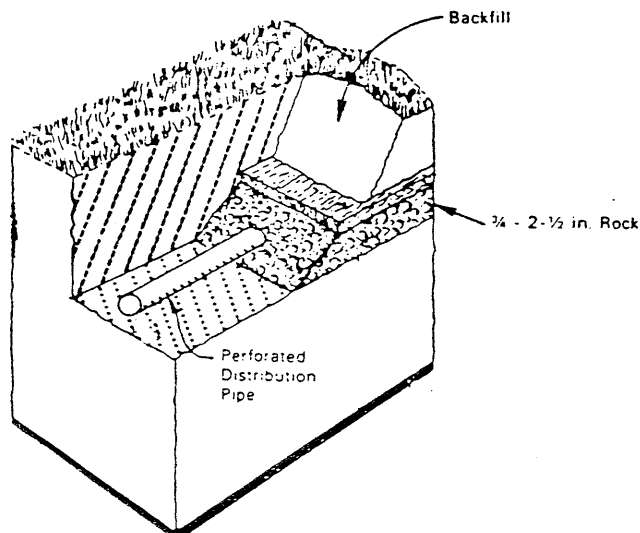
The septic tank is not a chemical treatment unit. This is important because harsh chemicals can kill the bacteria that reduce the solids, greatly reducing the systems' ability to function. In addition, chemicals discharged into the tank may enter the soil absorption field and eventually the groundwater with little or no change, and cause contamination.



SIDE VIEW
 (FORWARD WALL REMOVED)
 (Manholes optional but recommended)

Septic Tank
Side View
 (Forward Wall Removed)

The Soil Absorption Field—Once the septic tank has pretreated the wastewater as described above, the water flows into the soil absorption system. For current conventional systems, this is generally 200-450' of rock filled trench (depth of 2-5'). Running near the top of the rock is a 3-4" perforated plastic pipe which distributes the water through the trench length. Native soil backfill covers the pipe and rock (see cutaway diagram).



Typical Trench-type Soil Absorption System

The soil absorption system spreads out the wastewater, allowing it to be stored in the rock spaces as it seeps into the soil. Some may be absorbed by plants, or passed by evapotranspiration into the atmosphere. Further biological treatment and filtering occur in good unsaturated soils, and relatively safe water is eventually returned to the groundwater table or natural hydrological cycle. In saturated soils, the soil is less able to provide an effective cleaning action. This may occur in areas with high ground water tables, or shallow rain saturated soils.

Older homes may have only a redwood cesspool for their disposal system, (currently not legal) or may have a redwood or metal septic tank and a redwood seepage box. Some homes may have a septic tank pump, which is usually located in a separate septic tank. Newer dwellings may have a non-conventional system such as a surface "mound" system or pressure distribution system. Both are generally served by pump units. If you have another type of system or other questions, please contact the Division of Environmental Health.

III. What Can Go Wrong?

- A. Signs of a marginal or failing system may be heavy, lush green growth over the system, sluggish plumbing problems that persist after the tank is pumped, boggy areas in the system, or actual sewage discharge to the ground surface.
- B. The newer systems (mid-seventies to present) are based on soils analysis, percolation tests, and good design, and failures are infrequent. Those that do occur are generally caused by excessive water use, burrowing rodents, physical damage (vehicles, large animals, landslides, grading cuts) or a previously unsuspected high groundwater problem. Tree root or other blockage may also occur.
- C. Older systems (many installed before codes or inspections) may have additional problem areas: system may have reached its lifespan, poor soils, steep slopes, inadequate system size, and no space available for replacement/repair of the system. Many resort area systems were designed for occasional summer use, and now serve a year-round family, laundry, and sometimes the additional load imposed by illegally added living units.
- D. Pump and Non-Conventional Systems may experience mechanical or electrical problems. Gophers may fill the valve boxes. For further information on repairs, contact Environmental Health or a licensed septic system contractor. Repairs require a permit from the Division of Environmental Health.

IV. How Do I Maintain My Septic System?

Although some septic problems may seem insoluble, most can be resolved, or at least mitigated, by practicing the following maintenance concepts.

- A. Know the location of your tank and system. Environmental Health may have records, so may the prior owner, contractor, or architect.
- B. Pump your tank regularly. Solids accumulate differently depending on use, but a good place to start is every 2-3 years, or when the sludge level is 12-18" in depth. At your first pumping, your licensed pumper can tell you whether you need more or less frequent service. Both compartments should

be pumped, and all solids removed. Be sure the pumper checks inlet and outlet baffles for good repair. Broken baffles should be replaced by more reliable "Sanitary T" plumbing shown in the tank diagram. Note: gases make entering a septic tank dangerous.

C. Pump and Non-Conventional Systems -Mechanical and electrical components (pump, valves, valve boxes, control panel, alarm, etc.) should be occasionally reviewed by a knowledgeable professional.

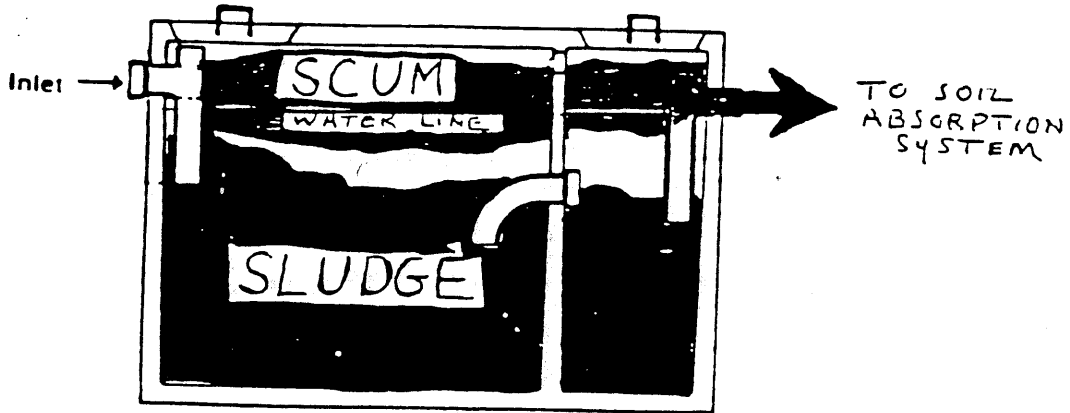
D. Minimize Liquid Load Studies have indicated that you can reduce your water use by half to two thirds with the following methods and save money on water, well-pump electricity, and hot water costs in the process!

1. Avoid house over-occupancy. Current septic systems are sized for two people per legal bedroom and continuous use above that occupancy level may strain or exceed your systems' capabilities and/or shorten its lifespan.
2. Repair leaky faucets and toilets. Toilets can be checked for less obvious leaks by adding food dye to the toilet tank. If color appears in the bowl later without flushing, the tank mechanism may need repair or replacement. Severe leaks can lose hundreds of gallons a day.
3. Low-flow toilets-Water saving devices can be placed in the tank, or the toilet can be replaced with an ultra-low flush toilet (.5 - 1.5 gallons per flush). Old models used 5-7 gallons, and current "water-saver" models use about 3.5 gallons maximum by law. Good working toilets exist in the .5 - 1.5 gallon range, with 2 quart models available for severe problems.
4. Low-flow showerheads-State law requires 2.75 gallon per minute (gpm) or less. Showerheads are available that use as little as 1.5 gpm, give a good shower, save water, and save on water heating energy costs. Aerators installed on all interior faucets also reduce flow.
5. Recycling Washers-If your system really has problems, laundry should be done elsewhere, or perhaps discharged into a separate approved disposal system. For marginal systems, washing machines with a sudsaver cycle divert the final rinsewater into the next wash cycle, saving water and energy costs, and septic system capacity.
6. Remove discharging type water softener from the system. This will decrease water use and avoid possible damage to your soil structure by the brine solution. Use a rechargeable softener or a separate, small sump for brine discharge.
7. Others
 - Take short showers instead of a bath.
 - Use stoppered sink basins; don't let water run while doing dishes, teeth, washing sinks, etc.
 - Do full laundry loads, preferably on different days so as not to flood the system all at once.
 - Reroute rain gutter and drainage away from septic system area to avoid over-saturation.

Do not discharge any liquid wastes, including sink or laundry, on the ground surface or in waterways. All wastewater must be discharged into an approved septic tank and disposal system.

E. Minimize Solids Load

A good rule of thumb is not to put anything into the tank that can be legally disposed of another way. Put in only human waste, toilet paper, water, and household chemicals in amounts normally used for cleaning (i.e., detergents, bleach, etc.). Avoid putting the following into your tank: disposable diapers, sanitary napkins, cigarettes, rags, paper towels, chemicals (poisons, thinners, etc.) and garbage disposal wastes (coffee grounds, grease, peels, bones, egg shells, etc.). These solids double the rate of sludge build-up, which increases frequency and cost of pumping.



The diagram above shows a septic tank overdue for pumping. The scum layer has overflowed the sanitary "T" and is beginning to clog the soil absorption system.

F. Traffic and Animal Problems

Avoid driveways or driving over your system. Avoid farm animals and their enclosures over the system. These may damage the tank distribution boxes or pipes. In addition, the soil may be compacted causing a malfunction or loss of efficiency. These conditions worsen in clay and clay loam soils.

V. Septic System Myths

A. Myth: "Septic tank additives are necessary to help the system operate properly."

Fact: Natural human waste contains all the ingredients necessary for septic tank function. It is not necessary to add chemicals, yeast, bacteria, rotten meat, or enzymes to the tank. Some products can actually harm the system and even contribute to groundwater contamination (source-University of Minnesota Bulletins).

- B. Myth: "Any bleach, detergent, or drain cleaner can harm the septic system."

Fact: When used in normal household quantities, these products do not harm the system, as they are adequately diluted. Excessive use however may disturb the septic tank bacterial action.

- C. Myth: "Boy, my system must be working great because I haven't had to pump the tank in 15 years!"

Fact: This equates to "Boy, my car engine must be working great because I haven't had to change the oil in 50,000 miles." When the septic system does go due to clogging, pumping the tank will be too little, too late, and system replacement may be several thousand dollars. It's cheaper insurance to clean the septic systems "oil filter" (tank) every 3 years at an average current (1988) cost of \$5-6 per month.

- D. Myth: Its O.K. to use "greywater" (sink, shower, or laundry discharges) on my yard or garden.

Fact: It is not legal to discharge greywater on the ground surface. Groundwater can contain pathogenic organisms and must be disposed of in an approved septic system.

- E. Myth: I can't plant anything over my septic system.

Fact: Although undisturbed, native conditions are best, it is not normally a problem if lawn, small shrubs, flowers, or a home garden is grown over a properly functioning conventional septic system. Avoid "in-ground" crops such as carrots and potatoes, and avoid trees, especially ones with pervasive roots such as redwoods, willows, and eucalyptus. Any excavations should be kept very shallow.

- F. Myth: "If my system fails, or I want to develop my vacant parcel that doesn't perc (clay soil), I'll just put in an engineered system."

Fact: The soil must perc (absorb water at a given rate) for a system to function. No magic wand can be waved to make 300-400 gallons per day of wastewater disappear into thin air.

Conclusion

There are times when a septic system can be a mysterious and frustrating entity. However, using the methods outlined in this manual, newer system lifespans should be lengthened, and marginal systems may be carefully maintained providing for continued safe operation. Don't forget that permits are required if repairs become necessary. State law requires that you disclose all illegal repairs and construction during a real estate sale.

If you have any questions or need advice, contact a licensed septic tank contractor or the Division of Environmental Health.

