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Septic Tank Inspection and Trouble-Shooting

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How to evaluate septic systems when selling or purchasing property, why septic systems fail, how to know when to pump a septic tank and troubleshooting for other problems.

Households not served by public sewers usually depend on a septic system to dispose of wastewater. Proper maintenance of the system is as important as proper installation (see MontGuide MT 9401 "Septic Tank and Drainfield Operation and Maintenance.") This MontGuide goes into greater detail on evaluating a septic system when selling or purchasing property, inspecting solids levels in a septic tank and troubleshooting problems in a septic system.

Evaluating a septic system when selling or purchasing property

Conducting a septic system evaluation prior to sale or purchase of property protects both the buyer and the seller. Most importantly, an evaluation helps to protect the value of the buyer's investment by ensuring that the system is functioning properly—and will continue to do so. It also protects the buyer from potentially tremendous costs of system repair or replacement soon after the sale.

For a seller (and realtor, too), a septic system evaluation will minimize the possibility of unknowingly selling a house with a defective or failing system, and could help avoid possible lawsuits that might arise as a result. A properly functioning system can also be a good selling point and enhance the value of the house.

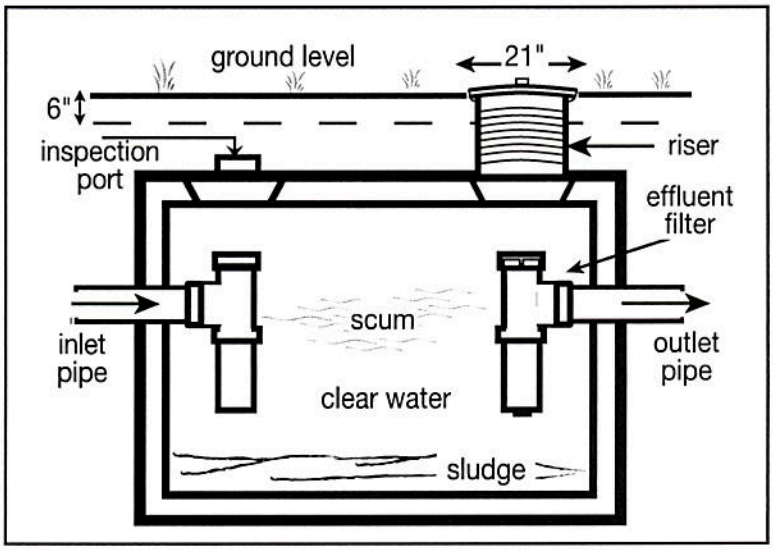

Figure 1: A Septic Tank with Effluent filter—The Montana Waste Water Association requires effluent filters and risers of at least 21" diameter to w/in 6" of grade. Risers must have a shut off (float ball) built in so nothing will pass through if the filter cartridge is removed. When a riser is installed, it replaces the concrete lid and a new lid is placed at grade. **

What is involved in an evaluation?

A septic system evaluation should be conducted as soon as the property is placed on the market so that necessary repairs can be made to the system. The evaluation should definitely be done before the sale is completed.

At a minimum, an evaluation should examine these things:

- The location, age, size and original design of the septic system.
- The soil conditions, drainage, seasonal water table and flooding possibilities on the site where the septic system is located.
- The history of the system if records are available.
- The condition of the plumbing fixtures and their layout to determine whether structural changes have been made to the plumbing that would increase flow to the septic system above capacity. System components that could affect

*The sections on trouble-shooting are adapted from a publication by James C. Converse, Agricultural Engineering Department, University of Wisconsin, 1977.

**In Montana, septic tank design approval is under the authority of local health departments. Before a system is installed, the design should be reviewed and approved by the the local health department. For design information and septic tank approval, consult the sanitarian in your area.

the system—for example, water softeners draining to the septic tank or the presence of footing drains—should also be inspected. Slow-flushing toilets and slow drains may indicate a failing system.

- The date the septic tank was last pumped.
- The sludge level in the septic tank if it has not been recently pumped.
- The condition of the absorption field. Look for evidence of liquid waste reaching the soil surface, draining toward nearby lakes and streams, or clogging the soil and gravel beneath the field. (This usually requires digging up a small portion of the field.). Look for evidence that heavy equipment has been on the drainfield, causing compaction and possible damage.

What is septic system failure?

A septic system should effectively accept liquid wastes from your house and prevent biological and nutrient contaminants from getting into your well or nearby lakes and streams. Anytime these things do not happen, the system is failing.

Why septic systems fail

By far the most common reason for early failure is improper maintenance by homeowners. When a system is poorly maintained and not pumped out on a regular basis, sludge (solid material) builds up inside the septic tank, then flows into the absorption field, clogging it beyond repair.

How will I know when to pump the tank?

The frequency with which you will need to pump depends primarily on these variables: 1) the size of your tank, 2) the number of people in the household contributing to the volume of your wastewater, 3) the volume of solids in your wastewater and 4) use of a garbage disposal. If you are unsure about when to have the tank pumped, observe the yearly rate of solids accumulation.

The primary maintenance point in a septic system is the septic tank. Inspection is accomplished by measuring the scum depth and sludge depth in the tank once a year. The tank should be pumped if the sludge layer has built up to within 18 inches of the tank outlet or if the scum layer thickens to within 3 inches of the bottom of the outlet baffle or sanitary tee. Follow these steps and Figure 2 for measuring scum and sludge depth.

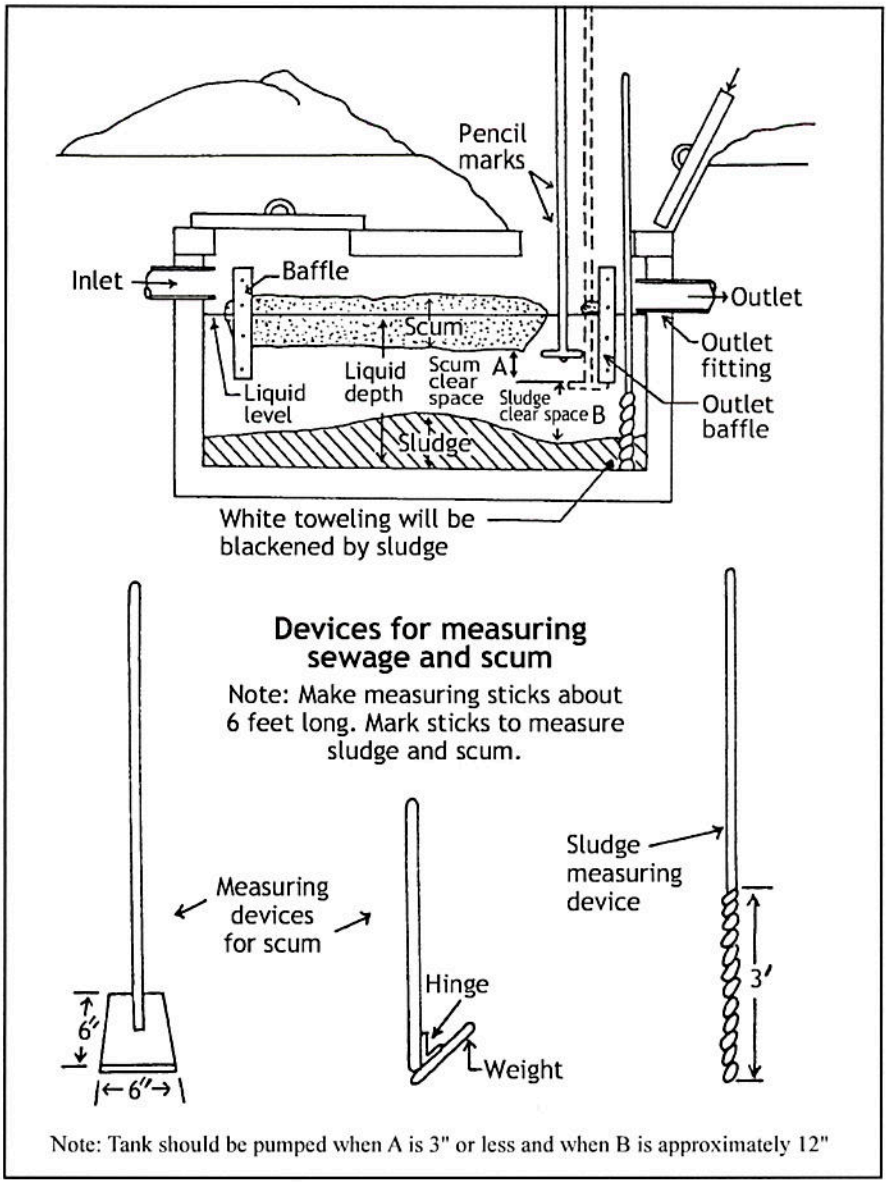

Figure 2 Measuring Scum Depth
—Courtesy Cooperative Extension Service, Michigan State University.

Measuring scum depth

1. Attach a 6 inch square board to the bottom of a stick about 6 feet long.
2. At the outlet end of your tank, extend the stick through the scum layer to find the bottom of the baffle or effluent pipe.
3. Mark your stick to indicate that point.
4. Raise the stick unit you "feel" or see the bottom of the scum layer.
5. Mark your stick again to indicate that point.
6. If the two pencil marks are 3 inches apart or less, or if the scum surface is within 1 inch of the top of the outlet baffle, the tank requires cleaning.

Measuring sludge depth

1. Wrap 3 feet of white rag or toweling around a long stick.

2. Place the stick into the sludge, behind the outlet baffle if possible.
3. Hold the stick there for several minutes.
4. Remove the stick noting the sludge line.
5. If the sludge line is within 12 inches of the outlet baffle, or within 18 inches of the outlet fitting, the tank requires cleaning.

While the above inspection steps can determine necessary pumping frequency most accurately, this task is unpleasant. Therefore the best solution is to have the tank pumped by a certified contractor on a routine basis. If the septic system is not used very often (as in an infrequently used vacation home with a correctly sized tank), it will probably not need to be pumped as frequently. Table 1 lists how often you need to pump out your tank on average, given the size of the tank and the number of persons living in the household. These figures were calculated assuming there was no garbage disposal unit hooked up to the system. The use of a kitchen garbage disposal will increase the amount of solids in the holding tank by as much as 50 percent.

Table 1. Estimated Septic Tank Pumping Frequencies in Years

Tank Size* (Gals)	Household Size (number of people) 1	2	3	4	5	6	7	8	9	10
500	5.8	2.6	1.3	1.0	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
1000	12.4	5.9	3.7	2.6	2.0	1.3	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	4.0	3.0	2.6

** Your local health department may be able to tell you the size of your tank.*

Troubleshooting septic system problems

Following are suggestions for troubleshooting and correcting septic system problems when they arise. This guide outlines:

1. The two most common symptoms of system malfunction,
2. The potential causes of each and how to check them out, and
3. Suggested solutions to the problems once identified. To facilitate troubleshooting, you should have a map of your system, showing location of the absorption field and tank clean-outs. This simplifies repair and prevents the lawn from being torn up needlessly.

Symptom A: House drains don't work or sewage backs up into basement

First, the trouble must be pinpointed. Measure the liquid level in the septic tank. If it's normal (i.e., a foot or so below the top of the tank), go to Cause A.1 or A.2; if above normal, go to Cause A.3.

Cause A.1.

A blockage between house and septic tank. The blockage may be in the house sewer, or the scum layer could be plugging the inlet pipe at the tank. If scum is the problem, the tank should be pumped. Have the inlet baffle checked at that time. If functioning properly, it should keep floating scum away from the tank inlet.

A house sewer blockage can be removed with a sewer routing tool from the clean-out at the house end of the line. Sewer cleaning is usually a job for a professional. If root penetration is the reason for the blockage, pipe joints should be resealed after routing to make them watertight.

If the blockage recurs in a new system, the problem may be improper sewer line slope and the only lasting solution is to relay the line, using the correct slope. If the blockage recurs in a previously trouble-free system, the most likely cause is a broken sewer pipe section, which must be located and replaced.

Cause A.2.

A plugged house sewer vent. In some cases, a plugged sewer vent (or soil stack) can slow the rate at which sewer lines drain to the point that solids settle out. A plugged or incorrectly installed vent sometimes results in a sewer gas smell around house drains; but more typically, it will just cause a gurgling sound as air is pulled through the trap into the house sewer when drains are used.

Plugged-vent problems should not occur if the plumbing code was followed during construction. However, temporary blockage can occur in winter when undersized roof vent openings freeze shut. The soil stack should be 4 inches in diameter where it passes through the roof, and should either extend 6 inches above the roof or 2 feet higher than any point on the roof that is 10 feet away (as measured horizontally), whichever is greater. Needed vent corrections should be made by a qualified plumber.

Cause A.3.

A blockage between septic tank and absorption field. If the liquid level in the septic tank is found to be above normal, either: (a) the tank outlet is plugged, (b) the line to the absorption field is obstructed, or (c) the absorption field is clogged. If the latter is the case, there will probably be evidence of seepage or general wetness in the absorption area.

a. ***Plugged tank outlet.*** In septic tanks which have been used for many years, the outlet baffle sometimes disintegrates or collapses. This allows scum and sludge solids to overflow and plug the outlet or the line to the absorption field. The cure is pumping the tank down, routing out the line and replacing the defective baffle.

b. ***Obstruction of tank-to-field line.*** Likely causes are solids overflowing the tank, tree roots getting into pipe joints or collapse of a pipe section. Again, the immediate remedy is pumping the

tank and clearing the line, followed by repair of the leaky joint or broken section.

Sewer pipe can break if not uniformly supported on solid or gravel fill or if shallow line is driven over by heavy vehicles. Tree roots can get into sewer lines through leaky pipe joints. Pipe plugging should not be a problem in the trench area, since tree roots seldom penetrate very far into the gravel fill around the pipe.

c. ***Clogged absorption field.*** See discussion under Cause B.2 below.

Symptom B.
Seepage or Swampy Conditions in Absorption Field Area

Cause B.1.

Too small a filter field. Many older homes have septic systems that are inadequate to handle the large amounts of water used in modern living, especially in cases where the original home has been enlarged without expansion of the septic system. If this describes your situation, consult your county health personnel to see if the absorption field is properly sized for your home and soil conditions.

If found to be seriously undersized, the present field should be enlarged or a new one constructed. In fact, the best decision might be a completely new system, since the septic tank also is probably too small. Often the old field can be reused as an alternate absorption area after resting a year or two.

If capacity is inadequate but not severely so, one solution could be to install water conservation devices in the home. Low-flow toilets and shower heads, faucet aerators and other devices can cut water use significantly with very little change in life-style.

Cause B.2.

Clogged soil absorption field. Soil absorption fields naturally clog over time, since effluent from the septic tank contains some suspended materials. Over a long period, development of a "clogging mat" reduces soil permeability to the point where tank effluent cannot be absorbed at the rate it is produced.

The best solution to a soil clogging problem is to rest the absorption field. This allows the organic matter to decompose, thus restoring the permeability of the soil around the trenches to near its natural state. Resting the area, however, requires that a second filter field be available to accept effluent for a year's time. Being able to switch from one absorption area to the other every year reduces soil clogging problems and significantly lengthens the life of the total system. Switching fields should be done during the summer when soil temperatures are high to obtain the best soil treatment of sewage. Alternating fields is especially effective in slowly permeable (high clay) soils.

Cause B.3.

High water table in spring. Septic system operation can become sluggish and even fail in the spring, because a seasonal high water table may saturate the soil around the trenches. Home sites and absorption fields in flat areas having poor surface drainage are especially susceptible. If this describes your situation, about the only thing you can do is to use subsurface tile drainage to lower the water table. The drainage tile must discharge to a surface ditch or to a larger tile drainage system.

If your system is located on a sloping site, installation of drain tile up slope from the absorption field should be very effective in lowering the water table. Place the tile at least 25 feet away from the filter field and at least as deep as the bottom of the trench. Home water conservation devices and practices may also be needed to make it through wet springtimes and prolonged rainfall periods.

Cause B.4.

Solids carryover. The overflow of solids from a septic tank which has filled with sludge can seriously affect absorption field operation. The cure, of course, is periodic tank clean-out.

Cause B.5.

Leaking faucets and toilets. The increased water load from leaky faucets and toilets can also affect absorption field operation. The cure is to keep plumbing fixtures in good repair.

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