Septic Tank Pumping

Septic tanks receive the raw wastewater from the home and are designed to facilitate the removal of particles heavier than water by encouraging these heavy particles to settle to the tank floor. This is why septic tanks fill up with solids, but how often should septic tanks be pumped to keep them operating properly?

A large majority of on-lot sewage systems have septic tanks. The question of how often a septic tank should be pumped has been debated for many years. On the one hand you will find homeowners who claim they have never pumped their septic tank and it "seems" to work perfectly. On the other hand, in an attempt to create a uniform pumping policy, regulators have come down on the conservative side and have stated that all septic tanks should be pumped every two or three years.

How a Septic Tank Works

Box 1. How much solid waste do you produce? The average adult eats about a quart of food each day. The body extracts a very small portion of this food and uses it to sustain the body. The rest is excreted into the waste stream. This means each adult discharges about 90 gallons of solid waste into the septic tank each year. Assuming the waste volume is reduced by about 60% by the anaerobic bacteria in the septic tank, this means each adult adds about 60 gallons of solids to their septic tank each year.

Both the regulatory and pumping industry recommend that the sludge and scum layer in a septic tank should never be permitted to fill more than about 30% of the septic tank's volume. Therefore, it will take about 5 years for one adult to fill 300 gallons of a 1,000-gallon septic tank with sludge and scum. A family of four will fill the 300-gallon storage volume of a 1,000-gallon septic tank in about 1.5 years. By making adjustments in this analysis for adults working outside of the home a third of the time and children going to school, it is easy to conclude that a septic tank should be pumped every two to three years.

A septic tank is a single- or dual-chamber tank that receives the raw wastewater from the home. Until recently, septic tanks were most often single chamber tanks. The Pennsylvania Department of Environmental Protection (PA-DEP) now requires all new and upgraded on-lot wastewater disposal systems to have a two-chamber septic tank similar to the one shown in Figure 1. Septic tanks are designed to facilitate the removal of particles heavier than water by encouraging these heavy particles to settle to the tank floor, thus creating the sludge layer. Septic tanks are also designed to retain particles lighter than water by encouraging these lighter particles to float to the surface and be retained in the tank creating a scum layer. In addition, during the approximate two to three days wastewater resides in the septic tank, the biodegradable organics in the septic tank are expected to decompose, in the absence of oxygen, into less complex organic compounds. This decomposition process is slow and largely ineffective because septic tanks are as cold as the soil around them and the anaerobic bacteria need higher temperatures to effectively decompose the organic material in the wastewater, thus reducing the biological oxygen demand (BOD) of the wastewater. Finally the anaerobically treated wastewater leaves the septic tank and is piped to additional treatment units or distributed to the soil absorption area. Retaining the heavy (settleable) and lighter (floatable) solids slowly fills the septic tank with solids from the bottom up and top down. When the septic tank no longer has room to store these captured particles, the particles begin to escape from the tank with the exiting wastewater and will begin to clog the soil absorption area. In septic tanks that have been fitted with an exit filter, this filter will capture and reduce the flow of solids to the absorption area. The filter will help protect the absorption area, but it will increase the volume of solids captured and stored in the septic tank. Thus it is important that every septic tank be pumped periodically to remove these captured, partially decomposed organic particles. The two-chamber tank provides enhanced removal of solids by holding the wastewater in each of the two tank chambers. A small percentage of the solids retained in the tank decompose; the remainder accumulates in the tank. *Biological and chemical additives are not needed to aid or accelerate decomposition.*

Never enter a septic tank for any reason. These tanks contain gasses that can kill you.

As the on-lot wastewater disposal system is used, sludge and scum continue to accumulate in the septic tank. Properly sized septic tanks (see Table 1) are large enough to safely store up to about three years of sludge and scum (see Box 1). As the tank volume filled with sludge and scum increases, wastewater is retained in the tank for less time and the solids removal process becomes less effective. If too much sludge accumulates, large amounts of the wastewater's solids will flow to the soil absorption field causing system failure (especially from older tanks that do not have exit filters. To prevent this, the tank must be pumped periodically. The material pumped is known as *septage*.

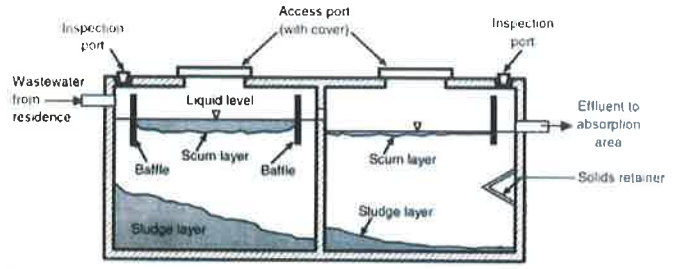

Figure 1. Cross-section of a two-chamber septic tank.

Number of bedrooms in the home	Estimated daily flow (gallons/day)	Minimum septic tank size (gallons)
3	400	900
4	500	1,250
5	600	1,400
6	700	1,550

Table 1. Required septic tank size.

How Frequent should a Septic Tank be Pumped?

The *frequency of pumping* depends on several factors:

- Capacity of septic tank
- Daily volume of wastewater added to the septic tank (see Table 1)
- Amount of solids in wastewater stream. It should be noted that there are several classes of solids that are commonly put into a septic tank. These include (1) biodegradable "organic" solids such as feces (see Box 1), (2) slowly biodegradable "organic" solids such as toilet paper and cellulosic compounds, which take a long time to biodegrade in the septic tank, and (3) non-biodegradable solids such as kitty litter, plastics, etc., which do not biodegrade and quickly fill the septic tank. Reducing the amount of slowly biodegradable organics and non-biodegradable waste added to your septic tank will greatly reduce the rate at which solids accumulate in the tank.

Another contributor to how quickly a septic tank will fill with solids is life style. The two most important life-style issues related to septic tank performance are:

1. water usage in the home, and
2. age of the residents.

Homes with growing families including children ranging from small children to teenagers usually use more water and put more solids into the septic tank. On the other hand, empty nesters, and especially the elderly tend to use much less water and put smaller amounts of solids into septic tanks.

Another important consideration regarding how often a septic tank should be pumped is timing. As stated earlier, as a septic tank fills with solids, these solids tend to be carried from the tank to the soil absorption area, especially from tanks that do not have exit filters. As more solids accumulate in the absorption area, these solids begin to clog the soil and restrict the movement of wastewater into the soil. By the time sewage has backed up into the home, the soil absorption area is clogged with a nearly impermeable biomat and flooded with wastewater because the soil is no longer able to absorb the wastewater produced on a daily basis. Removal of these biomats is usually expensive and time consuming. Pumping the septic tank will not remove the biomat. Removing the biomat requires that you pump the wastewater ponded in the soil absorption area. Then the pump-access hole to the absorption area should be left open for several days. Once the absorption area is free of water and has become aerated, the biomat usually decomposes in a few days. When the absorption area is pumped, the septic tank should also be pumped, thus enhancing the development of the aerated conditions in the absorption area.

Is It Time To Pump Your Septic Tank?

So, how does one decide how often a septic tank should be pumped? We know homes that put large amounts of non-biodegradable and slowly biodegradable organics into the septic tank need to pump more often. We also know that the septic tank should be pumped before the captured solids accumulate to the point where these solids begin being carried with the tank effluent to the absorption area. There are two relatively safe approaches to deciding when (or how often) to pump your septic tank. One is to just have it pumped every two or three years. The other is to open the access port to the first chamber (see Figure 1) once every year and insert a long pole to the bottom of the tank and withdraw it. You can see the depth of sludge by the darkness on the pole. If the sludge is more than a third of the tank depth, it is time to have it pumped. Most homeowners are better off just having their tank pumped every two or three years.

The Pumping Process

Septic tank pumping and haul contractors can pump your septic tank. It is a good idea to be on hand to ensure that it is done properly. To extract all the material from the tank, the scum layer must be broken up and the sludge layer mixed with the liquid portion of the tank. This is usually done by alternately pumping liquid from the tank and re-injecting it into the bottom of the tank. The septic tank must be pumped through the two large central access ports (manholes), not the small inlet or outlet inspection ports located above each baffle. Pumping a tank through the baffle inspection ports can damage the baffles and yield incomplete removal of sludge and scum.

The use of additives in septic tanks to reduce the sludge volume or as a substitute for pumping is not recommended. In fact, relying on additives rather than conventional tank pumping may result in failure of the entire septic system.

When you have your septic tank pumped, an additional step may help keep your septic system functioning properly for a long time. Most companies that pump septic tanks also have a certified PSMA Inspector in their company. This inspector can tell you if your septic tank needs repair or if other components of your septic system need maintenance.

To facilitate future cleaning and inspection, install risers from the central access ports and inspection ports to the soil surface. Also mark the location of the tank, so it can be easily located for future pumping.

Schedule Septic Tank Pumping

Homeowners should get in the habit of having the septic tank pumped. If you are able and willing to have your septic tank pumped on a routine basis (such as every two or three years), it may be possible to further enhance the effectiveness of your entire on-lot wastewater disposal system. Research at Penn State has shown that your soil absorption system will benefit from periodic resting (a period during which no wastewater is added to the absorption area). To get the greatest benefit from pumping your septic tank, it is recommended that you have your septic tank pumped every two to three years on the day before you, and your family, leave for your summer vacation. This means the whole system, especially the soil absorption area, will have the opportunity to dry out and any partially decomposed organic waste (biomat) that may have developed in the soil absorption area will quickly decompose in the absence of water.

Summary

The septic tank is only one part of an on-site wastewater system. It is designed to remove solids prior to the effluent proceeding to the soil absorption area, provide for the digestion of a portion of those solids, and store the remaining solids. Biological and chemical additives are not needed to aid or accelerate decomposition. Garbage grinders impose an additional solids load on the system. Solids must be removed periodically to prevent them from entering the soil absorption area. Your septic tank should be pumped and inspected every two to three years.

For additional assistance contact:

your local Sewage Enforcement Officer or Extension Educator.

Pennsylvania Association of Sewage Enforcement Officers (PASEO) 4902 Carlisle Pike, #268 Mechanicsburg, PA 17050 717-761-8648 E-mail: admin@pa-seo.org

Pennsylvania Septage Management Association (PSMA) P.O. Box 144 Bethlehem, PA 18016 717-763-7762 E-mail: infocenter@psma.net

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