

## SEPTIC TANKS

### What Are They?

Your septic tank is a key component of your water treatment and recycling system. It serves as a settling basin where solids accumulate and gradually get broken down by bacterial action.

Some of the organic waste (the organic fraction) is actually liquefied by this "natural bacterial decomposition," however the rest of the waste accumulates in the bottom as a layer of sludge. Additionally, a small percentage of this waste (mostly fats and oils) may float to the top of the tank to form a layer of semi-solid scum.

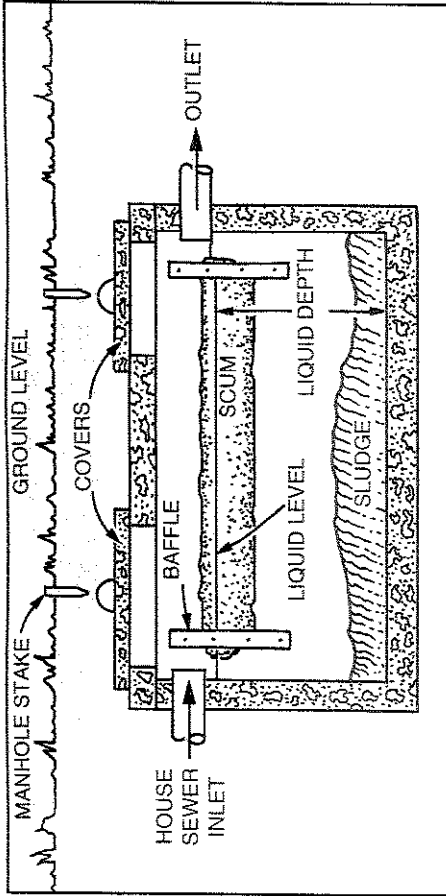
### How Do They Work?

The population living in metropolitan areas (who have never had the pleasure of maintaining a septic system, or who have never experienced waddling in their leachfield, or even had the experience of pumping out their systems) simply flush their toilets and "away go troubles down the drain." However, most of these people pay a quarterly sewer bill, usually between \$75 and \$150, for this service.

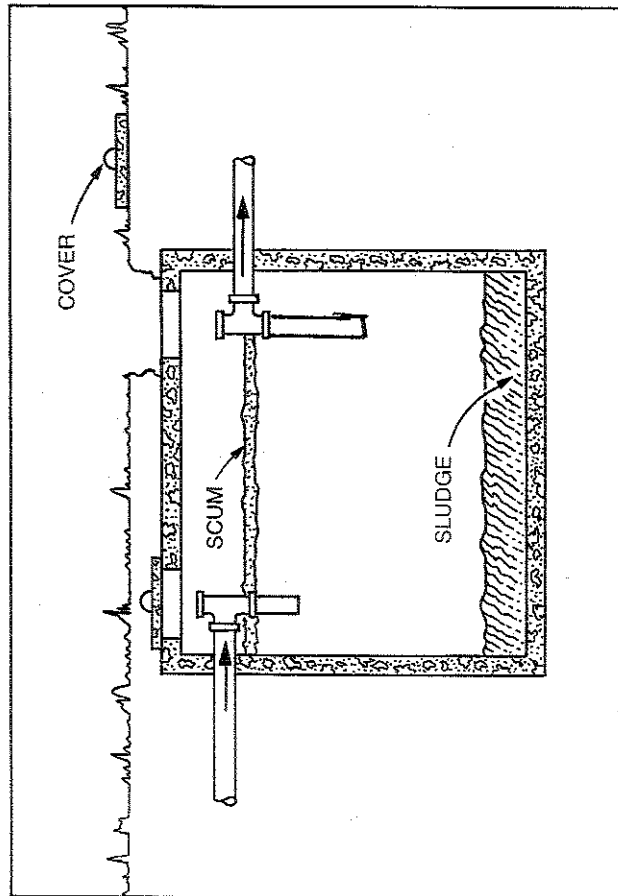
Those of us living in more rural areas have been forced to learn about the maintenance and working of the sewerage treatment facility attached to our home, "the septic system." Usually a septic tank is connected to a drainage field or seepage pit of some kind. If properly maintained, a well-designed system will last almost indefinitely. However, if it is neglected for too long a time, it can back up and clog the drainage field. This neglect can result in an expensive excavation and even a replacement of the drainpipes that could cost thousands of dollars.

### Design Of The Tank

Although designs vary, most septic tanks consist of a watertight, below ground tank that has one or two manhole covers (buried a few inches below ground) to provide access for pumping, cleaning and inspection. Effluent from the house flows into the tank through an inlet pipe near the top on one side. It flows out through a discharge or



Cross section of a typical concrete septic with baffle



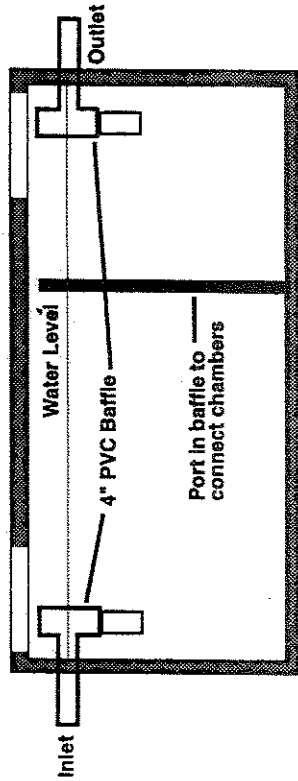
Septic tank with tee-fittings

overflow pipe at the other side. The pipe may end in a large tee-fitting or into a baffle (wall) preventing the effluent from flowing straight across from one pipe to the other.

The incoming effluent will be diverted downward with a minimum of splashing, allowing the solids to sink to the bottom.

Outgoing effluent is drawn from several feet below the top layer of the floating waste (grease, oil, scum) so that only liquid waste or solids that have been liquefied by the BACTERIAL ACTION going on at the bottom of the septic tank (which will come back to this point later) are discharged out into the drainage field. In the drainage field, further decomposition of the soluble organics will occur releasing the basic building blocks back to the environment.

### Double-Tank System



Many new tanks installed today have two compartments built in to the unit side-by-side. Having the tank divided into discrete units is done for several reasons. One is to minimize the potential for solids carryover to the drainage field. The majority of the solids are allowed to accumulate and digest in the first section of the tank. The potential for solids to accumulate in the bottom of the second compartment and be carried over to the leachfield is significantly reduced.

In some newer aerated systems, which accelerate the digestion of solids and breakdown of organics (BOD) from the sewage through introduction of air to keep the first chamber aerobic, the second compartment can be used as a settling chamber and also to oxidize nitrogenous components of the sewage once the organics (BOD) are removed.

### COMPONENTS OF SEWAGE TREATMENT SYSTEMS

A typical household sewage treatment system consists of a house sewer, septic tank, distribution box and absorption field or seepage pit.

**House Sewer** — The pipeline connecting the house and drain and the septic tank.

**Septic Tank** — Untreated liquid household wastes (sewage) will quickly clog your absorption field if not properly treated. The septic tank provides this needed treatment. When sewage enters the septic tank, the heavy solids settle to the bottom of the tank; the lighter solids, fats and greases partially decompose and rise to the surface and form a layer of scum. The solids that have settled to the bottom are attacked by bacteria. Some are solubilized; some form sludge. Septic tanks do not remove bacteria or viruses and, therefore, what is discharged cannot be considered safe.

**Distribution Box** — Serves to distribute the flow from the septic tank evenly to the absorption field or seepage pits. It is important that each trench or pit receive an equal amount of flow. This prevents overloading of one part of the system.

**Absorption Field** — A system of narrow trenches partially filled with a bed of washed gravel or crushed stone into which perforated or open joint pipe is placed. The discharge from the septic tank is distributed through these pipes into trenches and surrounding soil. The water filters through the soil, usually to groundwater or to recharge a receiving stream. In the process the water is further purified biologically and bacteria are filtered out providing clean water to the aquifer or stream. The subsurface absorption field must be properly sized and constructed. While seepage pits normally require less land area to install, they should be used only where absorption fields are not suitable and well-water supplies are not endangered.

**Cesspools** — Work in a similar manner to septic systems. Sewage water usually seeps through the open bottom and portholes in the sides of the walls. These can also clog up with overuse and the introduction of detergents and other material which slow up the bacterial action.

When the sewage backup occurs, homeowners usually have the system pumped out. Pumping out will only relieve the system temporarily. The clogged pores in the ground remain and eventually the system will have to be pumped again and again.

### MAINTENANCE

Since solids will continue to build up at the bottom of the tank, it is imperative that the "septic tank be pumped out periodically." Remember, the inorganic fraction of the sludge is not biodegradable, if it's not pumped out, sludge will accumulate until it overflows where it can cause problems in the absorption field.

The frequency of pumping out will depend primarily on the amount of wastewater and solids that go through the system each day. The frequency also depends on how careful you are about not throwing excess fats, rinds and other similar garbage down the drains. The more solid waste thrown in the system, the quicker the tank will fill up. Heavy flows of water also tend to make the tank fill up more quickly. That is why it is best not to use a garbage disposal in the system when you have a septic tank, and why water should not be left running indiscriminately in sinks or toilets.

### TREATMENT

It is important to get the septic tank cleaned before the sludge level gets high enough so that any of the solid material at the bottom, or the semi-solid scum at the top can flow out into the drainage field. This will quickly clog the drainage pipes and the soil into which they drain. If this happens the only cure would be to dig up and replace the entire drainage field.