Septic System

Owner's Guide

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Compliments of the
Minnesota Pollution Control Agency
and your county.

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College of Agricultural, Food, and Environmental Sciences

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Septic System Owner's Guide

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Preface

Stewardship

When your septic system is properly designed, installed, operated, and maintained it will provide economical and effective sewage treatment. If you properly treat sewage today, future generations will not incur the costs of cleaning up the health or environmental problems that may have otherwise been created.

Many things people do influence the quality of ground and surface water resources. One of the impacts we have on the quality of our waters is the sewage that we all produce. Proper handling and treatment of sewage will protect our waters, and ourselves, from contamination.

Treating sewage is everyone's responsibility. Residents of towns and cities have their sewage treated at a municipal treatment plant. Costs are covered by taxes, assessments, and direct charges. Residents of areas without access to municipal treatment plants own, operate, and maintain their own "mini-treatment plants" — their septic systems.

The septic system may be referred to as an "on-site sewage treatment system," "individual sewage treatment system," or "wastewater treatment system." In this owner's guide, ***septic system*** will be used to refer to the sewage treatment system not connected to a sanitary sewer.

This owner's guide and folder will help you:

1. understand the basic principles of how a septic system works,
2. learn how to operate the system efficiently and effectively,
3. know how to maintain the system to prevent costly repairs and water contamination, and
4. provide a place to keep information and records about your septic system.

Safety and Health

Why You Need Good Wastewater Treatment

The septic system is designed to treat wastewater for a specific site. Proper treatment of wastewater reduces health risks to humans and animals and prevents surface and groundwater contamination.

Risks to Human and Animal Health

It is unhealthy for humans, pets, and wildlife to drink or come in contact with surface or ground water contaminated with wastewater.

Inadequate treatment of wastewater allows bacteria, viruses, and other disease-causing pathogens to enter groundwater and surface water. Hepatitis, dysentery, and other diseases may result from bacteria and viruses in drinking water. Disease-causing organisms may make lakes or streams unsafe for recreation. Flies and mosquitoes that are attracted to and breed in wet areas where wastewater reaches the surface may also spread disease.

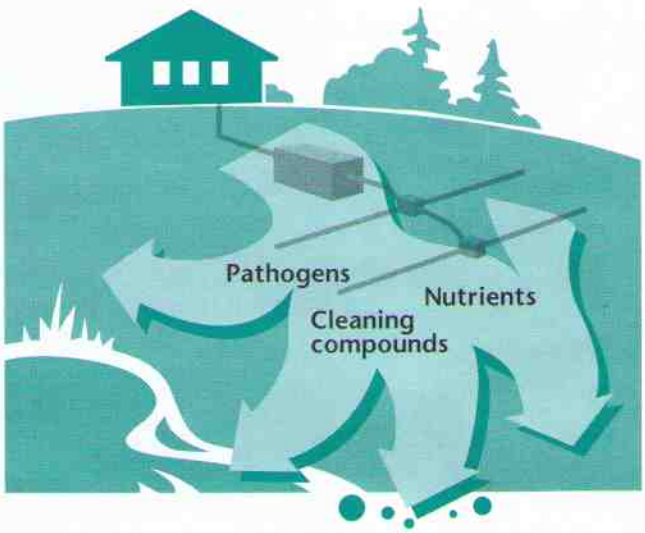
Inadequate treatment of wastewater can raise the nitrate levels in groundwater. High concentrations of nitrate in drinking water are a special risk to infants. Nitrate affects the ability of an infant's blood to carry oxygen, a condition called methemoglobinemia (blue-baby syndrome).

Risk of Contaminating Water

A septic system that fails to treat sewage can also allow excess nutrients to reach nearby lakes and streams promoting algae and weed growth. Algal blooms and abundant weeds may make the lake unpleasant for swimming and boating, and can affect water quality for fish and wildlife habitat. As plants die, settle to the bottom, and decompose, they use oxygen that fish need to survive.

Many synthetic cleaning products and other chemicals used in the house can be toxic to humans, pets, and wildlife. If allowed to enter a failing septic system, these products may reach groundwater, nearby surface water, or the ground surface.

In the soil treatment portion of the septic system (drainfield or mound), bacteria and viruses in the sewage are destroyed by the soil and naturally-occurring microscopic organisms. Nutrients are absorbed by soil particles or taken up by plants. However, these processes only work in soil that has air in it. The soil cannot be



saturated with water. Near lakes, streams, and wetlands soil conditions may be saturated. When the soil is saturated, biological breakdown will be incomplete and nutrients will move much greater distances, sometimes hundreds of feet from the drainfield or mound, and possibly into surface water. ***Even systems that appear to be working well or that are in compliance with local design and installation codes may allow nutrients or bacteria to reach the ground or surface water.***

Safety Checklist

- ✔ ***Never enter the septic tank.*** The tank has a manhole for cleaning and inspection from the outside only. The tank contains very little oxygen and has high levels of hydrogen sulfide, methane, carbon dioxide, and other life-threatening gases.
- ✔ ***Never use electrical*** lights, appliances, or tools in or close to the water or wet ground near the septic tank or drainfield. This can result in explosion or electrical shock.
- ✔ ***Always remember*** that the liquid and solid contents of the septic system are ***capable of causing infectious diseases.*** After working on any part of the septic system, always wash hands thoroughly before eating, drinking, or smoking. Change clothes before coming into contact with food or other people.
- ✔ ***Keep vehicles and other heavy equipment away*** from the septic system. The tank and other components may collapse due to weakness from corrosion.
- ✔ ***Never smoke near septic tank openings.*** Gases such as methane that may be present are potentially combustible.
- ✔ ***Keep children and other spectators away*** from the septic system when it is being cleaned or excavated.
- ✔ If there is a ***smell of sewer gases*** in your home, ***immediately call*** a plumber or other qualified person to identify the source and correct it. If the gas smell is very strong, ***evacuate the building*** until the problem is corrected and the gases are removed.

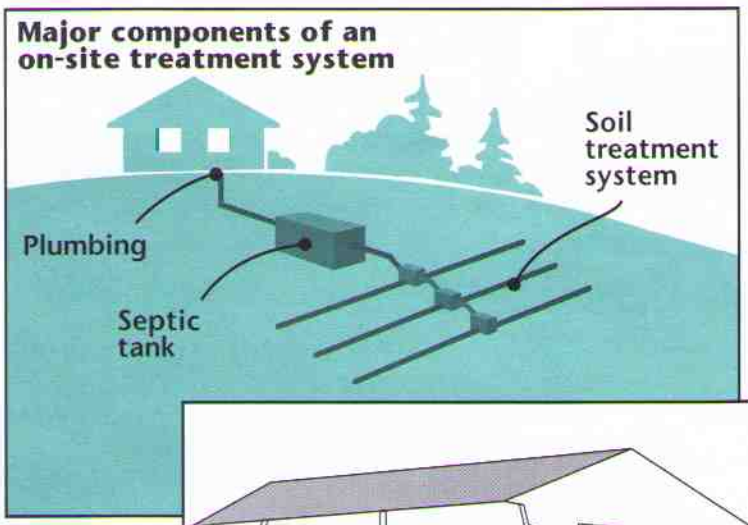
Septic System Features

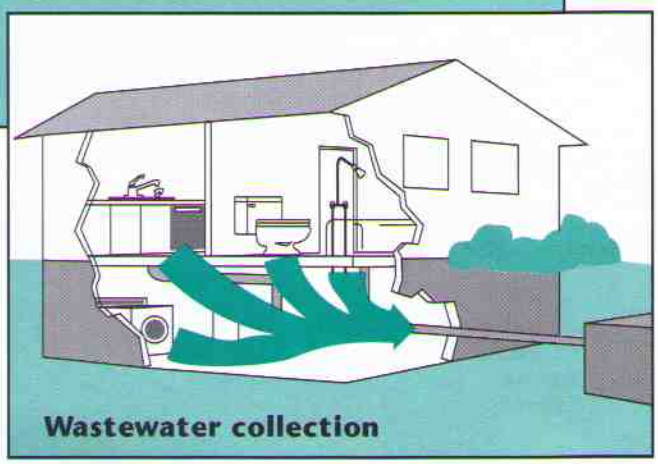
The design and installation of a septic system is controlled by local and state rules through the permit process. The permit takes into consideration all specific site characteristics including the type of soil, size of house, and wastewater-contributing fixtures and appliances. The system must be installed by licensed contractors and inspected by qualified officials to ensure proper installation. ***Operation and maintenance of the system is the owner's responsibility.*** Contact the local responsible agency (planning and zoning, environmental services, etc.) with questions about local requirements.

The complete septic system is made up of three primary components:

- Plumbing: wastewater collection
- Septic tank: primary treatment
- Soil treatment system: final treatment

Because systems are individually designed and have been installed over many years, there are many variations in the features and descriptions that follow.





Plumbing: Wastewater Collection

All wastewater containing human wastes, nutrients, dirt, and other contaminants must be collected and delivered to the septic tank and drainfield for treatment and disposal. ***All water used in bathing, toilets, laundry, and dishwashing must be treated by the system.*** Drains allowing wastewater to enter the system should be equipped with strainers and other filtration devices to reduce the amount of food particles, hair, and lint entering the system.

Some older homes may have been plumbed to bypass the septic tank with wash water but this has proven unsuccessful and damaging to drainfields. Minnesota's rules require all wastewater to be treated. However, water from roof drains, basement drainage sump pumps, hot tubs, and swimming pools should not be put into the septic system. These large volumes of clean water will overload the system.

Original and remodeled plumbing systems must be correctly designed and installed to allow trouble-free operation. ***Before remodeling, consider the impact of changes on the septic system.***

Septic Tank: Primary Treatment

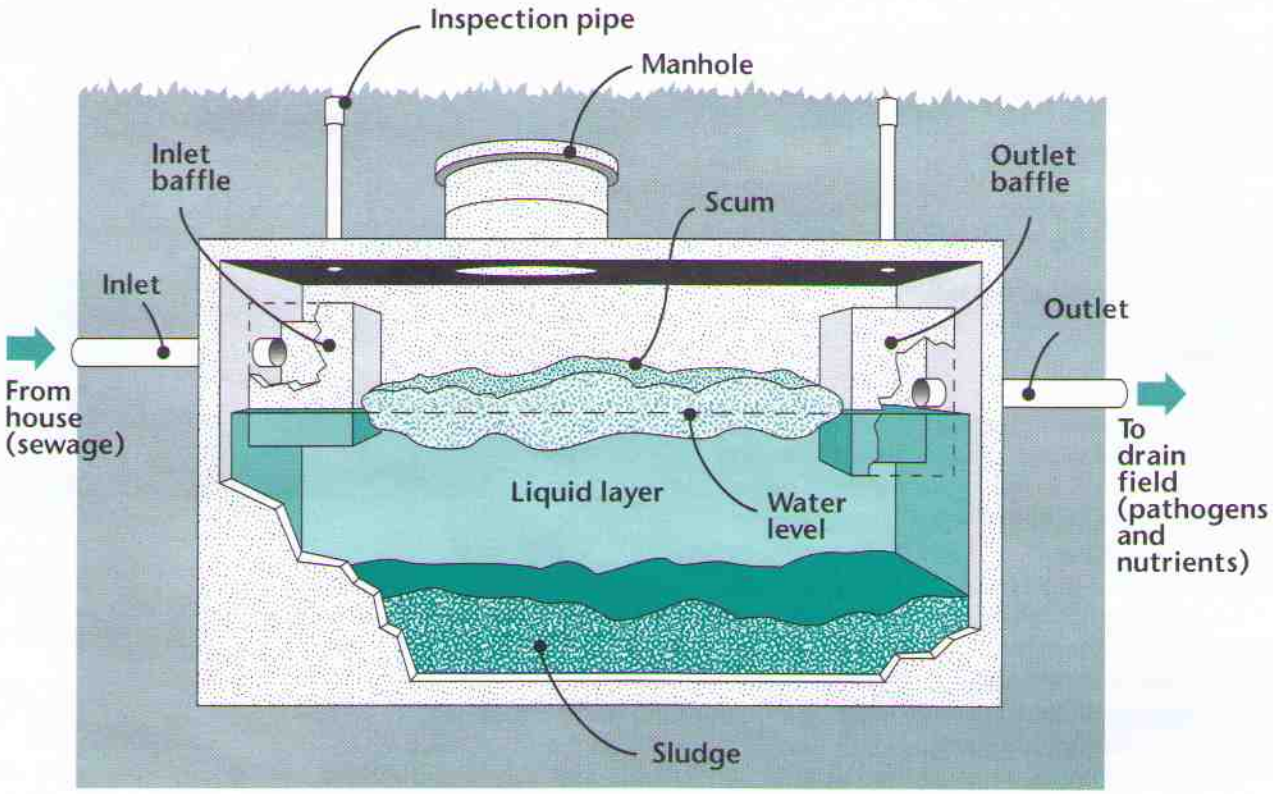
How the Tank Works

The contents of the septic tank separate into three layers:

- ***Floating scum layer*** - soaps, greases, toilet paper, etc.
- ***Liquid layer*** - water, liquid, and suspended solids
- ***Sludge*** - heavy organic and inorganic materials at the bottom of the tank.

Naturally-occurring bacteria in the sewage begin to break down organic materials in the tank. This is often referred to as ***primary treatment.*** Pathogens in the waste are NOT destroyed in the septic tank. Bacteria in the septic tank prepare the wastewater for final treatment in the drainfield.

Figure 1 – Septic tank



Components of the Tank

The ***septic tank*** is the first step of the wastewater treatment process. The septic tank is a solid tank designed specifically to accept all wastewater from the home. Some installations may have two tanks in a row or one large tank with two compartments. Several tank designs are available but all tanks should have inlet and outlet baffles, inspection pipes, and a manhole for cleaning (**Figure 1**). A few homes on small lots or in poor soil treatment situations may have a large holding tank to store wastewater until the entire contents are hauled away for treatment at another location.

The ***inlet baffle*** forces wastewater entering the tank to be mixed with the liquid contents to begin bacterial breakdown of organic materials and separation of solids. The inlet baffle also prevents the floating scum layer from floating back and clogging the inlet pipe.

The ***outlet baffle*** prevents scum from leaving the tank. If the scum layer reaches the outlet pipe, the pipe will become plugged. Scum in the drainfield will clog soil pores and destroy its ability to treat wastewater. Filtering devices can be installed at the outlet of new or existing tanks to prevent solids from reaching the drainfield. Regular maintenance is required to keep the filters from clogging and causing backups. Filters are not a substitute for proper operating or maintenance practices!

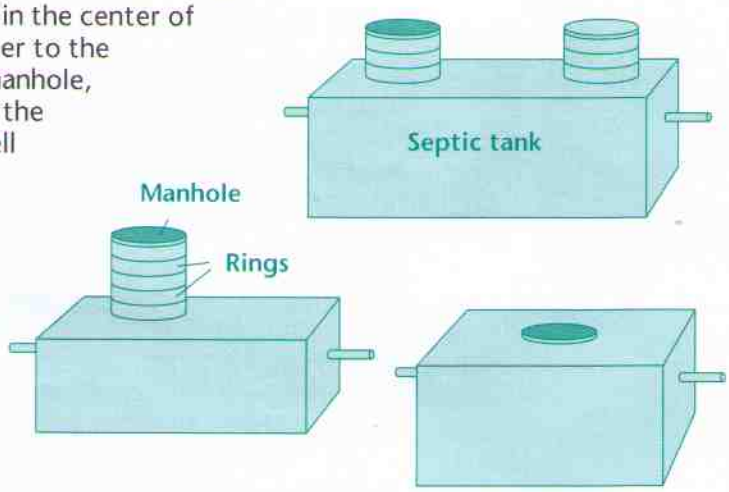
Inspection pipes of 4- or 6-inch PVC (plastic) material should be located above the inlet and outlet baffles to allow for inspection of pipes and baffles. Clogs in the inlet or outlet pipes can be unplugged through the inspection pipes. When operating properly, the septic tank is always "full" to the level of the bottom of the outlet pipe.

Inspection pipes must always be capped. They may be cut off flush with the ground to ease lawn care; however, the pipes should be left "long" until the final grade on a new site is determined. Metal covers can help in locating the inspection pipes when the ground is covered with snow.

> ***Do NOT use inspection pipes to clean or pump a tank!***

The ***manhole*** in the cover of the septic tank is the large entrance (20"-24") through which the tank should be cleaned. The manhole is often buried below ground level. It may be raised from the cover of the tank with concrete or plastic rings for easier access. It is usually located in the center of the tank; however, some manufacturers locate it closer to the inlet end of the tank. There may be more than one manhole, in which case they are usually located at the ends of the tank. The manufacturer or installer may be able to tell you where it is.

A variety of manhole configurations exist.



> ***Be careful when removing the manhole cover! It is heavy and creates a large, dangerous opening!!***

The manhole allows proper cleaning and inspection of the tank (see Maintenance and Care). The manhole cover must be kept securely in place. If the septic tank cover does not have a manhole or inspection openings, sometimes a new cover with these features can be installed on an existing tank.

Soil Treatment System: Final Treatment

How the Soil Treatment System Works

All septic systems include the same basic plumbing and septic tank components. Final treatment of wastewater occurs in the soil. Uncompacted, unsaturated, undisturbed soil must surround the soil treatment system. This system may be a series of trenches or a mound (**Figures 2 and 3**). Soil treatment kills disease-causing organisms in the sewage and removes nutrients. There are millions of naturally-occurring beneficial microscopic organisms in every tablespoon of soil. These complete the sewage treatment process.

The beneficial bacteria in the soil need air to live. Therefore, a zone of unsaturated soil must be present below the drainfield for complete treatment. In Minnesota, a minimum of three feet of unsaturated soil below the drainfield is the recognized standard. Some local units of government have established more strict requirements, such as four feet of separation from saturated soil.

The ***biomat*** is a thin layer of fine solids, dead bacteria, and soil bacteria that forms where the sewage meets the soil. This biomat layer regulates how fast liquid passes out of the trench or bed into the soil so the soil beneath the trench remains unsaturated. Once the wastewater is through the biomat layer and three feet of unsaturated soil, harmful pathogens have been destroyed.

Site conditions and local requirements determine the soil treatment system required.

Saturated soil is determined by its color and ***mottling.*** Mottling is the change in color of the soil due to water saturation. It is detected by soil borings done by professionals when the system is designed.

Site conditions and local requirements determine the soil treatment system for each site. If there is three feet of separation from the bottom of the drainfield trench to saturated soil, the least expensive distribution and soil treatment system is ***gravity flow*** to a simple trench system, as illustrated in **Figure 2**. If there is not the required separation for a trench, a mound is required, as illustrated in **Figure 3**. A ***mound system*** is an elevated drainfield built with clean sand. There are many small variations in design, but all trenches and mounds accomplish the same treatment function. New mound systems require pumps and/or lift stations and a pressurized wastewater distribution system.

Soil Treatment System (Drainfield)

Common terms for the soil treatment system are: drainfield, mound, seepage bed, leach bed, and soil absorption field. The soil treatment unit is where the final treatment and disposal of the septic tank effluent takes place. A properly designed and installed soil treatment system will destroy all disease-causing pathogens and filter out the fine solids contained in the septic tank effluent. Phosphorus will be adsorbed by (attached to) soil particles, and nitrate-nitrogen may move through the soil with the water.

In the summer, a shallow drainfield trench supplies water and nutrients to grass and trees. The nutrients that remain in the downward percolating water will be either changed to gas by soil bacteria or diluted. Nitrates in drinking water are rarely a problem with a soil treatment system when the nearby well is deeper than 50 feet and has a sealed casing.

The two most commonly used types of soil treatment (drainfield) units are trenches and mounds.

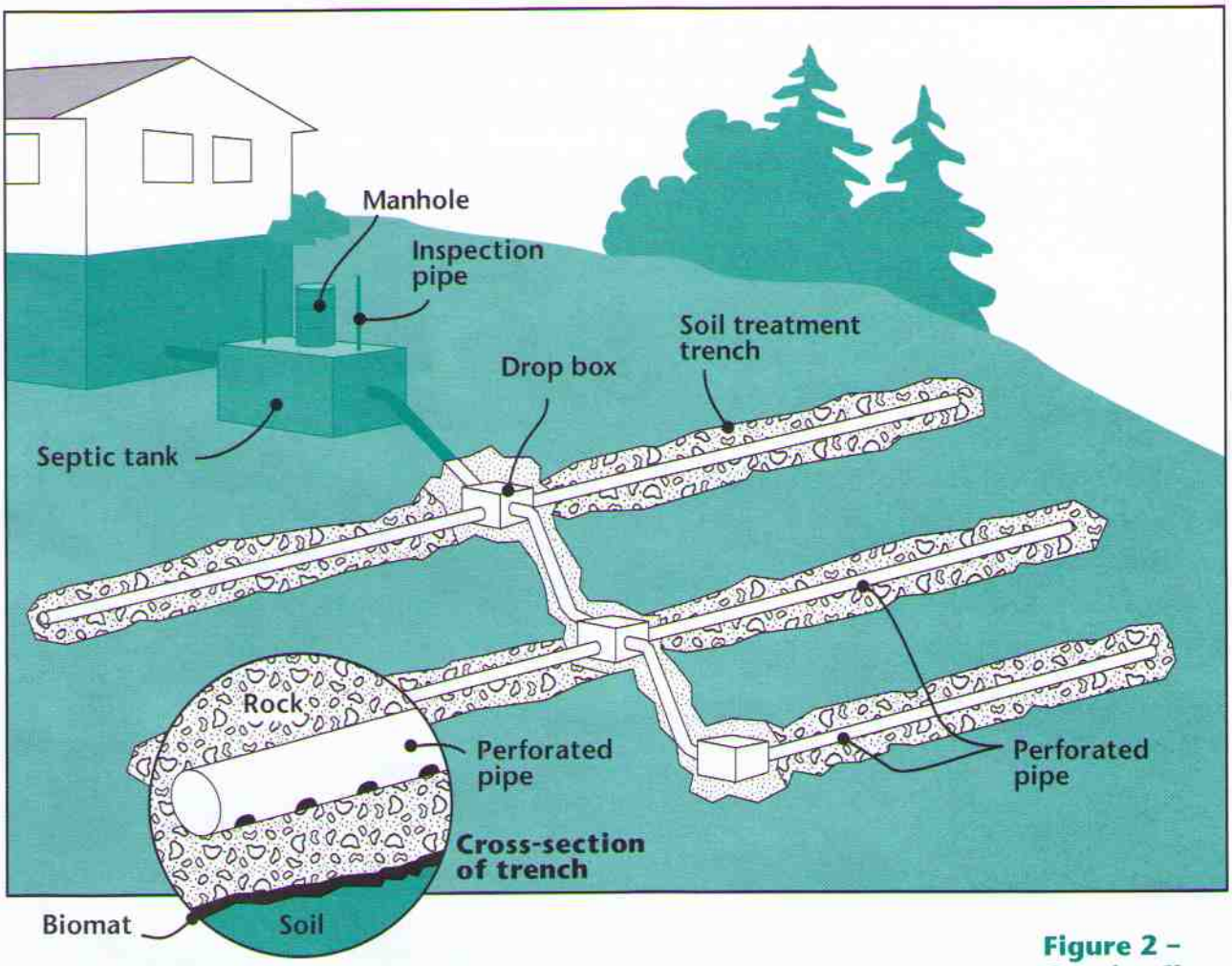


Figure 2 – Gravity flow to trench system

Trench: Drainfield trenches effectively treat liquid flowing from the septic tank. They are the most economical to install and are preferred when possible. A drainfield trench is a level excavation 18 to 36 inches wide and up to 100 feet long. The trench contains a perforated pipe in a bed of 3/4-inch to 2-inch diameter rock covered by natural or synthetic permeable fibers. Some soil treatment systems use large plastic tubing or some other chamber wrapped with fabric in the trench in place of rock. A 6- to 12-inch deep layer of topsoil covers the trench. Sewage flows through the holes in the distribution pipe, to the rock (or tube), through the biomat, and into the soil. Bacteria and fine sewage solids are removed or destroyed in this process.

The trench system may be laid out in one of many configurations to allow for the necessary square feet of surface. There are often inspection pipes on one or both ends of the pipes. These can be cut off at ground level and capped for easier lawn maintenance. The ground surface level of the soil treatment area should always be level or slightly raised above the surrounding ground to avoid excess rainfall flooding the system.

Mound (Elevated Seepage Bed): A sewage treatment mound is a seepage bed raised with clean sand to provide adequate separation between the wastewater in the mound and the saturated soil or an impermeable hardpan of soil or bedrock beneath. The mound is carefully constructed to provide adequate treatment of sewage. It is equally as effective in treating sewage as a trench system

as long as it is properly constructed and operated, and the septic tank is maintained correctly. The mound system, as illustrated in **Figure 3**, has a pressurized distribution system of 1-1/2 or 2-inch perforated pipe in a layer of small rock. A layer of sand covers the rock. The mound is covered with topsoil and planted to grass. The grass should be mowed regularly.

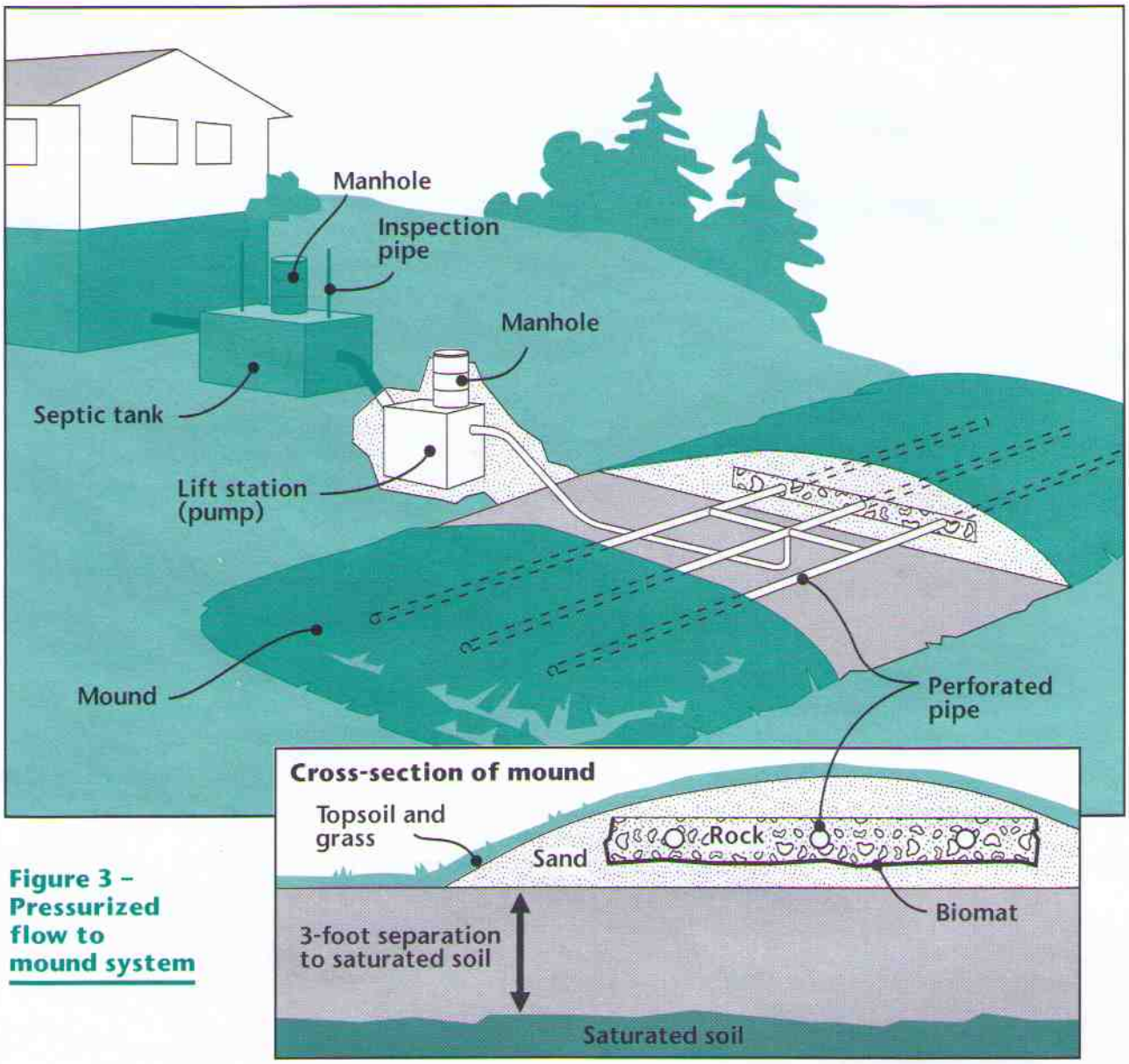


Figure 3 – Pressurized flow to mound system

Distribution System

Each site has a unique shape and slope. The soil type, percolation rate, water volume to be treated, and other factors determine how large an area is needed to properly treat sewage. To provide the necessary area, the design may be a series of many pipes, or "stepped" down a slope.

The distribution of effluent into the soil treatment system is accomplished using ***drop boxes*** and ***distribution boxes*** (**Figure 4**). The covers of either kind of box can be removed for inspection and cleaning. All pipes to the drainfield trench or seepage bed are solid with sealed connections.

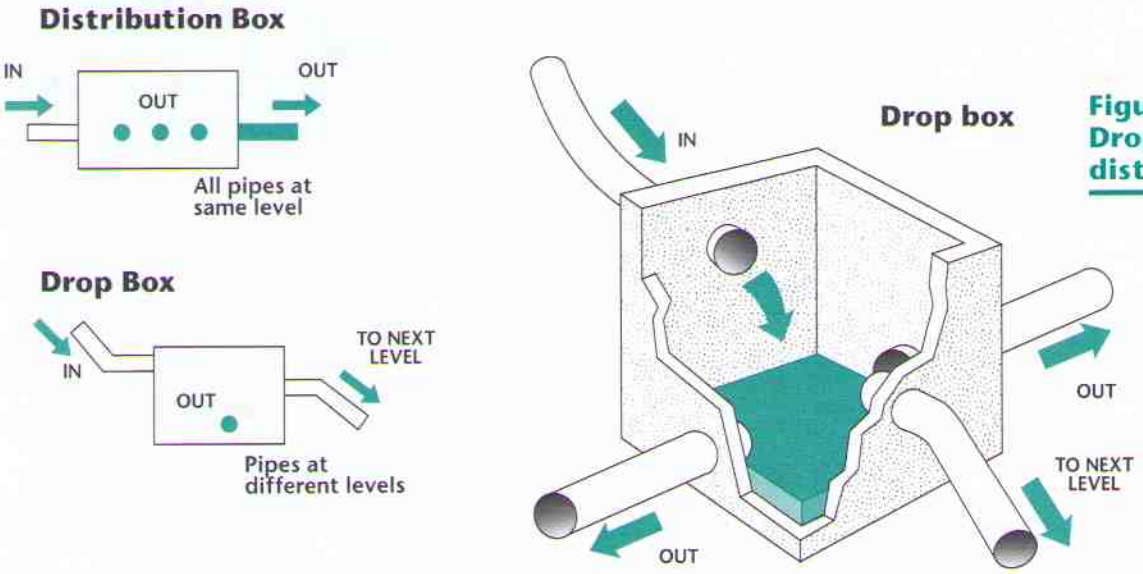


Figure 4 – Drop boxes and distribution boxes

Pumps and Lift Stations

If the liquid flowing out of the septic tank cannot flow to the trench or mound soil treatment system by gravity, a ***lift station,*** a small concrete tank containing an ejection pump, will be installed to move the liquid (**Figure 5**). The ***pump*** operates on a float-controlled switch. When the storage area in the tank is full it will pump the contents to the soil treatment bed. The pump has an emergency alarm indicator circuit to warn the homeowner when the pump has failed to remove the contents. If this happens, the problem needs **immediate attention**. Be sure to know where this alarm is, what it means, and what to do when it is activated.

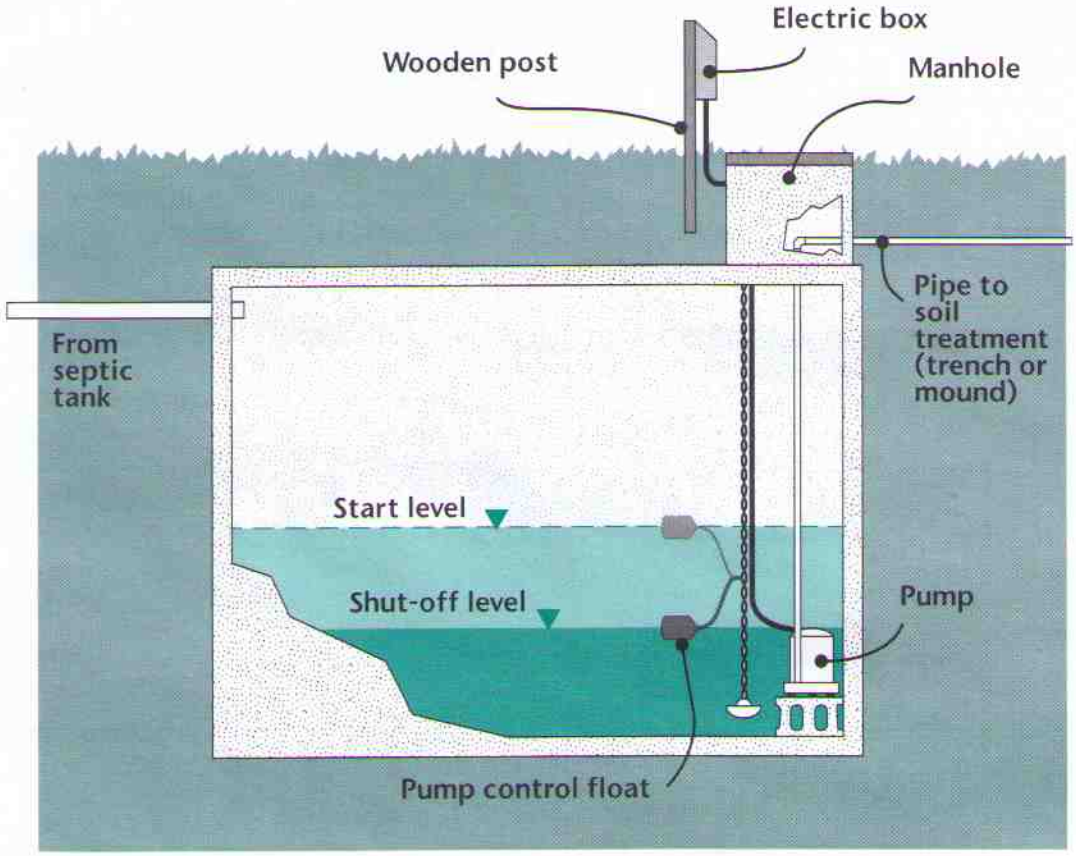


Figure 5 – Lift station

Use and Operation

The effectiveness of a septic system in treating sewage depends on how the homeowner uses and operates the system. Water-use habits, fixtures and appliances, product selection, and septic additives and cleaners all affect how well a septic system works. The septic system operates every time wastewater enters the system.

Water Use

The total amount of water and the pattern of water use affects how the septic system works. For complete and uniform treatment of wastes, the system needs time to work. The ideal situation would be to have wastewater enter the system as evenly as possible throughout the day and week. Every time water is used, wastewater enters the septic tank and an equal amount of water leaves the tank for the drainfield. Large volumes of water entering the system in a short period of time may agitate and re-suspend sludge and scum into the liquid contents (**Figure 6**). If this happens, suspended solids are carried into the soil treatment system, clogging soil pores and preventing adequate treatment.

The amount of water households use for specific tasks varies with the fixtures and appliances and with individual habits.

Excessive water use puts an unnecessary load on the septic system. Allowing faucets to drip, fixtures to leak, and using running water to wash and rinse dishes, shave, and brush teeth are wasteful water habits. In most households, toilet flushing is the largest user of water, followed by bathing, laundry, and dishwashing.

One of the best ways to reduce the amount of water treated by the septic system is to replace old water-using appliances. If a major remodeling is planned, regulations may require upgrades to low water use appliances. For example, local government units may have adapted the new state building codes requiring low-flush toilets in new construction or when replaced by a plumber. Whether remodeling or not, consumers may choose low-flow showerheads, hand-held showers with pause control, and temperature control valves to reduce water use, save energy, and save money. The way appliances are used affects how much water passes through the septic system, as shown in the chart on page 13.

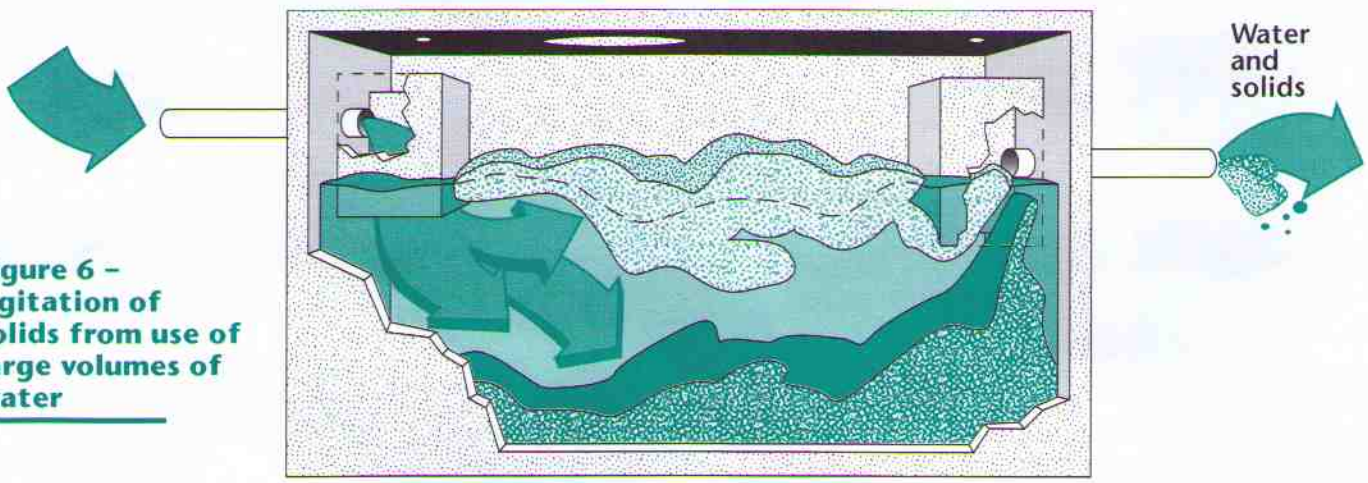


Figure 6 – Agitation of solids from use of large volumes of water

Typical Ranges of Water Used (in gallons)

ACTION	TYPICAL USE	CONSERVATIVE USE	ULTRA-CONSERVATIVE USE
Toilet-flushing	6 (old standard)	1.5–3 (low-flow)	Composting toilet
Tub bath	30 (1/2 filled)	15 (1/4 filled)	Sponge bath
Shower			
10 min	50 (5 gal/min)	25 (2.5 gal/min)	3 (camper style)
3 min	15 (5 gal/min)	7.5 (2.5 gal/min)	
Laundry - full load			
Top loading	50-60 (older models)	40 (newer models)	
Front loading	33 (older models)	17–28 (newer models)	Laundromat
(suds-saver reuses most of the "wash fill" for the 2nd load)			
Dishwashing			
Machine	12–15 (old-reg cycle)	6–9 (new-reg cycle)	
(prerinsing before loading adds 3-5 gal.)			
Hand	16 (faucet rinse)	6 (basin rinse)	
Teeth-brushing	2 (faucet running)	1/8 (wet brush, brief rinse)	
Hand-washing	2 (faucet running)	1 (basin; brief rinse)	
Shaving	3–5 (faucet running)	1 (basin; brief rinse)	

Improving Septic System Performance: Room by Room

By controlling water use, selecting appropriate products, and making wise disposal decisions, the homeowner can improve performance of the septic system and avoid major problems!

A typical Minnesotan uses about 110 gallons of water per day. About 60 percent of that water is used in the bathroom. Reducing water use conserves the water resources and helps the septic system.

In the course of daily living, many materials used in the home enter the wastewater system for disposal and treatment. Some are obvious and others much less obvious.

Home Management Ideas to Improve Septic System Performance:

Bathroom

- Install a new low-flow toilet. New units give a complete flush with 1 1/2 gallons per flush. Caution: displacing water with bricks or water bottles in old toilet tanks often gives less than a total flush.

- Repair leaky faucets and toilets immediately.
- Flush toilets less often. In many cases, the toilet can be used several times for liquid waste before flushing.
- Do not use "every flush" toilet bowl disinfectants that are placed in the tank or bowl.

- Do not flush facial tissues, paper towels, or personal hygiene products down the toilet.
- Do not flush cigarette butts or unwanted prescription or over the counter medications down the toilet.
- Use moderate amounts of white toilet paper. Toilet paper should break up easily in water. Some dyes used for toilet paper are difficult for bacteria to break down.
- Take showers instead of tub baths. Showers use less water than tub baths (about 5 gallons per inch in tub).

- Take shorter showers.
- Install low-flow shower heads, hand held showers with pause control, and temperature balance valve controls.
- Shut off water in the shower while lathering and shampooing.
- Do not run the hot water in the shower to warm the bathroom.
- Reduce use of drain cleaners by minimizing the amount of hair that goes down the drain.
- Shut off water while shaving and brushing teeth (save up to 5 gallons per minute).
- Fill basin to wash hands instead of washing under running water.

- Reduce use of cleaners by doing more scrubbing with less cleanser.

Kitchen

- Install low-flow faucets.
- Repair leaky faucets.
- Keep a pitcher of drinking water in the refrigerator instead of running the tap every time to get cool water.

- Hand wash dishes in the basin instead of under running water.
- Wash only full loads in the dishwasher.
- Install low-water-use dishwasher; use liquid detergent in the dishwasher.
- Use low-phosphate (0 to 5%) dishwasher soaps.
- Use the minimum amount of soap necessary to do the job. This is often less than suggested by manufacturers.
- Do not use a garbage disposal or dispose of vegetables, meat, fat, oil, coffee grounds and other undigested food products in the septic system. (Use composting or garbage service.)

- Reduce the use of drain cleaners by minimizing the amount of grease and food particles that go down the drain
- Use minimal amounts of mild cleaners, as needed only.
- When using drinking water treatment devices, be sure there is a shutoff valve so the system doesn't run continuously when the reservoir is full. Some units may reject up to 8 gallons for every 1 gallon retained.

Laundry

- Select a front-loading washing machine that uses 40% less water.
- Use suds-saving top-loading washing machine to reduce water and detergent use.
- Wash only full loads. Adjust load level settings for small loads.
- Distribute wash loads evenly throughout the week to avoid overloading the system with large volumes of water.
- Install filter on washer to remove lint.
- Use no-phosphate laundry detergents.
- Use the minimum amount of detergent or bleach necessary to do the job. This is often less than suggested by manufacturers.
- Use liquid detergents (powdered detergents add fine particles to the sludge accumulation).
- Use highly biodegradable powdered detergents if liquid detergents are undesirable.

Basement and Utility Rooms

- Recharge the water softener as infrequently as possible to reduce water use.
- Reroute the water softener recharge water outside the septic system. It does not need to be treated.
- Route chlorine-treated water from swimming pools and hot tubs outside of septic system to a ditch or separate dry well.
- Route roof drains and basement drainage tile water (sump pumps) outside of septic system and away from the drainfield.
- Dispose of all solvents, paints, antifreeze, and chemicals through local recycling and hazardous waste channels. Consult local solid waste officials for proper methods. These materials kill valuable bacteria in the system and may pass through to contaminate drinking water.
- Never let wash water from latex paint on brushes or rollers go down the drain and into the septic system.

Septic Starters, Feeders, Cleaners and Other Additives

There is no quick fix or substitute for proper operation and regular maintenance. Do not use starters, feeders, cleaners and other additives.

> **! There's no such thing as a safe *AND* effective septic system additive. !**

Starters: A starter is not needed to get the bacterial action going in the septic tank. There are naturally-occurring bacteria present in wastewater.

Feeders: It is not necessary to "feed" the system additional bacteria, yeast preparations, or other home remedies. There are millions of bacteria entering the system in normal sewage. If the bacterial activity level is low, figure out what is killing them (for example, cleaners) and correct it. High levels of activity will return after the correction.

Cleaners: Additives effective in removing solids from the septic tank will probably damage the soil treatment system. Many additives suspend the solids that would normally float to the top or settle to the bottom of the tank. This allows them to be flushed into the soil treatment system, where they clog pipes and soil pores leading to partial or complete failure of the system.

Other Additives: Additives, particularly degreasers, may contain carcinogens (cancer-causing agents) that flow directly into the groundwater along with the treated sewage.

Minn. Rules Chapter 7080, "Individual Sewage Treatment Standards," bans the use of septic system additives that contain hazardous materials. In addition, Chapter 7080 specifies that additives must not be used as a means of reducing the frequency of proper maintenance and removal of scum and sludge from the septic tank. EPA or USDA approval only means that the products contain no hazardous material. It does not mean the products are effective at what they claim to do.

> ***Additives and cleaners are heavily promoted to homeowners through direct mail and telephone. Don't be misled!***

Maintenance and Care

Tank Maintenance

Frequency of Pumping

The septic tank MUST be periodically cleaned (pumped) to remove floating scum and sludge that accumulate. If either floating scum or sludge is allowed to enter the soil treatment system (drainfield) it will cause expensive and often irreparable damage. How often to clean a septic tank depends on its size, use, and operating condition.

In ***new home installations,*** the tank should be cleaned after 6–12 months of use as a precautionary measure to ensure good bacterial activity and proper functioning. In new homes, wastewater from painting, varnishing, staining, and other construction functions can reduce the initial levels of bacterial activity causing damage to the soil treatment system. If finishing work is still being completed, the tank should be cleaned before it is used for sewage.

Once a system is known to be operating properly, the worksheet on page 18 can be used as a guideline for cleaning frequency. Take into consideration both the calculated guideline results (in months) and the condition of the tank (amount of scum and sludge) at the last cleaning. Homeowners should be present when the cleaning is done or be sure to get this information from the cleaning contractor.

A typical household will calculate a cleaning frequency (using the guideline worksheet) of 18–30 months. If your final result is very different from this, recheck your responses and the math. If your result is still very different, contact a qualified septic system professional for additional advice.

If the result suggests very frequent cleaning (less than every 12 months), the system may need to be upgraded and/or use habits changed. Use the space provided in the folder accompanying this guide to record the cleaning dates.

A few dollars spent every one to three years on proper cleaning is much less expensive and easier to plan for than an unexpected $2,000 to $10,000 repair bill!

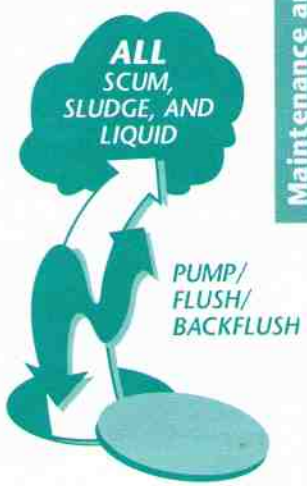
Never go more than 36 months between cleanings!!

Proper Cleaning Method

Cleaning, or "pumping" as it's often called, must be done by a licensed and bonded professional. Proper cleaning will remove ALL scum, sludge, and liquid from the septic tank(s). This requires pumping, flushing, and backflushing liquid contents back and forth between the truck's tank and the septic tank through the manhole several times. This process breaks up all scum and sludge in the tank, allowing all solids to be removed by the truck's suction line. Floating scum left in the tank after cleaning may plug baffles or allow solids to enter the drainfield when the tank refills. Cleaning will leave a black film on the tank walls and a small amount of liquid on the tank floor. This contains millions of bacteria to help get the tank working following the cleaning.

When the tank is cleaned, ask the contractor to make sure the baffles are in place and functioning properly. Cleaning a tank through the inspection pipes will often leave solids in the tank and possibly damage baffles. **Insist** that the tank be cleaned through the manhole if the tank has one. Ask beforehand if the tank will be cleaned through the manhole, and if it will not, find a different contractor. It may cost slightly more to have the tank cleaned through the manhole, but this will save money in the long run.

After cleaning, it is not necessary to add a starter. Bacteria present in wastewater and in the tank will do the job.



Cleaning Frequency Guidelines

How often a septic tank needs to be cleaned depends on the tank's design and how it is operated. In this chart, the negative factors that affect the cleaning frequency are called EFFECTS and the positive factors that reduce the frequency of cleaning are called CREDITS.

Consider the frequency guideline from this worksheet and the conditions observed when the tank is cleaned to decide when the tank will next need cleaning. No tank should go more than 36 months between cleanings!

EFFECTS

FACTORS

POINTS FOR EACH FACTOR

Enter 10 points for wastewater that enters the septic system for each of these appliances:

- Water conditioning unit (water softener or iron filter) _____
- Garbage disposal _____
- Automatic clothes washer _____

Enter 10 points if you have:

- An in-home business (such as daycare, beauty shop) _____
- More than 4 over-night guests at a time, several times per year _____
- A laundry pattern of doing three or more loads/day _____

Enter 10 points if your septic tank is smaller than indicated for the size of the house:

HOUSE SIZE	TANK CAPACITY
2-3 bedrooms	1000 gallons
4-5 bedrooms	1500 gallons
6-7 bedrooms	1750 gallons
8-9 bedrooms	2000 gallons

_____

Enter the points indicated if the last cleaning was:

FREQUENCY	POINTS
1-2 years ago	0
3-5 years ago	5
6-10 years ago	10
more than 10 years ago	12

_____

The number of people living and using water in the household affects the cleaning frequency. Enter the number of people for the house size and do the calculation.

HOUSE SIZE	# OF PEOPLE	LOAD
2 bedroom	_____	− 3 = _____
3 bedroom	_____	− 4 = _____
4 bedroom	_____	− 5 = _____
5 bedroom	_____	− 6 = _____
6 bedroom	_____	− 7 = _____
7 bedroom	_____	− 8 = _____

x3 = _____ (subtract if number is negative)

TOTAL EFFECTS _____

CREDITS

FACTORS

POINTS FOR EACH FACTOR

Enter 10 points if you:

- Use a suds-saving or front-loading clothes washer, or do 4 or fewer loads of laundry spread throughout the week _____
- Have two full-size septic tanks or one tank with 150% or more of the capacity required for your house _____

Enter 5 points if you:

- Are ULTRA-CONSERVATIVE on water use (see chart, p. 13) _____
- Use low-volume toilets (3 gallon or less per flush) _____
- Use low-flow shower heads _____
- Have two or fewer people in the house and bathe fewer than five times per week _____
- Have no one at home for 10 hours or more most days _____

TOTAL CREDITS _____

Enter your numbers in this equation to calculate how often your septic tank should be cleaned.

36 − [ ] (effects number) + [ ] (credits number) = [ ] months between cleanings

Soil Treatment System Maintenance

Overloading

The soil treatment system can become clogged by overloading with water and solids. Large amounts of water flowing through the system can flush solids out of the septic tank before it has had a chance to separate the solids, scum, and water. For example, washing many loads of laundry on the same day may overload the tank. Space heavy water-using jobs throughout the week to prevent overloading. (See the Use and Operation of the Septic System section, page 12, for more information.)

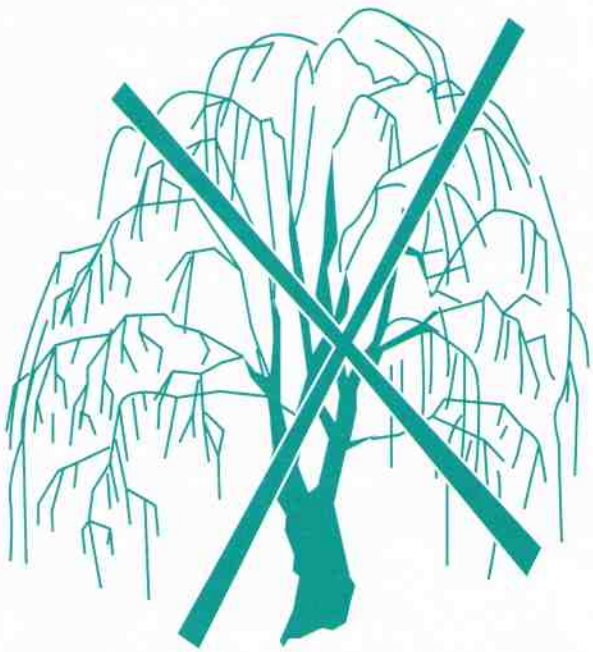
Lack of septic tank maintenance can cause biological overloading. Adding "dirty" water to the soil treatment system forces the biomat to become thicker than desired. This thickened layer slows the soil's ability to accept water, requiring more soil area than would normally be necessary.

Compaction

Driving heavy vehicles on the drainfield or mound system before, during, or after construction can cause damage. Soil treatment depends on undisturbed, uncompacted, unsaturated soil to treat wastes. This is especially important in winter, when a vehicle's weight can drive the frost deep into the soil and prevent effective treatment from occurring. Nothing heavier than a riding lawnmower should be driven over any part of the septic system. People and vehicles should stay off the area in winter time to prevent deep freezing.

Vegetative Cover

Good vegetative cover, usually grass, should be planted over soil treatment systems and mowed regularly. Mowing is necessary to encourage growth without using fertilizer. The vegetative cover helps the system remove nutrients such as nitrogen and phosphorous by using them for plant growth. Do not plant trees or other plants with deep, invasive roots within 5 feet of the soil treatment system. Consider the mature size of trees and shrubs when planting young plants. Be sure to keep gophers and other rodents out of the soil treatment area.



Troubleshooting

Finding an Existing System

Finding the septic system may not be an easy task, but is necessary for proper maintenance of the septic tank, troubleshooting problems, and making future plans for the property. Many counties and cities with permit and inspection programs for septic systems will have this information on file. If no plans exist, the following steps can be taken.

First, locate the septic tank. If the access manhole or inspection pipes are at ground level, they will be easy to find. Unfortunately, they are often buried several inches, or even several feet, below the ground surface. To locate the tank, go into the basement and determine the direction the sewer pipe goes out through the wall or floor. The sewer pipe should be easy to find. It is usually the largest diameter pipe made of plastic or cast iron with a cleanout access.

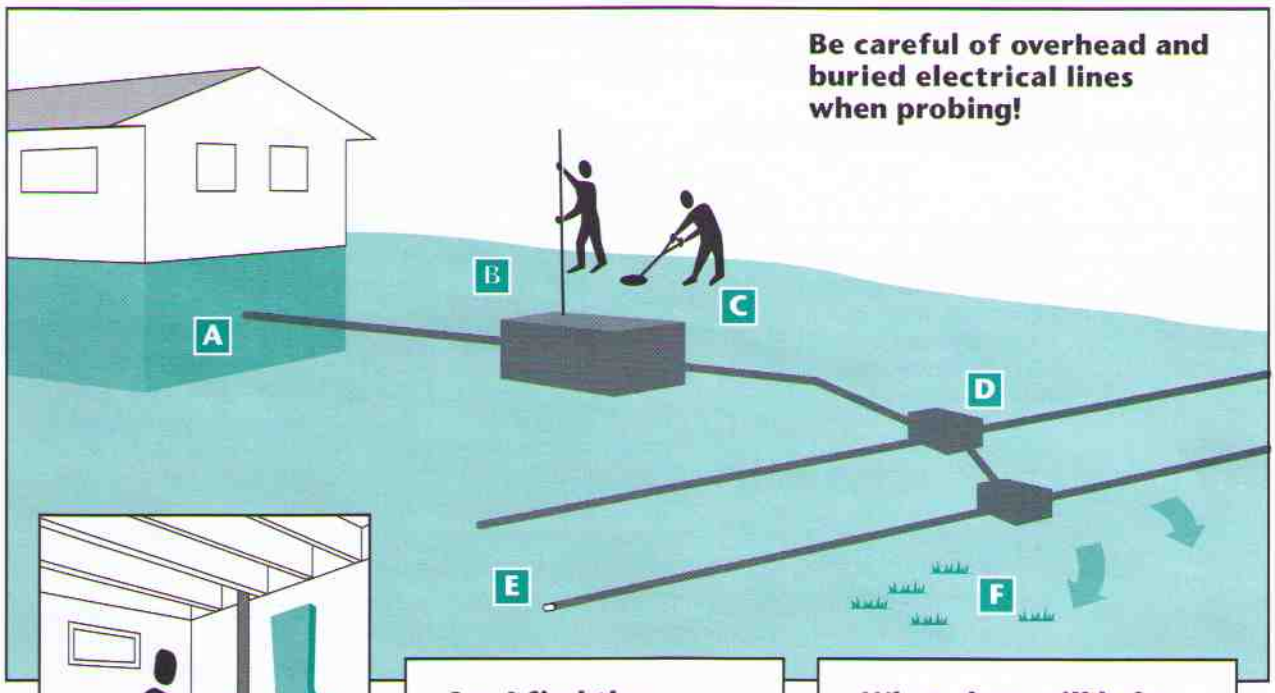
Once the sewer pipe is located, determine the direction it leaves the house. With a metal rod as a probe, start poking around in the soil 10 to 15 feet from the foundation of the house in the same direction as the pipe was headed in the basement. A metal detector may be of assistance in finding the tank since most concrete septic tanks contain metal reinforcing rods.

Next, locate the drainfield. If the soil treatment system is located, but not the tank, work backwards toward the house probing for the tank. Mounds are easy to find, but a drainfield system in the ground may be more difficult. Try looking around the yard in the general direction where the sewer pipe left the house for an area where the grass grows differently. These clues may help locate the drainfield:

- An area where the grass isn't growing well, or where the grass is greener or grows faster.
- An area where there is a slight depression or mound.
- An area where the soil is soggy when the rest of the yard is dry.

Often, a licensed contractor or inspector has tools to locate the tank. Once the tank is located, be sure to make a map of its location. There is a space on the inside cover of the folder accompanying this guide where you can draw a diagram of the system. If the soil treatment system cannot be found, there may not be one or it may be discharging into ground or surface water.

Locating a system



In what part of the yard is the septic system located?

- If no access pipes are showing, locate the sewer pipe in the basement.
- Check existing plans.

Can I find the septic tank?

B Begin probing about ten feet from the house with a metal rod, listening for a hollow sound. The tank will be at least as deep as the outgoing sewer pipe.

C Use a metal detector. You may be able to locate the manhole cover.

What clues will help me locate the soil treatment area?

D A mound or settled area?

E The exposed end of an outgoing pipe?

F An area where:

- the snow melts more quickly?
- the grass doesn't grow well, or where it grows greener and faster?
- the earth is soggy, or there is moisture-loving vegetation?

Common Problems

Existing septic systems may fail for a number of reasons. For the owner, the system is failing if it is not treating the wastewater effectively. The most common causes of system failure are excessive water, improper maintenance, or an inadequately designed system. ***Diagnosing the specific causes may be difficult for the owner and often requires the skills of a professional.*** The following chart shows common problems and their possible causes and remedies.

Septic System Troubleshooting Guide for Homeowners

Problem	Risks	Potential Causes	Potential Remedies
Sewage backs up into house and/ or plumbing fixtures don't drain or are sluggish	Human contact with sewage is a serious public health risk. Many water-borne diseases exist in household sewage. AVOID CONTACT.	- Excess water entering system - Improper plumbing - Blockage in plumbing - Improper operation - Pump failure - Improper system design - Roots clogging pipes	• Fix leaks • Install water-saving fixtures • Stop using garbage disposal • Clean septic tank and check pumps • Replace broken or cracked pipes and remove roots • Seal pipe connections • Avoid willow trees near system
Sewage surfacing in yard	Human contact with sewage is a serious public health risk. Many water-borne diseases exist in household sewage.	- Excess water use - System blockages - Improper system elevations - Undersized soil treatment system - Pump failure or improper operation	• Fix leaks • Install water-saving fixtures • Clean septic tank and check pumps • Consult professionals • Fence off area until problem is fixed
Sewage odors — indoors	Toxic gases can cause discomfort and illness.	- Sewage surfacing in yard - Improper plumbing - Sewage backup in house - Unsealed ejector sump pump - Roof vent pipe frozen closed	• Repair plumbing • Clean septic tank and check pumps • Replace water in drain traps
Sewage odors — outdoors	Major nuisance, but no serious health risk	- Source other than owner's system - Sewage surfacing in yard - Inspection pipe caps damaged or removed	• Clean tank and check pumps • Replace damaged caps • Repair or replace drainfield

Problem	Risks	Potential Causes	Potential Remedies
Contaminated drinking or surface waters	The above public health risks are magnified by possible ingestion of contaminated water. Drinking contaminated water can cause health problems such as dysentery, hepatitis, and, for infants, methemoglobinemia.	- System too close to well, water table, or fractured bedrock - Cesspool or drywell in use - Sewage discharges to surface or groundwater - Improper well construction - Broken water supply pipe - Source other than homeowner's system - Broken sewage lines	• Replace your well and/or septic system • Contact a local unit of government to investigate other potential sources
Lift station alarm activated	Tank effluent may back up into the house.	- Pump failed - Fuse breaker tripped - Pump unplugged - Controls malfunctioning	• Check breaker and plugs • Check controls and pump • Make sure professional replaces pump with proper size unit
Distribution pipes and/or soil treatment system freezes in winter	The system may be inoperable.	- Improper construction - Check valve in lift station not working - Foot or vehicle traffic over piping - Low flow rate - Lack of use - Undersized pump	• Check construction • Examine check valve and/or replace it • Keep people and vehicles off area • Increase water use • Have someone use water in house if you are away • Increase frequency of pump cycling • Operate septic tank as a holding tank • Pump system in fall and use carefully over winter months • Don't use antifreeze

Additional Assistance

Resources

Local

City, Township, or County Offices of:

- Planning and Zoning
- Minnesota Extension Service
- Environmental Health or Public Health
- Water Plan Coordinator
- Soil and Water Conservation District

Regional and State

Minnesota Board of Water and Soil Resources

Minnesota Pollution Control Agency

Minnesota Department of Health

Minnesota Water Line
1-800-455-4526

Publications

Minnesota Extension Service

To order by credit card call the Distribution Center at 1-800-876-8636 or contact the Minnesota Extension Service office in your county.

Get to Know Your Septic Tank MI-0639

Groundwater Contamination FO-5866

Locating On-Site Home Sewage Treatment Systems FO-0797

Site Evaluation Field Manual MI-5955

Treatment Systems for Household Water Supplies:
- *Chlorination* FO-5941
- *Distillation* FO-5943
- *Reverse Osmosis* FO-5944
- *Activated Carbon Filtration* FO-5939
- *Iron and Manganese Removal* FO-5940

Should I Buy a Home Water Treatment System? FS-5650

Find more Minnesota Extension Service educational information at http://www.mes.umn.edu/ on the World Wide Web.

Minnesota Pollution Control Agency

Facts about the Individual Sewage Treatment System Act, June 1994

Minnesota Rules Chapter 7080 on Individual Sewage Treatment Systems