Report on Citizen Groundwater Concern

North Beach Water Company

Date: **1/22/2013**

Re: **A North Beach Peninsula citizen called the District with concerns about groundwater contamination in the Ocean Park area.**

Dale Kramer called Commissioner Sheldon in December, 2012 expressing concerns about groundwater contamination from septic systems. Commissioner Sheldon asked the District's general manager to contact Mr. Kramer and make a report at the January, 2013 regular meeting of Board of Commissioners on Mr. Kramer's concerns.

Mr. Kramer is a Washington State as a licensed engineering geologist and hydrogeologist (license #2213). Mr. Kramer stated that the heavy rain the peninsula had experienced the last few weeks could adversely affect the ability of septic systems to treat bacteria in septic effluent allowing septic effluent with fecal, e-coli or other harmful bacteria to enter the shallow groundwater. Mr. Kramer has an impressive knowledge of groundwater science and local hydrogeology. Our discussion was edifying.

Mr. Kramer's concerns are valid. Environmental Protection Agency (EPA) Fact Sheet, "Septic Tank – Soil Absorption System" (EPA 932-F-99-075) notes:

> *"Since the soil absorption area must remain unsaturated for proper system functioning it may not be feasible to install septic system in regions prone to heavy rains and flooding or in topographical depressions where surface waters accumulate."*

Concerning the geology of the North Beach Peninsula the report states:

> *"A septic system performance study conducted on a coastal barrier island (characterized by variably high water tables and sandy soils – conditions unfavorable for septic systems operation) found that a 60-cm (24 inches) soil layer provided adequate microbial treatment, even at the highest loading rate studied."*

During heavy rains or when groundwater tables are high there may not be enough unsaturated soils to provide microbial treatment of septic effluent. Under the right conditions, untreated septic effluent laden

with fecal, e-coil or other harmful bacteria may make its way to water wells especially water wells completed in the shallow unconfined aquifer such as sand points.

Pacific County Environmental Health Department has issued an educational document entitled "A Homeowners Guide to Septic Systems". The guide informs homeowners that:

> "*Inadequately treated sewage from septic systems can be a cause of groundwater contamination. It poses a significant threat to drinking water and human health because it can contaminate drinking water wells and cause diseases and infections in people and animals.*"

In May of 1972, Yakima County, Washington, experienced a typhoid outbreak that was traced to water from a sand point well. Septic tank wastewater from the home of a typhoid carrier was discharged into the ground 210 feet away from the contaminated well.

The Winter of 1972 in Yakima County was noted for deep snow and the spring brought heavy rains. The groundwater was at its seasonally highest level at the time of the outbreak.

I assured Mr. Kramer that North Beach Water District and Surfside Homeowners Association have drilled water wells completed well below the shallow groundwater table and that the District routinely tests the water for coliform bacterial presence. Mr. Kramer agreed that properly sealed wells drilled below the shallow aquifer are much less susceptible to contamination from seasonally compromised septic systems than the shallow sand point wells. Mr. Kramer thanked me for taking time to discuss this issue with him.

I have attached a copy of EPA Fact Sheet "Septic Tank – Soil Absorption Systems" and the Pacific County's Homeowners Guide to Septic Systems for your review.

End of Report

United States Environmental Protection Agency | Office of Water Washington, D.C. | EPA 932-F-99-075 September 1999

Decentralized Systems Technology Fact Sheet

Septic Tank - Soil Absorption Systems

DESCRIPTION

An estimated 30 percent of all U.S. households use on-site treatment methods (Hoover *et al.*, 1994). Septic tank/soil absorption has been the most popular on-site method (U.S. EPA, 1980a.) The septic tank is an underground, watertight vessel installed to receive wastewater from the home. It is designed to allow the solids to settle out and separate from the liquid, to allow for limited digestion of organic matter, and to store the solids while the clarified liquid is passed on for further treatment and disposal. Though septic tank effluent can be treated in a variety of ways, this Fact Sheet describes the distribution of effluent wastewater into a subsurface soil absorption area or drainfield.

APPLICABILITY

Septic tank/soil absorption systems are an option to consider wherever a centralized treatment system is not available. Since subsurface soil treatment and disposal relies upon gradual seepage of wastewater into the surrounding soils, these systems can only be considered where favorable soil characteristics and geology exist for treatment and subsequent disposal of the treated wastewater into the environment.

For effective wastewater treatment, prospective soils should be relatively permeable and should remain unsaturated to several feet below the system depth. Moreover, the soil absorption system should be set well above water tables and bedrock. Further, it cannot be easily located in steeply sloped areas (U.S. EPA, 1980a.) For regions with high water tables or shallow bedrock, other systems using more advanced technology may be better options for wastewater treatment. (See *Wastewater Technology Fact Sheet: Mound Systems*.) In cases where impermeable soils exist, fill systems and sand-lined trench systems—in which fill material is brought in to replace unsuitable soils—may be a feasible alternative.

To avoid contamination of drinking water sources and other problems, soil absorption systems must be situated at prescribed distances from wells, surface waters and springs, escarpments, property boundaries and building foundations (U.S. EPA, 1980a). These regulations may restrict the feasibility of septic system installation, depending on property size, shape, and proximity to the features noted.

Conventional septic systems are designed to operate indefinitely if properly maintained. However, because most household systems are *not* well-maintained, the functioning life of septic systems is typically 20 years or less. In contemporary practice, it is commonly required that a second area of suitable soil be reserved at the site as a “repair area” in the event that the initial system fails to operate properly or to allow for the possibility of a future home addition project (Hoover, 1999.)

Since the soil absorption area must remain unsaturated for proper system functioning, it may not be feasible to install septic systems in regions prone to frequent heavy rains and flooding, or in topographical depressions where surface waters accumulate.

ADVANTAGES AND DISADVANTAGES

Advantages

- Simplicity, reliability and low cost.
- Low maintenance requirements.
- Nutrients in waste are returned to soil.
- A properly designed, well-maintained system can last for more than twenty years.

Disadvantages

- Siting limitations for septic systems include natural soil type and permeability, bedrock and groundwater elevations, and site topography.
- Regulations pertaining to set-backs from water supply, lot lines, and drainage lines must be taken into account.
- Restrictions on the character of influent wastewater must be included in project planning.
- Improperly functioning systems can introduce nitrogen, phosphorus, organic matter, and bacterial and viral pathogens into the surrounding area and groundwater.

DESIGN CRITERIA

A septic system usually includes three components: the septic tank, a drainfield and the soil beneath the drainfield. The tank must be a watertight container constructed of a sound, durable material resistant to corrosion or decay (concrete, fiber reinforced plastic, fiberglass, or polyethylene). The septic tank is connected to a piping system that distributes wastewater effluent into subsurface soil for absorption and subsequent treatment.

Wastewater generated from a household is collected and transported through the house drains to the buried septic tank, where most of the solids settle while grease and scum float to the surface. Inlet baffles or effluent screens help to force wastewater down into the tank, preventing short-circuiting across the top. Outlet baffles keep the scum layer from moving into the soil absorption system. Collected solids undergo some decay by anaerobic digestion in the tank bottom. The capacity of a septic tank typically ranges from 3,785 to 7570 liters (1,000 to 2,000 gallons).

Clarified septic tank effluent exits the septic tank and enters the soil absorption system (also called a "leachfield" or "drainfield") where a biological "clogging mat" or "biomat" forms, contributing to even distribution of the waste into the drainfield (U.S. EPA, 1980a; Hoover et. al., 1996.) State regulations usually require between two and four feet (or sometimes less) of unsaturated soil beneath the drainfield to renovate wastewater before it reaches a "limiting layer"—the point at which conditions for waste renovation become unsuitable. The limiting layer may be bedrock, an impervious soil layer or the seasonal high water table.

Absorption beds and trenches are the most common design options for soil absorption systems. Trenches are shallow, level excavations, usually from 0.305 to 1.524 meters (one to five feet) deep and 0.305 to 0.914 meters (one to three feet) wide (see U.S. EPA, 1980a.) The bottom is filled with at least 15.24 centimeters (six inches) of washed gravel or crushed rock over which a single line of 10.16 centimeters (four-inch) perforated pipe is placed. Additional rock is placed over and around the pipe. A synthetic building fabric is laid on top of the gravel to prevent backfill from migrating into the gravel trench. Beds are constructed analogously to trenches, but are more than three feet wide and may contain multiple lines of distribution piping. While beds are sometimes preferred for space savings in more permeable soils, trench designs provide more surface area for soil absorption (U.S. EPA,1980a; Hoover, 1999.)

The size of a soil absorption system is based on the size of the house and the soil characteristics. Traditionally, soil is evaluated using a "percolation rate", a measure of the water migration rate through the candidate soil. Acceptable limits of percolation for drainfield suitability range between 23 seconds and 24 minutes per centimeter (1 and 60 minutes per inch) (U.S. EPA, 1980a.) Percolation rates of

1.18 and 24 minutes per centimeter (3 and 60 minutes per inch) would correspond to absorption areas of about 70 and 340 square meters respectively per bedroom of the house to be serviced (Harlan and Dickey, 1999.) Though the number of bedrooms has typically been used as a rule-of-thumb measure for tank sizing, it should be noted that this is only an approximation; by itself, it is an unreliable way to gauge anticipated waste volume (U.S. EPA, 1980a.)

While some states continue to use the percolation rate as a criterion for site suitability, many use a more comprehensive measure, the long-term acceptance rate (LTAR), as part of a thorough site evaluation (Hoover, 1999). The LTAR accounts for the texture, structure, color, and consistency of all soil layers beneath the drainfield, as well as the local topography, to make a determination of the wastewater loads the area is able to accept on a long-term basis once the biomass has formed.

The character of wastewater flowing into the soil absorption area is a critical variable for proper functioning of septic systems. Soil absorption systems work most effectively when the influent wastewater does not contain significant levels of settleable solids, greases and fats (U.S. EPA, 1980a), which can accelerate clogging of the infiltrative soil. Accordingly, the use of household garbage disposals and pouring of grease down domestic drains can reduce the effectiveness of septic tank/soil absorption systems (Gannon *et al*., 1998). To avoid infiltrative soil clogging, septic tanks are fitted with outlet baffles to prevent floating grease, scum, and entrained particles from moving into the soil absorption system. Also, the use of two-compartment tanks is recommended over single-compartment designs. Even so, tanks must be properly sized to avoid hydraulic overload and the passing of unwanted materials into the soil absorption system.

Digestion of wastes is a temperature dependent process, and colder temperatures may hinder effective breakdown of wastes in septic tanks (Seifert, 1999.) Therefore, in cold climates tanks may need to be buried more deeply, and/or insulated.

Septic systems can act as sources of nitrogen, phosphorus, organic matter, and bacterial and viral pathogens, which can have potentially serious environmental and health impacts (Gannon *et al*., 1994.) Failure of systems to adequately treat wastewater may be related to inadequate siting, inappropriate installation, or neglectful operation. Hydraulic overloading has been identified as a major cause of system failure (Jarrett *et al*., 1985). Since septic wastewater contains various nitrogen compounds (e.g., ammonia, ammonium compounds, and organic forms of nitrogen) (Brown, 1998), installation of septic systems in areas that are densely developed can, in combination with other factors, result in the introduction of nitrogen contaminants into groundwater. Groundwater impacts can occur even when soil conditions are favorable because the unsaturated aerobic treatment zone located beneath the drainfield—a zone required for pathogen removal—promotes conversion of wastewater-borne nitrogen to nitrates (Hoover, 1999.) If nitrate contamination of groundwater is a concern in the region, control methods or denitrifying technologies may be required for safe operation of a septic system.

Symptoms of a failing septic system can include strong odors, ponding of improperly treated wastewater or backup of wastewater into the home (Hoover, 1999.) Less obvious symptoms arise when systems are operating less-than-optimally, including a measurable decline in water quality, leading over the long term to local environmental degradation (Brown, 1998).

Solvents, poisons, and other household chemicals should not be allowed to flow into a septic system; these substances may kill beneficial bacteria in the tank and drainfield, and lead to system failure (Montgomery, 1990.) Though some organic solvents have been marketed as septic system cleaners and substitutes for sludge pumping, there is little evidence that such cleaners perform any of their advertised functions. It is known that they can exterminate useful microbes, resulting in increased discharge of pollutants (Gannon *et al.*, 1999; Montgomery, 1999.) In addition, the chemicals in these products can contaminate receiving waters (U.S. EPA, 1993). Additive restrictions are most effective when used as part of a Best Management

Practice system involving other source reduction practices such as phosphate bans and use of low-volume plumbing fixtures.

Design of subsurface disposal beds and trenches varies greatly due to specific site conditions. In sloping areas, a serial distribution system configures the trenches so that each is used to its capacity before effluent overflows into the succeeding trench. A dosing or pressurized distribution system may be installed to ensure complete distribution of the effluent to each trench(U.S. EPA, 1980a.) Alternating valves permit switching between beds or trenches to allow drying out or resting of the system (U.S. EPA, 1980a; Gannon *et al.*, 1999). A dosing system, such as a low-pressure pipe system, is useful in areas of both high groundwater and permeable soils, where shallow gravel ditches installed from 22.86 to 30.48 centimeters (9 to 12 inches) below grade are employed. Another option is the use of drip irrigation (Hoover, 1999.)

For systems that are properly sited, sized, constructed, and maintained, septic tank/soil absorption has proven to be an efficient and cost effective method of onsite wastewater treatment and disposal. Operating without mechanical equipment, properly maintained soil absorption systems have a service life in excess of 20 years. Several important steps must be taken during construction to ensure system reliability:

- Keep heavy equipment off the soil absorption system area both before and after construction. Soil compaction can result in premature failure of the system.

- Divert rainwater from building roofs and paved areas away from the soil absorption system. This surface water can increase the amount of water the soil has to absorb and lead to premature failure.

- Ensure that the alternating device and the trench bottoms are level to provide even distribution of the septic tank effluent. If settling and frost action cause shifting, part of the soil absorption system may be overloaded.

- Avoid installing the septic tank and soil absorption system when the soil is wet. Construction in wet soil can cause puddling, smearing, and increased soil compaction, which greatly reduces soil permeability and the life of a system.

- Install water-saving devices to reduce the amount of wastewater entering the soil absorption system.

- Have the septic tank pumped at least every three to five years, and inspected regularly.

PERFORMANCE

When correctly installed and maintained, septic tank/soil absorption systems are an effective way to treat and dispose of domestic wastewaters. Nevertheless, even under the best of circumstances septic systems allow a "planned release" of contaminants into the groundwater (Tolman *et al.*, 1989) and must be designed and operated to minimize the impact of this release. While hydraulic overloading been identified as a major cause of septic system failure (Jarrett *et al.*, 1985), contamination due to system failure can be caused by a variety of factors. In one study, widespread septic failures in Illinois were primarily attributed to unsuitability of soils, age of system, lack of maintenance, and improper design and installation of systems (Smith and Ince, 1989.) Likewise, a study of septic systems in the Borough of Hopatcong, New Jersey, found poor soil conditions and shallow bedrock to be significant contributors to system failure (HSAC, 1997.) By one estimate, only 32 percent of the total United States land area has soils suitable for waste treatment by traditional septic tank/soil absorption systems (U.S. EPA, 1980a.)

Frequency of use also affects system performance. Drainfields installed on seasonally used properties have been found to develop an incomplete biological clogging mat, leading to uneven distribution and absorption of wastewater (Postma *et al.*, 1992.)

A critical factor in optimal system performance is the depth of unsaturated soil beneath the soil absorption field. A septic system performance study conducted on a coastal barrier island (characterized

by variably high water tables and sandy soils—conditions unfavorable for septic system operation) found that a 60-cm soil layer provided adequate microbial treatment, even at the highest loading rate studied (Cogger *et al.*, 1988.) By contrast, the same study found that another system of the same design having a 30-cm soil layer beneath the leachfield suffered from rising water tables and ineffective treatment. For the loading rates studied, the depth of unsaturated soil beneath the system was determined to be a more decisive factor in system performance than hydraulic loading.

Despite the limitations discussed above, septic systems tend to be preferred over other on-site treatment methods for long-term domestic use. A 1980 study found septic tank/soil absorption systems to offer the lowest cost and the highest level of performance among six on-site treatment techniques tested (U.S. EPA, 1980b). In addition to septic tank/soil absorption, the other five techniques included incinerating toilets, recycling toilets, extended aeration units followed by open sand filters, septic tanks followed by open sand filters, and septic tanks followed by horizontal sand filters).

OPERATION AND MAINTENANCE

To keep the system healthy, care must be taken to avoid putting high-solids or grease containing materials down drains or toilets, including paper towels, cigarettes, cat litter, feminine hygiene products, and residual cooking fat (HSAC 1997). In the past, pump-out of accumulated solids from septic tanks every three to five years has been recommended, however solids loading has been shown to be extremely variable and for modern tanks, pump-out may not need to occur as often (U.S. EPA, 1994). Pump-out every four years should be planned, but actual practice should be determined by inspection.

Inspections should be conducted at least biannually to confirm that baffles are operating correctly, that no leaks are occurring, and to check the levels of sludge and scum in the tank (U.S. EPA, 1994). The tank should be pumped out if the sludge layer thickness exceeds 25 percent of the working liquid capacity of the tank (Hoover, 1999), or if the bottom of the scum layer is within 7.62 centimeters (three inches) of the bottom of the outlet baffle (U.S. EPA, 1994). More frequent inspections are required for systems using more advanced on-site technologies (Hoover *et al.*, 1995.)

Though many enzyme additives are marketed as septic system digestion aides, the effectiveness and usefulness of many of these products is questionable. (Seifert, 1999.) If waste products are not being properly digested before they are discharged, the most likely cause is hydraulic overloading. In cold climates, lower average tank temperatures can also inhibit digestion.

Similarly, many chemical additives are available for system cleaning and rehabilitation. However, many of these products are not effective (see Bicki and Bettler, 1988, on use of peroxide for rehabilitation of septic systems) and some may even harm the system (Gannon *et al.*, 1998.) The use of chemical additives should be avoided.

COSTS

Costs for installation and maintenance of septic systems vary according to geographical region, system size and type, and the specific soil and geological characteristics of the selected site. Installation of a new bed or trench septic system on a site meeting the criteria for such systems varies widely in cost. Figures range from as low as $1,500 to more than $8,000 (Montgomery, 1990; Anchorage HHS, 1999; Ingersoll, 1994.) An average installation cost of $4,000 is assumed for a traditional septic tank/soil absorption system in a geologically favorable area.

The cost of tank pump-out varies from as low as $60 to(Ingersoll, 1994) to as much as $260 (HSAC, 1997.) For a pumping cost of $150, assuming pump-out every four years, the total pump-out cost over a 20-year period would be $750 (subject to inflation). Biannual inspections cost between $50 and $250 (Scott County, 1999); for a $125 fee, the cumulative inspection cost over 20 years would be $1,250. Non-inflation adjusted inspection and maintenance costs for a properly functioning septic system average $100 per year for a hypothetical 20-year system life.

The total (non-inflation adjusted) cost including purchase price averaged over a 20-year period comes to $300 per year. It should be noted, however, that if a system is properly maintained, its life should exceed 20 years.

The value of proper maintenance is further underscored by the costs associated with repairing failing septic systems. These can range widely, depending on the nature of the problem and on the location of the site. A typical range would be $1,200 to $2,500 for revitalization or repair of an exhausted drainfield. Complete removal and replacement of existing systems can cost five to ten times more than this (see, for example, HSAC,1997; Ingersoll, 1994.)

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ADDITIONAL INFORMATION

Contact your local county extension office and your state department of health for information and region-specific details. Additional information is available from:

American Society of Civil Engineers
World Headquarters
1801 Alexander Bell Drive
Reston, VA 20191-4400

American Society of Home Inspectors
Contact: Rob Paterkiewicz
932 Lee St., Suite 101
Des Plaines, IL 60016

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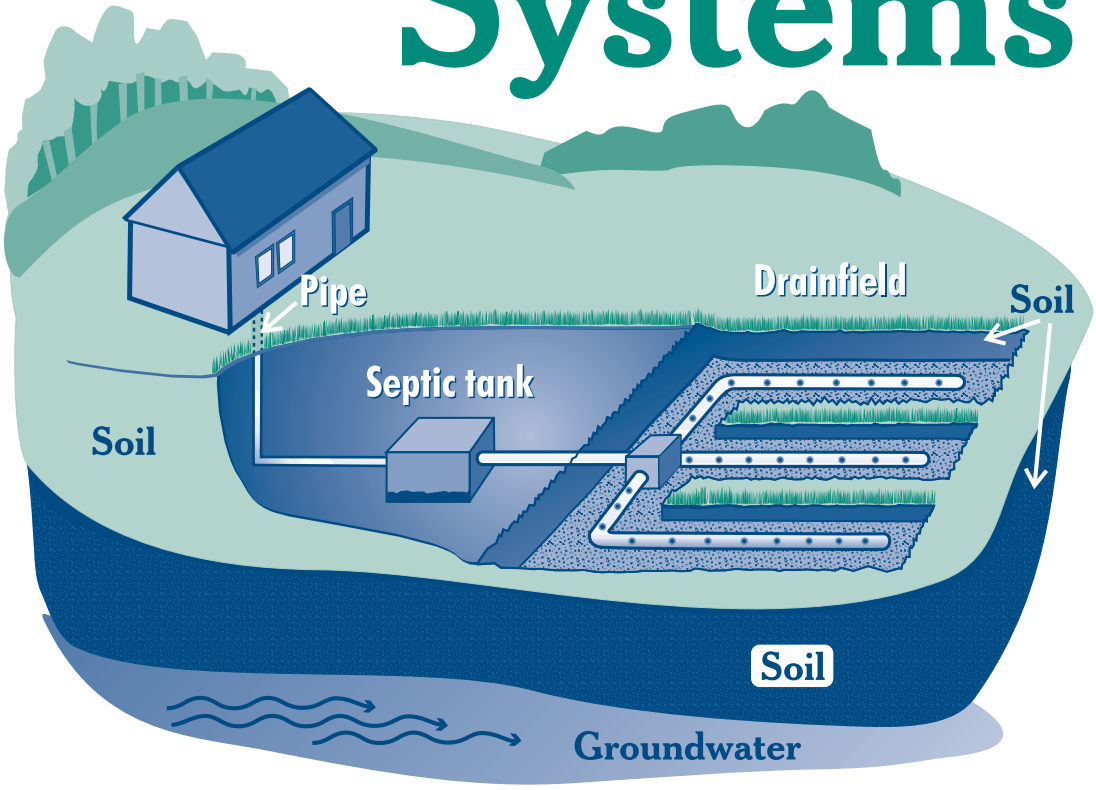
National Society of Consulting Soil Scientists
Mary Reed, Executive Secretary
Chuck Jackson, Executive Director
National Society of Consulting Soil Scientists, Inc.
325 Pennsylvania Ave., S.E., Suite 700
Washington, DC. 20003

For more information contact:

Municipal Technology Branch
U.S. EPA
Mail Code 4204
401 M St., S.W.
Washington, D.C., 20460

EPA
United States
Environmental Protection
Agency

A Homeowner's Guide to Septic Systems



What's Inside

Your Septic System is your responsibility!

Did you know that as a homeowner you're responsible for maintaining your septic system? Did you know that maintaining your septic system protects your investment in your home? Did you know that you should periodically inspect your system and pump out your septic tank?

If properly designed, constructed and maintained, your septic system can provide long-term, effective treatment of household wastewater. If your septic system isn't maintained, you might need to replace it, costing you thousands of dollars. A malfunctioning system can contaminate groundwater that might be a source of drinking water. And if you sell your home, your septic system must be in good working order.

Top Four Things You Can Do to Protect Your Septic System

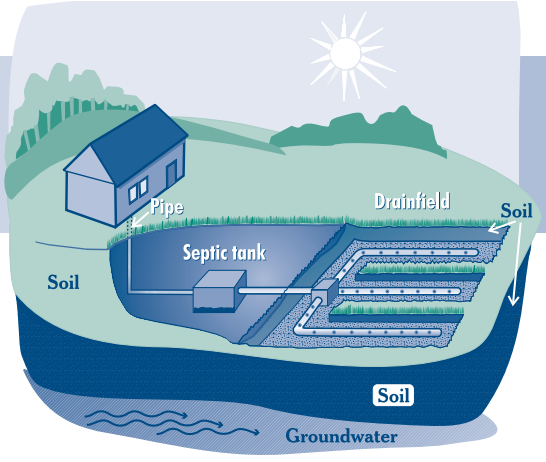
1. **Inspect your system (every 3 years) and pump your tank as necessary (generally every 3 to 5 years).**
2. **Use water efficiently.**
3. **Don't dispose of household hazardous wastes in sinks or toilets.**
4. **Care for your drainfield.**

This guide will help you care for your septic system. It will help you understand how your system works and what steps you can take as a homeowner to ensure your system will work properly. To help you learn more, consult the resources listed at the back of this booklet. A helpful checklist is also included at the end of the booklet to help you keep track of your septic system maintenance.

How does it work?

Components

A typical septic system has four main components: a pipe from the home, a septic tank, a drainfield, and the soil. Microbes in the soil digest or remove most contaminants from wastewater before it eventually reaches groundwater.



Typical onsite wastewater treatment system

Septic system aliases:

- **On-lot system**
- **Onsite system**
- **Individual sewage disposal system**
- **Onsite sewage disposal system**
- **Onsite wastewater treatment system**

Pipe from the home

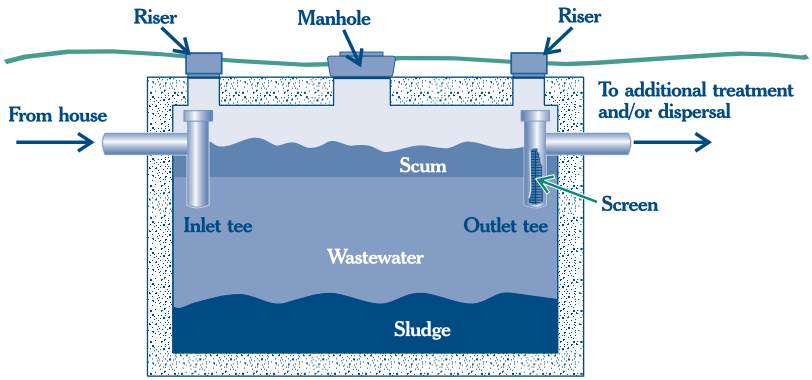
All of your household wastewater exits your home through a pipe to the septic tank.

Septic tank

The septic tank is a buried, watertight container typically made of concrete, fiberglass, or polyethylene. It holds the wastewater long enough to allow solids to settle out (forming sludge) and oil and grease to float to the surface (as scum). It also allows partial decomposition of the solid materials. Compartments and a T-shaped outlet in the septic tank prevent the sludge and scum from leaving the tank and traveling into the drainfield area. Screens are also recommended to keep solids from entering the drainfield.

Newer tanks generally have risers with lids at the ground surface to allow easy location, inspection, and pumping of the tank.

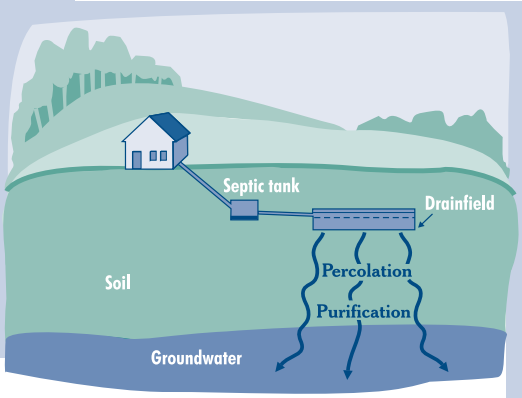
Typical single-compartment septic tank with ground-level inspection risers and screen



Tip **To prevent buildup, sludge and floating scum need to be removed through periodic pumping of the septic tank. Regular inspections and pumping as necessary (generally every 3 to 5 years) are the best and cheapest way to keep your septic system in good working order.**

Finding Your System

Your septic tank, drainfield, and reserve drainfield should be clearly designated on the "as-built" drawing for your home. (An "as-built" drawing is a line drawing that accurately portrays the buildings on your property and is usually filed in your local land records.) You might also see lids or manhole covers for your septic tank. Older tanks are often hard to find because there are no visible parts. An inspector/pumper can help you locate your septic system if your septic tank has no risers.



Drainfield

The wastewater exits the septic tank and is discharged into the drainfield for further treatment by the soil. The partially treated wastewater is pushed along into the drainfield for further treatment every time new wastewater enters the tank.

If the drainfield is overloaded with too much liquid, it will flood, causing sewage to flow to the ground surface or create backups in plumbing fixtures and prevent treatment of all wastewater.

A reserve drainfield, required by many states, is an area on your property suitable for a new drainfield system if your current drainfield fails. Treat this area with the same care as your septic system.

Soil

Septic tank wastewater flows to the drainfield, where it percolates into the soil, which provides final treatment by removing harmful bacteria, viruses, and nutrients. Suitable soil is necessary for successful wastewater treatment.

Alternative systems

Because many areas don't have soils suitable for typical septic systems, you might have or need an alternative system. You might also have or need an alternative system if there are too many typical septic systems in one area or the systems are too close to groundwater or surface waters. Alternative septic

systems use new technology to improve treatment processes and might need special care and maintenance. Some alternative systems use sand, peat, or plastic media instead of soil to promote wastewater treatment. Other systems might use wetlands, lagoons, aerators, or disinfection devices. Float switches, pumps, and other electrical or mechanical components are often used in alternative systems. Alternative systems should be inspected annually. Check with your local health department or installer for more information on operation and maintenance needs if you have or need an alternative system.

Why should I maintain my septic system?

When septic systems are properly designed, constructed, and maintained, they effectively reduce or eliminate most human health or environmental threats posed by pollutants in household wastewater. However, they require regular maintenance or they can fail. Septic systems need to be monitored to ensure that they work properly throughout their service lives.

Saving money

A key reason to maintain your septic system is to save money! Failing septic systems are expensive to repair or replace, and poor maintenance is often the culprit. Having your septic system inspected regularly (at least every 3 years) is a bargain when you consider the cost of replacing the entire system. Your system will need pumping (generally every 3 to 5 years), depending on how many people live in the house and the size of the system. An unusable septic system or one in disrepair will lower your property value and could pose a legal liability.

Protecting health and the environment

Other good reasons for safe treatment of sewage include preventing the spread of infection and disease and protecting water resources. Typical pollutants in household wastewater are nitrogen, phosphorus, and disease-

causing bacteria and viruses. If a septic system is working properly, it will effectively remove most of these pollutants.

With one-fourth of U.S. homes using septic systems, more than 4 billion gallons of wastewater per day is dispersed below the ground's surface. Inadequately treated sewage from septic systems can be a cause of groundwater contamination. It poses a significant threat to drinking water and human health because it can contaminate drinking water wells and cause diseases and infections in people and animals. Improperly treated sewage that contaminates nearby surface waters also increases the chance of swimmers contracting a variety of infectious diseases. These range from eye and ear infections to acute gastrointestinal illness and diseases like hepatitis.

How do I maintain my septic system?

Inspect and pump frequently

You should have your septic system inspected at least every 3 years by a professional and your tank pumped as recommended by the inspector (generally every 3 to 5 years). Systems with electrical float switches, pumps, or mechanical components need to be inspected more often. Your service provider should inspect for leaks and look at the scum and sludge layers in your septic tank. If the bottom of the scum layer is within 6 inches of the bottom of the outlet tee or the top of the sludge layer is within 12 inches of the outlet tee, your tank needs to be pumped. Remember to note the sludge and scum levels determined by your service provider in your operation and maintenance records. This information will help you decide how often pumping is necessary. (See the checklist included at the end of the booklet.)

What Does an Inspection Include?

- Locating the system.
- Uncovering access holes.
- Flushing the toilets.
- Checking for signs of backup.
- Measuring scum and sludge layers.
- Identifying any leaks.
- Inspecting mechanical components.
- Pumping the tank if necessary.

Four major factors influence the frequency of pumping: the number of people in your household, the amount of wastewater generated (based on the number of people in the household and the amount of water used), the volume of solids in the wastewater (for example, using a garbage disposal increases the amount of solids), and septic tank size.

Some makers of septic tank additives claim that their products break down the sludge in septic tanks so the tanks never need to be pumped. Not everyone agrees on the effectiveness of additives. In fact, septic tanks already contain the microbes they need for effective treatment. Periodic pumping is a much better way to ensure that septic systems work properly and provide many years of service. Regardless, every septic tank requires periodic pumping.

In the service report, the pumper should note any repairs completed and whether the tank is in good condition. If the pumper recommends additional repairs he or she can't perform, hire someone to make the repairs as soon as possible.

Use water efficiently

Average indoor water use in the typical single-family home is almost 70 gallons per person per day. Leaky toilets can waste as much as 200 gallons each day. The more water a household conserves, the less water enters the septic system. Efficient water use can improve the operation of the septic system and reduce the risk of failure.

High-efficiency toilets

Toilet use accounts for 25 to 30 percent of household water use. Do you know how many gallons of water your toilet uses to empty the bowl? Most older homes have toilets with 3.5- to 5-gallon reservoirs, while newer high-efficiency toilets use 1.6 gallons of water or less per flush. If you have problems with your septic system being flooded with household water, consider reducing the volume of water in the toilet tank if you don't have a high-efficiency model. Plastic containers (such as ½-gallon plastic milk jugs) can be filled with small rocks and placed in a toilet tank to reduce the

amount of water used per flush. (Be sure that the plastic containers do not interfere with the flushing mechanisms or the flow of water.) You'll save about ½ gallon of water per flush! You might also consider replacing your existing toilet with a high-efficiency model to achieve even more water savings.

Faucet aerators and high-efficiency showerheads

Faucet aerators help reduce water use and the volume of water entering your septic system. High-efficiency showerheads or shower flow restrictors also reduce water use.

Water fixtures

Check to make sure your toilet's reservoir isn't leaking into the bowl. Add five drops of liquid food coloring to the reservoir before bed. If the dye is in the bowl the next morning, the reservoir is leaking and repairs are needed.

A small drip from a faucet adds many gallons of unnecessary water to your system every day. To see how much a leak adds to your water usage, place a cup under the drip for 10 minutes. Multiply the amount of water in the cup by 144 (the number of minutes in 24 hours, divided by 10). This is the total amount of clean water traveling to your septic system each day from that little leak.

Use Water Efficiently!

- **Install high-efficiency showerheads**
- **Fill the bathtub with only as much water as you need**
- **Turn off faucets while shaving or brushing your teeth**
- **Run the dishwasher and clothes washer only when they're full**
- **Use toilets to flush sanitary waste only (not kitty litter, diapers, or other trash)**
- **Make sure all faucets are completely turned off when not in use**
- **Maintain your plumbing to eliminate leaks**
- **Install aerators in the faucets in your kitchen and bathroom**
- **Replace old dishwashers, toilets, and clothes washers with new, high-efficiency models.**

For more information on water conservation, please visit www.epa.gov/owm/water-efficiency/index.htm

Watch your drains

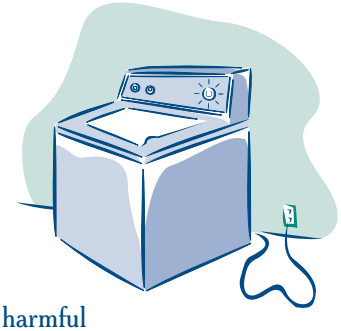
What goes down the drain can have a major impact on how well your septic system works.

Waste disposal

What shouldn't you flush down your toilet? Dental floss, feminine hygiene products, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, and other kitchen and bathroom items that can clog and potentially damage septic system components if they become trapped. Flushing household chemicals, gasoline, oil, pesticides, antifreeze, and paint can stress or destroy the biological treatment taking place in the system or might contaminate surface waters and groundwater. If your septic tank pumper is concerned about quickly accumulating scum layers, reduce the flow of floatable materials like fats, oils, and grease into your tank or be prepared to pay for more frequent inspections and pumping.

Washing machines

By selecting the proper load size, you'll reduce water waste. Washing small loads of laundry on the large-load cycle wastes precious water and energy. If you can't select load size, run only full loads of laundry.



Doing all the household laundry in one day might seem like a time-saver, but it could be harmful to your septic system. Doing load after load does not allow your septic tank time to adequately treat wastes. You could be flooding your drainfield without allowing sufficient recovery time. Try to spread water usage throughout the week. A new Energy Star clothes washer uses 35 percent less energy and 50 percent less water than a standard model.

Care for your drainfield

Your drainfield is an important part of your septic system. Here are a few things you should do to maintain it:

- Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.
- Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.
- Keep roof drains, basement sump pump drains, and other rainwater or surface water drainage systems away from the drainfield. Flooding the drainfield with excessive water slows down or stops treatment processes and can cause plumbing fixtures to back up.

What can make my system fail?

If the amount of wastewater entering the system is more than the system can handle, the wastewater backs up into the house or yard and creates a health hazard.

You can suspect a system failure not only when a foul odor is emitted but also when partially treated wastewater flows up to the ground surface. By the time you can smell or see a problem, however, the damage might already be done.

By limiting your water use, you can reduce the amount of wastewater your system must treat. When you have your system inspected and pumped as needed, you reduce the chance of system failure.

A system installed in unsuitable soils can also fail. Other failure risks include tanks that are inaccessible for maintenance, drainfields that are paved or parked on, and tree roots or defective components that interfere with the treatment process.

Failure symptoms

The most obvious septic system failures are easy to spot. Check for pooling water or muddy soil around your septic system or in your basement. Notice whether your toilet or sink backs up when you flush or do laundry. You might also notice strips of bright green grass over the drainfield. Septic systems also fail when partially treated wastewater comes into contact with groundwater. This type of failure is not easy to detect, but it can result in the pollution of wells, nearby streams, or other bodies of water. Check with a septic system professional and the local health department if you suspect such a failure, and remember to have your septic system inspected by a professional at least every 3 years.

Stop, look, and smell!

Failure causes

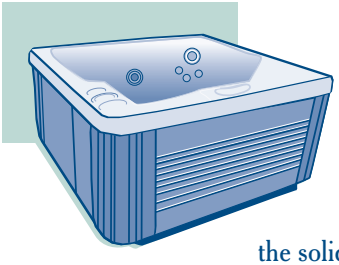
Household toxics

Does someone in your house use the utility sink to clean out paint rollers or flush toxic cleaners? Oil-based paints, solvents, and large volumes of toxic cleaners should not enter your septic system. Even latex paint cleanup waste should be minimized. Squeeze all excess paint and stain from brushes and rollers on several layers of newspaper before rinsing. Leftover paints and wood stains should be taken to your local household hazardous waste collection center. Remember that your septic system contains a living collection of organisms that digest and treat waste.

Household cleaners

For the most part, your septic system's bacteria should recover quickly after small amounts of household cleaning products have entered the system. Of course, some cleaning products are less toxic to your system than others. Labels can help key you into the potential toxicity of various products. The word "Danger" or "Poison" on a label indicates that the product is highly hazardous. "Warning" tells you the product is moderately hazardous. "Caution" means the product is slightly hazardous. ("Nontoxic" and "Septic Safe"

are terms created by advertisers to sell products.) Regardless of the type of product, use it only in the amounts shown on the label instructions and minimize the amount discharged into your septic system.



Hot tubs

Hot tubs are a great way to relax. Unfortunately, your septic system was not designed to handle large quantities of water from your hot tub. Emptying hot tub water into your septic system stirs the solids in the tank and pushes them out into the drainfield, causing it to clog and fail. Draining your hot tub into a septic system or over the drainfield can overload the system. Instead, drain cooled hot tub water onto turf or landscaped areas well away from the septic tank and drainfield, and in accordance with local regulations. Use the same caution when draining your swimming pool.

Water Purification Systems

Some freshwater purification systems, including water softeners, unnecessarily pump water into the septic system. This can contribute hundreds of gallons of water to the septic tank, causing agitation of solids and excess flow to the drainfield. Check with your licensed plumbing professional about alternative routing for such freshwater treatment systems.

Garbage disposals

Eliminating the use of a garbage disposal can reduce the amount of grease and solids entering the septic tank and possibly clogging the drainfield. A garbage disposal grinds up kitchen scraps, suspends them in water, and sends the mixture to the septic tank. Once in the septic tank, some of the materials are broken down by bacterial action, but most of the grindings have to be pumped out of the tank. Using a garbage disposal frequently can significantly increase the accumulation of sludge and scum in your septic tank, resulting in the need for more frequent pumping.

Improper design or installation

Some soils provide excellent wastewater treatment; others don't. For this reason, the design of the drainfield of a septic system is based on the results of soil analysis. Homeowners and system designers sometimes underestimate the significance of good soils or believe soils can handle any volume of wastewater applied to them. Many failures can be attributed to having an undersized drainfield or high seasonal groundwater table. Undersized septic tanks—another design failure—allow solids to clog the drainfield and result in system failure.

If a septic tank isn't watertight, water can leak into and out of the system. Usually, water from the environment leaking into the system causes hydraulic overloading, taxing the system beyond its capabilities and causing inadequate treatment and sometimes sewage to flow up to the ground surface. Water leaking out of the septic tank is a significant health hazard because the leaking wastewater has not yet been treated.

Even when systems are properly designed, failures due to poor installation practices can occur. If the drainfield is not properly leveled, wastewater can overload the system. Heavy equipment can damage the drainfield during installation which can lead to soil compaction and reduce the wastewater infiltration rate. And if surface drainage isn't diverted away from the field, it can flow into and saturate the drainfield.

For more information

Local Health Department

Name

Agency

Address

Address1

Phone and e-mail

EPA Onsite/Decentralized Management Homepage

www.epa.gov/owm/onsite

EPA developed this Web site to provide tools for communities investigating and implementing onsite/decentralized management programs. The Web site contains fact sheets, program summaries, case studies, links to design and other manuals, and a list of state health department contacts that can put you in touch with your local health department.

National Small Flows Clearinghouse

www.nesc.wvu.edu

Funded by grants from EPA, the NSFC helps America's small communities and individuals solve their wastewater problems. Its activities include a Web site, online discussion groups, a toll-free assistance line (800-624-8301), informative publications, and a free quarterly newsletter and magazine.

Rural Community Assistance Program

www.rcap.org

RCAP is a resource for community leaders and others looking for technical assistance services and training related to rural drinking water supply and wastewater treatment needs, rural solid waste programs, housing, economic development, comprehensive community assessment and planning, and environmental regulations.

National Onsite Wastewater Recycling Association, Inc.

www.nowra.org

NOWRA is a national professional organization to advance and promote the onsite wastewater industry. The association promotes the need for regular service and educates the public on the need for properly designed and maintained septic systems.

Septic Yellow Pages

www.septicyellowpages.com

The Septic Yellow Pages provides listings by state for professional septic pumpers, installers, inspectors, and tank manufacturers throughout the United States. This Web site is designed to answer simple septic system questions and put homeowners in contact with local septic system professionals.

National Association of Wastewater Transporters

www.nawt.org

NAWT offers a forum for the wastewater industry to exchange ideas and concerns. The NAWT Web site lists state associations and local inspectors and pumpers.

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December 2002

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Notice

Septic System Dos and Don'ts

(adapted from National Small Flows Clearinghouse)

Dos

- Check with the local regulatory agency or inspector/pumper if you have a garbage disposal unit to make sure that your septic system can handle this additional waste.
- Check with your local health department before using additives. Commercial septic tank additives do not eliminate the need for periodic pumping and can be harmful to the system.
- Use water efficiently to avoid overloading the septic system. Be sure to repair leaky faucets or toilets. Use high-efficiency fixtures.
- Use commercial bathroom cleaners and laundry detergents in moderation. Many people prefer to clean their toilets, sinks, showers, and tubs with a mild detergent or baking soda.
- Check with your local regulatory agency or inspector/pumper before allowing water softener backwash to enter your septic tank.
- Keep records of repairs, pumpings, inspections, permits issued, and other system maintenance activities.
- Learn the location of your septic system. Keep a sketch of it with your maintenance record for service visits.
- Have your septic system inspected at least every 3 years and pumped periodically (generally every 3 to 5 years) by a licensed inspector/contractor.
- Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.

Don'ts

- Your septic system is not a trash can. Don't put dental floss, feminine hygiene products, condoms, diapers, cotton swabs, cigarette butts, coffee grounds, cat litter, paper towels, latex paint, pesticides, or other hazardous chemicals into your system.
- Don't use caustic drain openers for a clogged drain. Instead, use boiling water or a drain snake to open clogs.
- Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.

Homeowner Septic System Checklist

Septic System Description

Contact your local authority if you don't have this information.

Date system installed _____

Installer _____

Phone _____

Tank size _____ **gallons**

Capacity _____ **bedrooms**

Type ☐ **conventional**

☐ **alternative (type)** _____

For more information about septic systems, contact:

Clean Water starts at Home

Name

Agency

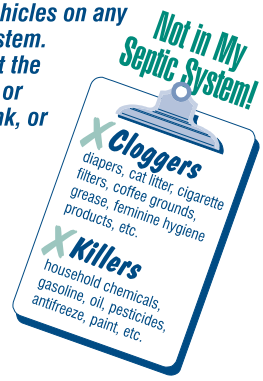
Phone and e-mail

U.S. Environmental Protection Agency

www.epa.gov/owm/onsite/

Things to keep in mind:

- ✓ *Inspect your system (every 1 to 3 years) and pump your tank (as necessary, generally every 3 to 5 years).*
- ✓ *Use water efficiently.*
- ✓ *Don't dispose of household hazardous wastes in sinks and toilets.*
- ✓ *Plant only grass over and near your septic system. Roots from nearby trees or shrubs might clog and damage the drainfield.*
- ✓ *Don't drive or park vehicles on any part of your septic system. Doing so can compact the soil in your drainfield or damage the pipes, tank, or other septic system components.*



Septic System Maintenance Record

Next Service	Scheduled Activity	Pumping Co./ Phone	Activities Completed	Comments
Jan. 2003	inspection	Joe Pumper 555-1234	inspection	sludge layer okay-may need pumping next year

Place on electrical box (fuse box) or other convenient location.

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