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Septic Tank Pumping

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Septic tanks are commonly used as a part of on-lot wastewater disposal systems. Septic tanks remove settleable and floatable solids from the wastewater. The clarified septic tank effluent is then passed on to additional treatment processes or is distributed to the soil absorption area. Removing the solids from the wastewater protects the soil absorption area from clogging and failure.

The septic tank is a single- or multi-chamber tank that receives the raw wastewater from the home. Until recently, septic tanks were most often single chamber tanks. Based on recent research results, Pennsylvania Department of Environmental Protection 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. The two-chamber tank provides enhanced removal of solids by passing the wastewater through each of the two tank chambers. This allows the heavier solids to settle as sludge and the lighter particles to float to the surface as scum. Up to 50 percent of the solids retained in the tank decompose; the remainder accumulate in the tank. *Biological and chemical additives are not needed to aid or accelerate decomposition.* The septic tank outlet must also be equipped with a solids retainer that further enhances the tanks ability to capture solids.

As the on-lot wastewater disposal system is used, sludge continues to accumulate in the bottom of the septic tank chambers. Properly sized septic tanks (see Table 1) are large enough to safely store up to three years of sludge and scum. 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 and more solids escape into the soil absorption area. If too much sludge accumulates, the wastewater's solids will flow to the soil absorption field causing system failure. To prevent this, the tank must be pumped periodically. The material pumped is known as *septage*.

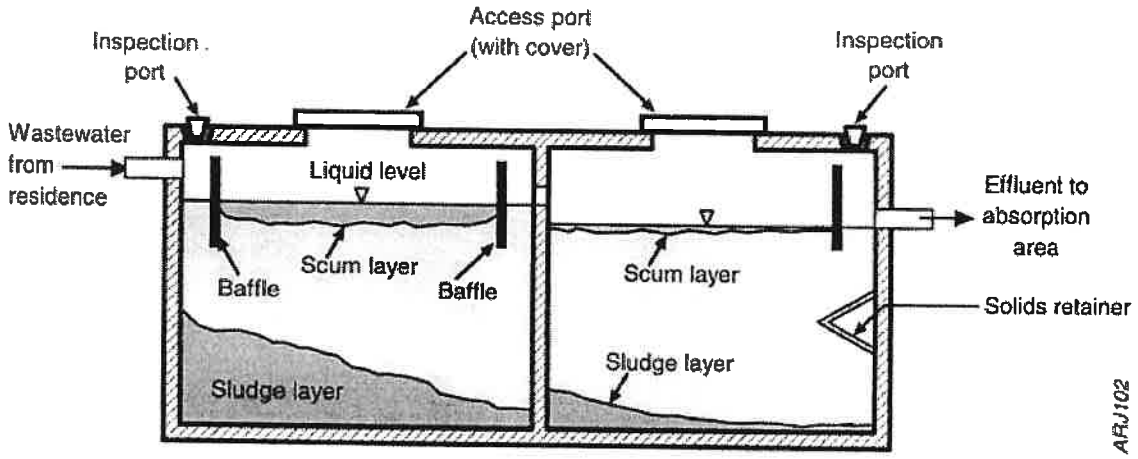

Figure 1. Cross-section of a two-chamber septic tank.

If you have just moved into a home, you may not know the size of the tank. In this case, you should have the tank pumped and inspected. The company pumping the tank will tell you its size, age, and condition.

Septic tanks may not fail immediately if they are not pumped. However, a poorly maintained septic tank will not effectively protect the soil absorption area from solids. *Continued neglect may result in system failure and even replacement of the soil absorption area.*

Tank Pumping

Septic tank pumping and haul contractors can pump your septic tank. It is a good idea to supervise cleaning 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 baffle 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.

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

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 septic system.

Before closing the tank, check the condition of the baffles. If they are missing or deteriorated, replace them with appropriate sanitary tee baffles. It should never be necessary to enter a septic tank. Any work to replace the baffles or repair the tank should be done from the outside. Decomposing wastes in the septic tank produce toxic gases which can kill a human in a matter of minutes. When working on a tank be sure the area is well ventilated and that someone is standing nearby. *Never go into a septic tank* to retrieve someone who has fallen in and was overcome by toxic gases without a self-contained breathing apparatus (SCBA). If a SCBA is not available, call for emergency services and put a fan at the top of the tank to blow in fresh air.

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

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 2 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 system). To get the greatest benefit from pumping your septic tank, it is recommended that you have your septic tank pumped every two 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 that may have moved into 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 1 to 3 years.

For More Information

Other Penn State Fact Sheets relating to domestic wastewater treatment systems include the following:

- F 162, *Preventing Septic System Failures*
- F 163, *Site Evaluation for On-Lot Sewage Systems*
- F 164, *Mound Systems for Wastewater Treatment*
- F 165, *Septic Tank-Soil Absorption*
- F 169, *Individual Residential Spray Irrigation System (IRSIS)*
- F 170, *A Lexicon for Alternate On-Site Wastewater Treatment Systems*
- F 171, *At-Grade On-Lot Sewage Disposal System*

Table 1. Required septic tank size.

Number of bedrooms in the home	Estimated daily flow (gallons per day)	Minimum septic tank size (gallons)
3	400	900
4	500	1,250
5	600	1,400
6	700	1,550
7	800	1,700
8	900	1,850
9	1,000	2,000

The *frequency of pumping* depends on several factors:

- Capacity of septic tank
- Volume of wastewater (related to size of household)
- Amount of solids in the wastewater (i.e. garbage disposals produce more solids)

Table 2 lists estimated pumping frequencies according to septic tank capacity and the number of persons living in the household. The frequencies were calculated to provide a minimum of 24 hours of wastewater retention assuming 50 percent digestion of the retained solids.

Under current Pennsylvania law a 900 gallon septic tank is the minimum size that may be used for a home with three bedrooms or less. If six people reside in a three-bedroom house, the tank should be pumped every 1.3 years. If the same system serves a family of two, the tank would need pumping every 5.2 years. Systems installed before the current rules and regulations were implemented may need to be pumped more often, perhaps every year or less As indicated in the footnote to Table 2, the use of garbage grinders will increase the frequency of pumping.

Table 2. Estimated septic tank pumping frequency. Based on single family dwelling occupancy (# of people). Example: for a tank size of 1000 gallons and a household size of five, the septic tank should be pumped every two years.

	Household Size (number of persons living in the household)									
	1	2	3	4	5	6	7	8	9	10
Tank size (gal)	Years between pumping									
500*	5.8	2.6	1.5	1.00	0.7	0.4	0.3	0.2	0.1	—
750*	9.1	4.2	2.6	1.8	1.3	1.0	0.7	0.6	0.4	0.3
900	11.0	5.2	3.3	2.3	1.7	1.3	1.0	0.8	0.7	0.5
Example 1000	12.4	5.9	3.7	2.6	2.0	1.5	1.2	1.0	0.8	0.7
1250	15.6	7.5	4.8	3.4	2.6	2.0	1.7	1.4	1.2	1.0
1500	18.9	9.1	5.9	4.2	3.3	2.6	2.1	1.8	1.5	1.3
1750	22.1	10.7	6.9	5.0	3.9	3.1	2.6	2.2	1.9	1.6
2000	25.4	12.4	8.0	5.9	4.5	3.7	3.1	2.6	2.2	2.0
2250	28.6	14.0	9.1	6.7	5.2	4.2	3.5	3.0	2.6	2.3
2500	31.9	15.6	10.2	7.5	5.9	4.8	4.0	3.5	3.0	2.6