Study Guide for How to Inspect Septic Systems

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- take notes;
- read and study offline;
- organize information; and
- prepare for assignments and assessments.

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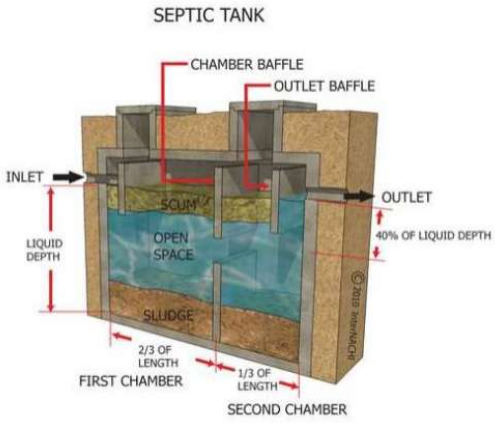
Introduction

"Septic"

In this course, the term "septic" is used to describe all types of systems (anaerobic and aerobic). The term "septic" is a commonly used term to describe all types of septic systems and components, even though it should only be used when describing anaerobic systems. The term "septic" actually refers to the anaerobic bacterial environment that exists in the treatment tank, which decomposes the waste discharged into the tank.



Septic Systems

The French are considered the first to use an underground septic tank system in the 1860s. By 1880, two-chamber septic systems were being used in the United States. Today, nearly one in four households in the United States depends on an individual septic (onsite) wastewater treatment system or small community cluster system to treat wastewater.

In 2007, 20 percent (26.1 million) of total U.S. housing units were served by septic systems. This is an increase of 1.54 million septic systems since 1985. In 2007, 22 percent (1.6 million) of all housing units less than 4 years old used septic systems. In 2007, 46 percent (10.1 million) of occupied housing units with septic systems were located in the southern region of the United States.

In far too many cases, the septic systems in the U.S. are installed and largely forgotten — until problems arise. EPA concluded in its 1997 Report to Congress that "adequately managed decentralized wastewater systems are a cost-effective and long-term option for meeting public health and water quality goals, particularly in less densely populated areas."

The difference between a failed system and a functional system is the implementation of an effective wastewater maintenance and inspection program. Such a program, if properly executed, can protect public health, preserve valuable water resources, and maintain economic vitality in a community.

When used properly, an onsite system can function very well for many years. If used improperly, the system will fail and cause conditions that threat human health and the environment. Inspection and maintenance is key to ensuring that septic systems function properly.

Onsite wastewater treatment and disposal systems are inspected routinely across the United States during a real estate transaction. There are several national associations that have developed standards for the inspection and maintenance of septic systems. Every state regulates the installation of septic systems and most require strict certification and training of installers and inspectors.

A septic inspection leads to an inspection report that provides the client with information about the type and condition of the onsite wastewater treatment system as observed at the time of the inspection. Recommendations for further evaluation or corrective actions regarding the systems and components might be included in the report.

It should be the intention of the inspector to provide as much accurate, unbiased information about the septic system's condition so that the client can make smart, informed decisions. In your particular state or county, the septic inspector might not be required to declare a system to be malfunctioning, failed or non-compliant. This will likely be the responsibility of the local administrative authority such as the local or state health department. The inspector simply reports any observed condition that may represent an indication of a malfunctioning system to their client and the local health department soon after (typically within 24 hours) the septic inspection.

A typical septic inspection is:

- An objective evaluation of the onsite wastewater treatment system based upon the inspector's experience and knowledge;
- An evaluation of each inspected component of the system; and
- A conclusion about the system's condition.

A typical septic inspection is NOT:

- A warranty or guarantee that the system will properly function for any period of time in the future; and
- A certification of the system's installation or performance.

Two Types of Inspections

How should septic systems be maintained? How do you know if a septic system is working properly? This training course answers these questions by providing instruction for evaluating and maintaining onsite (septic) wastewater treatment systems. This training course provides instructions for gathering information about the system, locating components of the system, checking the plumbing system inside the house, evaluating the performance and condition of the components of the system, applying inspection techniques, and recommending routine maintenance and inspections.

This training course for inspecting onsite (septic) wastewater treatment systems describes two types of inspections:

1. A maintenance inspection to determine the need for pumping and minor repairs; and
2. A complete functional inspection typically used during a real estate transfer.

Inspector Logo

The *Septic Inspector* logo is available for use by all InterNACHI certified members who successfully complete this course, including its final exam. Download the logo from www.nachi.org/logos.

Objective

After successful completion of the training, the student will be able to perform two types of inspections of onsite wastewater (septic) treatment systems:

- **maintenance** inspections; and
- **functional** inspections.

For Residential Home Inspectors

The routine maintenance inspection is designed for residential home inspectors to:

1. perform a routine maintenance inspection using visual-only, non-invasive inspection techniques; and

2. report to their client:
    - the location of the system components;
    - how the system works, and
    - maintenance recommendations.

For Everyone

Inspection and maintenance is key to ensuring that septic systems function properly. This training is for everyone with an interest in inspecting and maintaining functional onsite wastewater (septic) treatment systems.

- Home inspectors can use this training to provide valuable information to their clients with respect to routine inspections and maintenance of their system.
- Septic contractors can use the training to learn how to evaluate the condition of the system and determine the need for regular maintenance as well as repair.
- This training can also help to prepare for a state certification examination. It is intended to provide reliable information to inspectors, homebuyers, septic contractors, homeowners, and interested parties.

Regularly inspected and properly maintained septic systems help to protect public health, preserve valuable water resources, and maintain economic vitality in a community. Properly trained home inspectors play a vital role in a homeowner's regular home maintenance plan by performing routine maintenance inspections.

Acknowledgements

This training course is based upon several documents that are available to the public from the following sources:

- New Jersey Department of Environmental Protection
- Pennsylvania Septage Management Association
- Rutgers Cooperative Extension
- United States Environmental Protection Agency
- Rhode Island Department of Environmental Management
- Georgia Department of Community Health
- Chester County Health Department, Bureau of Environmental Health Protection

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Course author: Ben Gromicko at ben@internachi.org. Comments and suggestions are appreciated.

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Two Types of Inspections

This training course describes two types of inspection that can be performed by properly trained inspectors:

1. **maintenance** inspections; and
2. **functional** inspections.

The routine maintenance inspection is well suited for a residential home inspector. A maintenance inspection is used to locate system components, describe how the system functions and how it can be maintained regularly. The functional inspection is used primarily during property transfers, includes a maintenance inspection, and designed primarily for septic contractors.

Maintenance Inspections

The maintenance inspection determines the need for pumping and to identify minor problems before they become major defects that threaten human health and the environment.

There are two maintenance inspection subtypes:

1. A first maintenance inspection; and
2. A routine maintenance inspection.

For the Home Inspector

The first maintenance inspection is designed for the home inspector to report to their client (1) the location of the system components, (2) how the system works, and (3) maintenance recommendations using visual-only, non-invasive inspection techniques.

For the Septic Contractor

The routine maintenance inspection assumes that the components have already been located.

First Maintenance Inspection

1.2 First Maintenance Inspection (designed for a home inspector)

1. Gather Information Before the Inspection
    - Health departments and local authorities
    - Ask the homeowner
2. Evaluate the Plumbing of the House
    - Inspect the plumbing system of the house
    - Leaking fixtures and equipment
3. Locating the Components of the System

    - Locate and access the treatment tank, cesspool or seepage pit
    - Effluent delivery and distribution
    - Locate the absorption area
    - Risers, filters and baffles
4. Scheduling Maintenance Inspections
5. Report to the Client

Routine Maintenance Inspection

1. Evaluate the Plumbing of the House

- Inspect the plumbing system of the house
- Estimate water use
- Changing fixtures with water conservation devices
- Leaking fixtures and equipment

2. Evaluate the System Components

- Inspect the treatment tank
- Inspect the cesspool or seepage pit
- Inspect the holding tank
- Inspect the dosing and siphon tanks and pumps
- Inspection of mound, subsurface bed and trench systems
- Hydraulic load test
- Accessory components and alternate technologies

3. Report to the Client

Functional Inspections

For the Septic Contractor

The functional inspection is used primarily during a property transfer to protect the consumer and identify systems in need of correction and further evaluation. A functional inspection determines whether a system serves the house adequately.

1. Gather Information Before the Inspection

- Health departments and local authorities
- Ask the homeowner

2. Evaluate the Plumbing of the House

- Inspect the plumbing system of the house
- Estimate water use

- Changing fixtures with water conservation devices
- Leaking fixtures and equipment

3. Locating the Components of the System

- Locate and access the treatment tank, cesspool or seepage pit
- Effluent delivery and distribution
- Locate the absorption area
- Risers, filters and baffles

4. Evaluate the System Components

- Inspect the treatment tank
- Inspect the cesspool or seepage pit
- Inspect the holding tank
- Inspect the dosing and siphon tanks and pumps
- Inspection of mound, subsurface bed and trench systems
- Hydraulic load test
- Accessory components and alternate technologies

5. Scheduling Maintenance Inspections

6. Report to the Client

Tools Needed

Tools Needed

To inspect the plumbing system in the house:

- Flashlight
- Calculator
- Stopwatch
- Water pressure and flow meter

To access the components of the system:

- Shovel
- Metal prod (steel rod)

To check the tank:

- Sludge measuring device
- Scum measuring device

- Latex gloves
- Pumping service with pump truck
- Flashlight
- Mirror on pole
- Eye protection
- Garden hose
- Dye tracing

Quiz

In 2009, nearly one in ____ households in the United States depends on an individual septic (onsite) wastewater treatment system or small community cluster system to treat wastewater.

- four
- two
- five
- ten

T/F: The difference between a failed system and a functional system is the implementation of an effective wastewater maintenance and inspection program.

- True
- False

T/F: A typical septic inspection is a warranty or guarantee that the system will properly function for any period of time in the future.

- False
- True

General Information

Major Components

Generally speaking, there are three components of a typical septic system. They include:

1. The treatment tank;
2. The distribution system; and
3. The absorption area.

Building Sewer Pipe

A typical house will have all wastewater discharge through a single pipe, called the building sewer pipe, which delivers the wastewater by gravity to the sewage disposal system, typically the tank.

The sewer lines that carry solids form the house to the tank should have sufficient slope to maintain velocities that carry solids. A slope of between 1 percent (1/8 inch per foot) and 2 percent (1/4 inch per foot) is generally recommended. The last 15 feet of sewer line before the tank should not slope more than 2 percent (1/4 inch per foot).

The sewer line from the house to the tank, all fittings and the pipe in the tank, all extensions to the surface from the top of the tank and the first 10 feet exiting the tank must be schedule 40 PVC pipe or heavier.

Treatment Tanks

A treatment tank is a buried, watertight receptacle designed and constructed to receive wastewater from a building. A septic tank is designed to do the following:

- separate the settleable and the floatable solids;
- promote growth of the anaerobic bacteria necessary to decompose the solids; and
- provide storage for the scum and sludge.

A vertical cross-section of a properly operating tank will show it divided into three distinct layers:

- A layer of floating scum at the top;
- A middle zone of generally clear water relatively free of solids (the “clear zone” or “clear space”); and
- A bottom layer of settled sludge.

Multiple tanks or tanks with two compartments are more effective in separating solids than a single tank with one compartment. If there are multiple tanks or a tank with more than one compartment, then all tanks and all compartments should be inspected.

Tanks are either anaerobic (septic) or aerobic.

Anaerobic (septic)

The tank of an anaerobic (septic) system is where:

- the solids separate from liquids;
- the organic matter is digested;
- the solids are stored; and
- the relatively clear effluent comes from.

The term "septic" is a commonly used term to describe all types of septic systems and components, even though it should only be used when describing anaerobic systems. The term "septic" refers to the anaerobic bacterial environment that exists in the treatment tank, which decomposes the waste discharged into the tank.

"ANAEROBIC" = "SEPTIC"

Aerobic

The tank of an aerobic tank is not as tranquil as a septic tank. Inside an aerobic tank, air may be forced into the effluent, or mechanical agitation devices, pumps or impellers constantly or at timed intervals mix the effluent. A properly working aerobic tank discharges effluent that is more thoroughly treated, is clearer, and has fewer odors.

Sludge, Scum and a Clear Zone

A tank is used to hold wastewater while the wastewater's solids and liquids separate. The heavier solids in the wastewater, called sludge, sink to the bottom of the tank. There it will slowly decompose. A properly functioning septic tank will remove 75% of the suspended solids, oil and grease from the effluent.

The lighter, floatable material, called scum, rises to the surface and becomes trapped between devices at the tank's inlet and outlet, either baffles or sanitary tees. When wastewater enters the tank, it pushes relatively clean effluent, called "the clear zone" that located in the settling area between the scum and the sludge layers, out of the tank.

As solids enter the tank, the clear zone is reduced. If there's not enough of the clear zone, then the wastewater entering the tank will push the stuff out of the tank before it gets enough time to separate. Wastewater with unsettled solids will be pushed out of the tank and can clog a soil absorption system.

To prevent this from happening, tanks need to be pumped to maintain a good "clear zone." Failure to pump regularly will cause the absorption field to fail. Routine pumping of the treatment tank is the best way to prevent system failure.

In most areas, a newly installed septic tank is required to be a minimum of 1,000 gallons in size. The minimum septic tank capacity is based upon the number of household bedrooms. For 3 bedrooms, the minimum size is 1,000 gallons. For 5 bedrooms, the minimum size is 1,500 gallons.

Distribution System

The distribution system is where effluent is taken from the treatment tank into the absorption area. The distribution may consist of a gravity delivery line to a distribution box, or to a tank with a life or dosing pump, or to a siphon chamber. Where the system is a cesspool, there may be no distinct distribution system.

Absorption Area

When effluent leaves the treatment tank, it flows to the soil absorption system. The absorption area is the most important component because it is the most expensive and most difficult component of an onsite system to correct. Absorption of the effluent into the soil is achieved with the use of any of the following:

- Cesspools
- Seepage pits
- Absorption beds
- Absorption trenches
- Above grade mounds
- Soil replacement systems

Except for cesspools, which are both treatment tanks and absorption areas, these are generally referred to as absorption areas. An inspection includes the determination of the location, type, size, and, if present, the liquid level within the absorption area. The absorption area must be located as part of a septic inspection. A completely saturated absorption area will accelerate organic clogging and could eventually result in an absorption area malfunction. This would be a malfunction of the septic system.

Permission to Inspect

Permission to Inspect

It is recommended to attain written permission from the homeowner or representative prior to performing any type of inspection of the onsite treatment system.

Call Before Digging

States have a “one-call” system to request that any utility lines be located prior to the inspection. This service should be called at least 72 hours prior to the inspection.

Gather Information

Gather Information Before the Inspection

Determining the condition of an onsite wastewater treatment system requires knowing as much as you can about its type, its past performance and how well it has been maintained. Knowing all of this requires gathering information and collecting data about the system.

Gather as much information about the property prior to arriving at the property. Any information that was not gathered in advance of the inspection can be attained after arriving at the site.

Health Departments & Local Authorites

Health departments may be contacted to obtain information about the property. If available, the inspector should review records from the local authority regarding the property and the system. If records are not available, the inspection report should note that records were not available for the property and septic system.

A site plan of the property and onsite system can be retrieved from the archived records held by the local building official. A site plan (or sketch of the property) should be done by the inspector for the inspection report to show the location of the onsite system.

Ask the Homeowner

It is best to ask the homeowner about the onsite system in person. Be sure to remain courteous and professional during the interview. Make the homeowner comfortable. Ask quality questions. The interview with the homeowner may also provide a good opportunity to inform them about septic maintenance. You may wish to leave some educational materials with the homeowner.

Information attained from the homeowner prior to the inspection should be compared to the information gathered at the inspection, including, but not limited to, the following:

- Age of the house
- Number of bedrooms
- Type of onsite system
- Age of onsite system
- If occupied, the number of occupants currently living in the house
- During the last 12 months, the number of year-round occupants
- If vacant, the length of time the house has been vacant
- Number of occupants expected to live in the house
- Existence of a garbage disposal
- Permits in relation to the system
- Site plan or sketch of the property and system with measurements

- Evidence of malfunction
- Evidence of sewage back-up in the house
- Separate gray water system
- Washing machine drain line connection to the onsite system
- Sump pump discharge
- Date of the two most recent pumping of the tank
- Frequency of the tank being pumped
- Water bills for the last 12 to 24 months
- Any inspection of the system and inspection results
- Any maintenance inspection reports
- Any repairs to the system
- High water usage at the property

Local officials may keep permit and maintenance records. Try contacting the local building officials or wastewater officials to provide information. Building officials keep records of all building permits, and they likely require an up-to-date certificate of conformance for the septic system.

Quiz

T/F: Generally speaking, there are three components of a typical septic system. They include the treatment tank, the distribution system, and the private well.

- False
- True

T/F: A septic tank must be watertight.

- True
- False

A septic tank is designed to separate the floatable _____ from the ones that settle.

- solids
- liquids
- pipes
- bacteria

A septic tank is designed to store the _____ and the sludge.

- scum
- sand
- aggregate
- distribution box

Inside a properly operating septic tank, the _____ floats at the top.

- scum
- solids
- sludge
- clear zone

Inside a properly operating septic tank, the _____ has the generally clear water relatively free of solids.

- clear zone
- solids space
- sludge layer
- floating scum layer

Multiple tanks or tanks with two compartments are _____ effective in separating solids than a single tank with one compartment.

- more
- less
- not

Tanks are either anaerobic (septic) or _____.

- aerobic
- analytic
- concrete
- aesthetic

In an anaerobic tank, solids _____ liquids.

- separate from
- combine with

Inside an _____ tank, air may be forced into the effluent, or mechanical agitation devices, pumps or impellers constantly or at timed intervals mix the effluent.

- aerobic
- analytic
- polyethylene
- aesthetic

When effluent leaves the treatment tank, it flows to the soil _____ system.

- absorption
- composition
- infusion
- releasing

Evaluate the Plumbing of the House

Evaluate the Plumbing of the House

- Inspect the plumbing system
- Estimate water use
- Changing fixtures with water conservation devices
- Leaking fixtures and equipment

When performing an inspection of the onsite treatment system, an inspector should check the interior plumbing system of the house because a faulty or outdated plumbing system may add significantly to the wastewater load on a system. Overloaded systems tend to fail. Faulty plumbing adds to overall water use. When performing an inspection, check all the plumbing, water fixtures and water-using devices for malfunctions.

Inspecting the Plumbing System

By inspecting the plumbing system, the inspector may determine the location where the sewer pipes exit the structure, the general location of the treatment tank and absorption field, and the presence of multiple plumbing or treatment systems. Inspecting the plumbing of the house can result in determining where the laundry facilities discharge. The clothes washer or laundry tub may discharge into the onsite system or may discharge elsewhere. This part of the inspection is limited to where the plumbing is exposed. If there is a crawlspace, the inspector should check the plumbing inside that space. If there is an unfinished basement, the inspection of the plumbing may be relatively easy. If the lowest level is finished, as in the case of a slab-on-grade construction, the inspection may be very limited. If for some reason, part of the inspection of the plumbing is restricted, as in the case of a limited access to the crawlspace, then that restriction to the inspection should be noted in the report.

- Inspect the interior plumbing system of the house. Confirm the number, size and general direction of the exit point(s) of the sewer drain line(s) of the house. Determine if they are consistent with the onsite system's location.
- Check all the fixtures in the house. Follow the drain lines from each fixture to the main drainpipe that exits the house and travels to the treatment tank. Make sure you have determined that all drain and waste lines appear to be exiting towards the location of the onsite system. Running water at particular fixtures can help in identifying and confirming. Follow the laundry discharge pipe to its destination. Look for drainage lines that exit the house in very different directions.
- Inspect the general condition of the drain lines in the house. Look for different materials used in the lines. A PVC DWV pipe that is connected to an old cast iron drainpipe may indicate alterations to the drainage system. A capped line that previously accepted the washing machine discharges may indicate a problem experienced with the onsite system. Check for anything in the drainage system that may indicate past failures in the septic system.
- If there is a fixture that is apparently not entering the onsite treatment system, then dye can be used to confirm the discharge point for that fixture. Insert the dye tablets into the fixtures drain and flush with water. Observation of the effluent within the first septic system component should occur to confirm that the dye from the fixture has entered the tank. If the colored discharge is not observed, further investigation of the fixture and is drainage is required, and that condition should be noted in the inspection report.
- Determine if there is a sump pump system installed. If one exists, confirm that the discharge of the sump is not connected to the house drain line and that no drain pipe discharges into the sump pump.

Estimate Water Use

As part of a functional inspection, inspectors should check the water use. High water use can cause two septic system problems:

1. High water flows put stress on the absorptive capacity of soils; and
2. Large water flows may push solids out of the treatment tank and clog the absorption system.

To estimate water use, you could use two of the most recent water bills. And the water meter could be used to help estimate the water usage. The following equation could be used to approximate water use per capita per day.

Water use per capita per day equation: $W=(R_2-R_1)/DxO$, where:

W = water use per capita per day

R2 = most recent water meter reading

R1 = oldest water meter reading

D = number of days elapsed between the water meter readings

O = average occupancy of the residence between readings

Daily water usage can be estimated for typical households based on the number of occupants or bedrooms. Refer to your local sewer authority or state official sources about the average daily water usage data in your area. For example, a household with moderate water use will typically need 110 gallons of water per day per bedroom. This number, however, does not take into account extra water needed for homes with high occupancy, lawn irrigation, spa tubs, and other activities and plumbing fixtures that have a high water demand. High-water-use activities and fixtures are not recommended for homes with an onsite wastewater treatment system.

Changing Fixtures with Water Conservation

In most cases where water use is above the acceptable range, it is because of a leaky or old, high-volume water fixture. Water-use problems can be fixed by retrofitting fixtures with new water conservation devices or by repairing leaks. Installing water conservation devices can be quick, inexpensive, and can reduce the water load on the system.

Leaking Fixtures and Equipment

Leaking Toilet

A leaking toilet can contribute a hundred gallons of water per day to the wastewater system. Leaky toilets can cause failures of septic systems.

Listen for leaking toilets. Sometimes they can be heard. If it is not making a leaky noise, then use another technique to find a leaking toilet. Add a small amount of food coloring to the toilet storage tank. Wait 10 minutes. If the toilet is leaking, dye will appear in the toilet bowl.

Dripping Faucet

A dripping water faucet with just a couple drops per second can add many gallons to the daily water load. Sometimes it's just a matter of replacing a washer in the fixture. The use of dry measuring cups located under a suspect fixture will indicate a dripping faucet.

Leaking Water Treatment Equipment

Water softeners and purification systems remove minerals from the domestic water. Some water treatment systems are installed under the kitchen sink — look there first. Water treatment systems use back-flushing routinely. The back-flush leaves the system using a small-diameter plastic hose. The hose is usually installed to drain into one of the following outlets:

- The laundry machine drain pipe;
- The kitchen sink drain pipe;
- A sump pump; and
- An auxiliary soil absorption system that is separate from the septic system.

If the back-flushing mechanism is leaking, the onsite system could become overloaded and backup.

Quiz

When performing an inspection of the onsite treatment system, an inspector should check the interior _____ system of the house because a faulty or outdated plumbing system may add significantly to the wastewater load on a system.

- plumbing
- electrical
- insulation
- heating

T/F: A PVC DWV pipe that is connected to an old cast iron drainpipe may indicate alterations to the drainage system.

- True
- False

If there is a fixture that is apparently not entering the onsite treatment system, then _____ can be used to confirm the discharge point for that fixture.

- dye
- excavation
- infrared
- probing

_____ water use can put stress on the absorptive capacity of soils.

- High
- Low
- Hot

In most cases where water use is above the acceptable range, it is because of a leaky or old, high-volume water _____.

- fixture
- fountain
- hose
- tank

_____ toilets can cause failures of septic systems.

- Leaky
- Ceramic
- Low-flow
- Water-efficicent

A _____ water faucet with just a couple drops per second can add many gallons to the daily water load.

- dripping
- plastic
- brass

Locating the Components of the System

Locating the Components of the System

- Locate and access the treatment tank, cesspool or seepage pit (section 7.1)
- Effluent delivery and distribution (section 7.2)
- Locate the absorption area (section 7.3)
- Risers, filters and baffles (section 7.4)

Locating the components of the system is part of both maintenance inspections and functional inspections.

Personal Safety

The inspector's personal safety, as well as the protection of the environment and the client, shall receive the highest priority at all times. An inspector is not required to do anything that, in the opinion of the inspector, is dangerous, hazardous or may cause damage to the system, property or the environment.

Recent Precipitation

If you are inspecting an onsite treatment system and there has been recent rainfall or other precipitation event, including but not limited to rain, drizzle, snow, snow melting, or when the ground is snow covered, then the inspector should discuss the relationship of the precipitation to the results of the inspection with the client. Present weather conditions, recent precipitation events, and their impact on the onsite treatment system should be recorded and explained in the inspection report.

General Inspection Procedural Comments

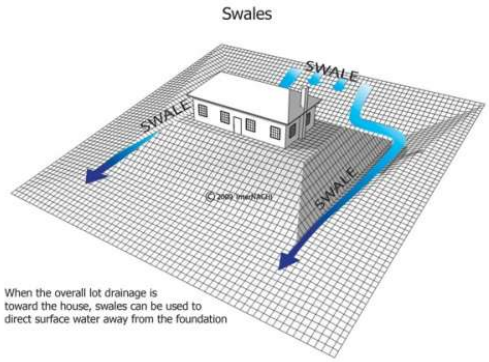
The portion of the onsite system inspection should be conducted in the following general sequence:

- Record a list of all of the people present at the inspection including any professional contractors who may be working on the system.
- Record the weather conditions at the time of the inspection.
- Make observations of the site's condition.

- Draw a site plan or sketch of the property. Indicate on the site plan distances of the treatment tank lid from two fixed points of the house structure.
- Indicate on the site plan distances from the house to the distribution box, if located and accessed.
- Look for a private well. Indicate the well's location in the field notes and on the site plan.
- Look at the location of driveways, decks, patios, and walks that might have an effect on the system.
- Compare the information that is gathered at the inspection to the information gathered previously and note any discrepancies.
- Locate and access the treatment tank, cesspool and seepage pit.
- Check the effluent delivery and distribution.
- Locate the absorption area.
- Check the risers, filters and baffles.

Observation of Site's Condition

- Look for and report any trees, large shrubs or other plants with extensive root systems growing over or within 10 feet of any component of the system. You should inform your client that large roots might crack, offset or otherwise intrude and damage components. Vegetation can create a negative impact on the system.
- Look for signs of heavy machinery or heavy objects running over any part of the system. Heavy objects may crush or offset the components of the system.
- Check how storm water or surface runoff water is being directed away from the components of the system. If water is flowing into or towards any component, the water should be re-directed. Runoff surface water directed to the absorption area may flood it and interfere with proper wastewater treatment or cause backup.
- Look for signs of system malfunction, such as cave-in or exposed components.
- Look for impermeable surfaces, such as driveways or patios, within 10 feet of components of the system. Impermeable surfaces block the natural movement of air and moisture in soil, inhibiting biological activity and hindering wastewater treatment.
- Check for signs of malfunctioning, such as septic odors, ponding, or other signs of wastewater outbreak, patches of lush green grass, burnt-out grass or ground staining. These signs indicate major failure of the system.
- Walk around the house, the site (property, yards, gardens, grounds) and look for unexpected fixtures, plumbing pipes, or discharge outlets.
- Look for discharges on or through any of the following: the surface of the ground, streams, roads, storm drains, and unexpected pipes.



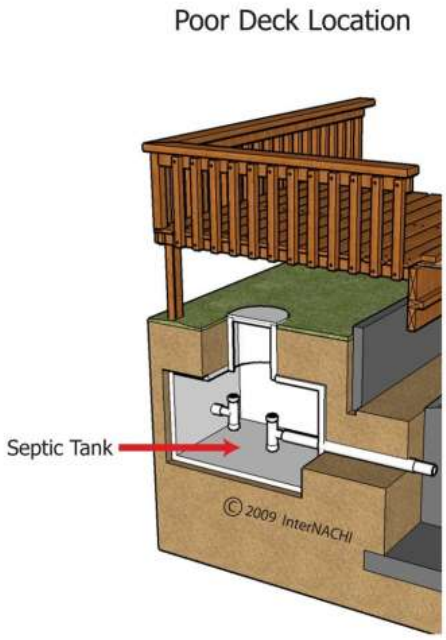
Using Dye to Identify Treatment Bypasses

Bypasses are used to re-direct wastewater away from being treated by the system. Bypasses are not legal and should be eliminated when they are confirmed. Treatment may be bypassed by an overflow pipe that routes effluent out of a component, preventing it from reaching the absorption system. Bypasses are often difficult to trace visually. Dye tracing helps in identifying and confirming bypasses. The dye will appear on the surface and flow wherever the wastewater does.

Locate the Treatment Tank

Horizontal and vertical separation distances are important for the protection of groundwater from septic system effluent. Tanks should not be closer than 50 feet to any source of water and greater distances may be required by your local authority/official. Tanks should not be closer than 10 feet from any building or within the 100-year flood plain. Tanks should not be in areas subject to flooding.

There should not be any permanent covering over the tank, lateral, or any other part of the system (patio, building, shed, deck, porch, driveway, walkway, etc.).



Access ports may be visible and exposed at ground level. The access ports should not be more than 12 inches below the ground surface.

Modern tanks are usually rectangular boxes made from concrete or fiberglass. Older tanks may be round. Very old tanks may be built with steel, which corrodes over time. Modern tanks are from 1000 to 1500 gallons, depending upon the number of bedrooms in the house. Some older tanks could be as small as 500 gallons in size.

Treatment tanks are made from the following common materials:

- concrete,
- metal,
- polyethylene (plastic), and
- fiberglass.

The type of material that the tank is made out of should be documented. Concrete tanks are generally sound and reliable as compared to tanks of other materials. Metal tanks have an average life expectancy of only 5 to 10 years. The corrosive atmosphere and contents cause rapid disintegration of metal tanks. Metal tanks should not be allowed in a wastewater treatment system. Plastic or fiberglass tanks resist deterioration; however, they are susceptible to puncture by a probe. Be very careful if you have to probe for locating the buried parts of the tank.

Access

Every treatment tank should have access to the tank lids/covers. The tank risers should be accessible. Some inspectors request that the tank be located and the lid of the tank exposed prior to arriving at the property. If you need to access the tank lid yourself, be careful to avoid damaging the tank with your shovel or iron digging bar. Do not damage any electrical wires that may be present.

On failed systems, you may find the access to the tank restricted with some unexpected materials. Sometimes the tank lid will be covered with construction materials such as 4x4 beams and plastic. There should not be anything foreign over the tank lid location. If there is plastic wrapped over the lid area or any other type of building materials, this may indicate a major problem with the system or the structural integrity of the tank.

Lids for non-traffic residential tanks should be able to hold a dead load of 12 inches of earth cover with a dry soil density of 100 pounds per cubic foot.

Tanks are Hazardous

Treatment tanks should not be entered during a typical septic inspection. Treatment tanks are hazardous environments. Work carefully and safely. Sewage contains germs that can cause diseases. Never enter a septic tank. Toxic and explosive gases in the tank present a hazard. Do not bend over or stick your head towards an open tank. The gases that come out of the tank may cause you to lose consciousness. You may lose your balance and could end up falling into the tank. Do not reach with your hand into the tank. Old tanks may collapse. Secure the septic tank lid so that children cannot open it. Do not enter cesspools. Do not work alone. Do not bring sewage-contaminated clothing into the home.

Methane and hydrogen sulfide gases are produced in a septic tank. They are both toxic and explosive. Hydrogen sulfide gas is deceptive. It can have a very strong odor one moment, but after exposure, the odor may not be noticed.

Septic Tank Abandonment

When a tank is disconnected from use, the tank should be removed or filled. The tank should be completely removed of all solids and liquid. It could be collapsed then filled or removed.

Techniques to Locate a Tank

To located a treatment tank, the following techniques can be used:

- Ask the homeowner for past inspection reports, and look for the sketches or measurements for the system components.
- Check for plans, permits or documentation with the local authority or officials.
- Check the direction of the main sewer drainage pipe in the house, where the pipe exits the structure. The tank may be located in that direction.
- Look for an inspection port for the distribution box at the ground level. They are sometimes installed to provide access and evidence of location.

If the tank has no risers over inspection holes and no diagram is available showing the location, you will have to probe for the tank, as follows:

- You can use a probing tool designed for probing septic systems, or use a long metal rod (1/2-inch rebar, bent over 90° to make a handle at the top);
- Begin probing where the main drainpipe leaves the house.
- Push the rod firmly down into the soil until you "feel" the drainpipe. Use a firm and steady push. Don't punch or pound the rod as you can damage the pipe, particularly the pipe/septic tank connection.
- If the soil is too hard and dry for probing, try soaking the area with a garden hose.

Opening Components

In some cases, a component will be accessible from the ground surface. In others, the access is buried. Once you located the component, it should be opened. After you inspect it, close it and cover it with minimal disturbance to the ground cover or landscaping.

Access is at Grade Level

Sometimes a component is accessible because of a riser. A riser is a vertical tube with a tight-fitting fiberglass or concrete cover at, slightly above, or just below the ground surface. If the lid is locked, ask the homeowner to open it. Concrete covers usually do not have locks.

Access is Buried

Once the component is located, approximate the location of the inspection ports or central manhole access based on the anticipated size of the component. Use a shovel or spade to dig carefully. First cut and remove the sod, then dig the dirt to uncover the inspection ports. Standards did not always require inspection ports to be accessible at grade level. Most codes now require accesses at grade. Some tanks will have one manhole access. Most modern compartmented tanks will have two. One will be located at the influent end, and another at the effluent end, and there will be no central manhole.

The access manhole should be a minimum of 20 inches in diameter for each compartment.

Cesspool or Seepage Pit

The cesspool is simply a vertical pit dug into the earth. The pit is lined with a porous cement, or block, or stone. The area outside the liner is usually filled with gravel. All the fixtures of the house drain from the home directly to the cesspool. There are no tanks in between the cesspool and the house. At the cesspool, the solids fall to the bottom where they are partially digested by bacteria and microorganisms that occur there naturally. The effluent leaches out into the gravel and soil surrounding the pit.

The term "cesspool" is a buried chamber, tank, or perforated concrete vault or covered hollow or excavation, which receives discharges of sanitary sewage from the building sewer for the purpose of collecting solids and discharging liquids to the surrounding soil.

Many people confuse cesspools with seepage pits. Usually a seepage pit is constructed similarly to a cesspool in construction. There is a large pit with a circular wall of cement, block or stone that is porous, and there's a surrounding bed of gravel. Sometimes the seepage pit can be referred to as a diffuser or galley where there is a bottomless concrete structure with grated sides.

The main difference is that only effluent that has come from a septic tank enters the seepage pit. A seepage pit is always downstream from a septic tank. (When a cesspool has two chambers, the second chamber is often considered the seepage pit.) The effluent enters the seepage pit and is temporarily stored there until it gradually seeps through the walls and into the surrounding soil. A biomat forms in the bottom of the pit and as the pit ages the biomat grows thick clogging the pores of the pit walls.

Because of their construction seepage pits are not as efficient at processing effluent as drainfields or soil absorption beds. Cesspools are not an approved method of sewage disposal and all existing cesspools are considered to be substandard. Cesspools tend to have system overflows and backups. Cesspools allow wastewater to flow to ground- and surface-water resources without providing adequate treatment.

Owners of cesspools should be encouraged to upgrade their systems. Even cesspools that are maintained provide, at best, marginal treatment and should be considered for upgrade

or replacement as soon as practical. If a cesspool is found to be unrepairable, then it should be replaced with a modern onsite wastewater treatment system built in according with modern standards.

Locate Effluent Delivery and Distribution

Effluent goes from the tank to the absorption area through a solid, rigid pipe. It enters the absorption area in a way that provides equal distribution of the effluent through the absorption area. Effluent may be brought from the tank to the absorption area by the use of a pump or by gravity.

Systems installed since the 1970s have commonly used plastic pipe, such as a schedule 20 pipe. When the pipe runs under an area subject to heavy loads, such as a driveway, it is commonly found that the pipe is crushed or is damaged. In those heavy load areas, a heavier grade of pipe (schedule 40 or 80 pipe) is installed or the pipe is encased with a larger diameter heavier grade pipe.

Effluent delivery systems may include a lift pump. When a lift pump is used, the absorption area is at a higher elevation than the treatment tank. Lift pumps are sized appropriately to overcome the friction of the pipe and the weight of gravity. These forces are referred to as the “head.” Unlike a dosing pump, there is no required minimum head at the terminal end.

By Gravity

In a gravity system, the effluent should be distributed either to a number of trenches or through several interconnected lines in an absorption field.

A distribution box (called a D-box) is a small, usually concrete, container that most often receives effluent from a connecting pipe. Lift pumps can also discharge into a D-box.

The D-box will have a lid. Open the lid and you'll see one inlet and a few outlet ports. The outlets should be at least one inch below the inlet's elevation. The D-box should be level or situated as to provide even entry of the liquid into all of the outlet ports at the same time. On older D-boxes, you may find that the box has settled or has been crushed. This will be a problem for the system (particularly at the absorption area) because the effluent has not been entering the lines equally. A variety of devices can be used to adjust the outlet elevations so that all lines receive an equal amount of effluent volume. A D-box must be used to divide the flows in all gravity trench systems.

A D-box may be installed to divide the effluent flows to the laterals in a bed system. The D-box should not be inside a trench. It may be installed either outside or within the bed area. When you find the D-box, its location should be noted in the report.

By Pressure

In a pressure distribution system, there is a pump that is used to pump an equal amount of effluent across an entire absorption area. In a pressurized distribution system, the pump delivers effluent to a manifold component. The manifold supplies the effluent to a series of smaller lateral pipes.

Pressure distribution can be used in all types of systems.

Locate the Absorption Area

The absorption area is the most critical component of the onsite treatment system.

Breakout of septic effluent to the ground surface is a system failure. The system in this condition has failed and is not functional. If you observe or have reason to believe that the system is discharging directly to the surface of the ground, or to the surface or ground waters, such conditions should be noted in your report. The inspector does not have to continue the inspection as the system's condition can be described as "failed" and "non-functional."

Subsurface Absorption (or Disposal) Bed or Trench System

Beds

Subsurface absorption beds are usually rectangular excavations that are filled with aggregate in which a branching network of perforated pipes distribute the effluent through the bed area. The bed is filled from the aggregate to ground surface with earth.

Trenches

Trenches are long, narrow rectangles from 1-1/2 to 3 feet wide. Trenches are usually of equal length. They are partially filled with aggregate. Perforated pipes are installed in the trenches, and they distribute the effluent through the length of the trench. The trench is filled from the aggregate to grade with earth. Effluent is distributed to the trenches either under pressure (pump or siphon delivery) or by gravity.

D-boxes

Gravity supplied trenches and beds both receive effluent from the distribution box (D-box). They both typically will use a D-box to split the flow into approximately equal amount. All trenches should receive the same amount of effluent. An inspector should find the condition of each trench similar. If one trench is found to be different from the rest during an inspection, there is a problem and further evaluation is needed.

Above-Ground Systems: Mounds

A mounded system or a mounded soil replacement system is a bed-type distribution system built on top of a suitable fill material. In both systems, the fill provides both a level surface upon which the aggregate is placed and a porous filtering material for effluent renovation. The fill and aggregate are contained within a berm of soil. The aggregate is above the site's original ground surface. The cover over the aggregate is graded and sloped to direct surface water away from the mound.

The berm of soil supports the aggregate and suitable fill. The berm also contains the effluent and directs the downward movement of the effluent within the berm's footprint.

A mounded system has the entire system, including fill, aggregate and cover, installed over the site's original soil. For a mounded soil replacement system, some of the site's original ground is excavated and backfilled with suitable soil that extends above the original grade. This fill is leveled and the system is built upon that suitable fill material.

In above-ground systems, the piping distributes the effluent through the aggregate. The effluent comes from a pumping chamber, which pumps the effluent up to the top of the absorption area. The effluent flows into a network of perforated distribution pipes, located just beneath the mound's surface.

A portion of the wastewater released from the pipes evaporates up through the surface of the mound or is taken up by the grass or other vegetation growing on the mound.

The remaining wastewater trickles down through gravel, sand and soil layers within the raised mound. The sand serves to remove larger particles and disperse the wastewater evenly through the absorption field. Through complex physical, chemical, and biological processes the soil beneath the mound provides treatment, removing much of the remaining disease causing microorganisms and other pollutants.

The Risers, Filters and Baffles

Risers

Inspectors should recommend certain retrofits to homeowners to make inspections easier and to improve the longevity of the system, including installing risers to grade, effluent filters and gas baffles.

Risers installed on a treatment tank provides easy access to the tank, inspection ports, and manholes. Without risers, a tank must be dug-up for every inspection and pumping. With risers, very little, if any, digging is needed. Risers for D-boxes are a good idea too. D-box risers allow inspectors to see if any solids are being carried into the D-box from the tank. Solids in the D-box indicate a great potential for clogging in the absorption area. D-box risers can provide access to the laterals of the absorption system, which may clog occasionally and require cleaning.

Common risers are made of concrete, fiberglass or plastic. The interior dimension of the riser should be larger than that of the access hole. The riser should have a proper lid or cover that is seated and fitted properly to prevent surface water from entering the tank.

Effluent Filters and Gas Baffles

Effluent filters and gas baffles are simple and inexpensive ways to protect and extend the service life of the absorption system.

Effluent filters are usually installed at the outlet of a treatment tank. Filters capture particulates that may travel to and clog the soil absorption system. Properly sized filters only need cleaning every 5 years or so. If the filter is not cleaned, it will eventually clog, causing the effluent to back-up into the house or overflow the top of the tank. If the occupants notice the water draining slowly, the filter might need cleaning.

Cleaning a filter involves removing the effluent filter from the tank and spraying the filter clean with a hose. All the debris from the filter should be washed back into the tank for removal when the tank is pumped.

Gas baffles are attached to the effluent sanitary tee of the tank. They deflect gas bubbles, which may otherwise carry solids through the effluent outlet.

Quiz

Look for and report any trees, large shrubs or other plants with extensive root systems growing over or within _____ feet of any component of the system.

- 10
- 50
- 25
- 100

T/F: Runoff surface water directed to the absorption area may flood it and interfere with proper wastewater treatment or cause backup.

- True
- False

A patch of lush green _____ may be a sign of a malfunctioning system.

- grass
- paint
- trees
- acres

Tanks should be at least _____ feet to any source of water and greater distances may be required by your local authority/official.

- 50

- 3
- 25
- 200

T/F: The access ports of septic tanks should not be more than 12 inches below the ground surface.

- True
- False

Do not bend over or stick your _____ towards an open tank.

- head
- foot
- arm
- flashlight

T/F: The main difference between a cesspool and a seepage pit is that only effluent that has come from a septic tank enters the seepage pit. A seepage pit is always downstream from a septic tank.

- True
- False

A _____ may be installed in the system to divide the effluent flows to the laterals in a bed system.

- D-box
- A-box
- C-box
- P-box

T/F: Breakout of septic effluent to the ground surface is a system failure.

- True
- False

A mounded system or a mounded soil replacement system is a bed-type distribution system built _____ a suitable fill material.

- on top of
- below

T/F: A portion of the wastewater released from the pipes evaporates up through the surface of the mound or is taken up by the grass or other vegetation growing on the mound.

- True
- False

_____ installed on a treatment tank provides easy access to the tank, inspection ports, and manholes. Without them, a tank must be dug-up for every inspection and pumping.

- Risers
- Baffles
- Filters
- Shoots

Evaluate the Components of the System

Evaluate the System Components

- Inspect the treatment tank
- Inspect the cesspool or seepage pit
- Inspect the holding tank
- Inspect the dosing and siphon tanks and pumps
- Inspection of mound, subsurface bed and trench systems
- Hydraulic load test
- Accessory components and alternate technologies

Inspect the Treatment Tank

Look at the condition of the tanks. Look for cracks or other signs of leakage on top of the tank and especially around the access hole or inspection ports. Leaks in the tank prevent proper treatment of the wastewater. Any damage to the access or port should be repaired and usually that type of repair does not require a permit.

Inverts, Inlet and Outlet

The invert of the inlet pipe should be located at least 3 inches above the invert of the outlet when the tank is level. This space allows for a momentary rise in the liquid level during discharges into the tank.

The septic tank inlet should be a sanitary tee, elbow, or long sweep elbow with a low head inlet or baffle to direct incoming sewage downward. This prevents flow from disturbing the floating scum layer. The inlet should extend at least 8 inches below the liquid level, but shouldn't be deeper than 20% of the liquid depth.

The length of the outlet device is important because it must allow only clear effluent to leave the tank (no solids). It extends below the floating scum layer in the tank. If the length of the outlet tee is not sized properly, solids may be carried into the absorption area. The

outlet device should extend below the liquid surface to a distance 30-35% of the liquid depth.

Inspect the Baffles

The inlet and outlet baffles should be thoroughly inspected. The inlet and outlet baffles are somewhat susceptible to damage and should be treated with caution. They will break if they are hit with an instrument like a shovel. Do not tap or pick at the baffles. If the baffle appears to have damage such as a crack or a missing piece then report the condition. The baffles are designed to protect the absorption area from solids entering it. The baffle holds the solid materials in the tank and blocks them from entering the pipe that runs towards the field. If a baffle is missing or deteriorated, the baffle should be repaired or replaced by a professional contractor. The inspector should then discuss with the client about the potential problems associated with a broken baffle allowing solids to enter the absorption area.

Do Not Pump First

Do not pump any treatment tank before the absorption field has been evaluated. Once the inspection of the field has been completed, or nearly completed, then the pumping of the tank can begin. The decision about whether or not (or when) to pump a treatment tank is based upon the condition of the absorption area.

If the aggregate in the absorption area is fully saturated, do not pump the tank. It is important to leave the system undisturbed so that your inspection results can be verified if deemed necessary. If the tank is pumped after finding the field saturated, then the field may drain into the empty tank.

If the water level inside the tank is above the outlet invert and the liquid level is less than the full depth of the field aggregate, then there may be a blockage. Pumping the tank may not be necessary initially. The cause of the blockage needs to be determined and corrected.

If the operating level in the tank appears normal and the aggregate is free of liquid or the liquid level is less than the full depth of the aggregate, then pump the tank(s).

Measuring Scum and Sludge Depths

The primary maintenance point in a septic system is the septic tank. Inspection is accomplished in part by measuring the scum and sludge depth in the tank once a year. The tank should be pumped if:

- the sludge layer has built up to within 18 inches of the tank outlet; or
- if the scum layer thickens to within 3 inches of the bottom of the outlet baffle or sanitary tee.

Measuring the Scum Depth

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

Measuring the Sludge Depth

1. Wrap 3 feet of white rag or toweling around a long stick.
2. Place the stick into the sludge, behind the outlet baffle if possible.
3. Hold the stick there for several minutes.
4. Remove the stick noting the sludge line.
5. If the sludge line is within 12 inches of the outlet baffle, or within 18 inches of the outlet fitting, the tank requires pumping.

A device for measuring both the scum and sludge layers can be a clear plastic tube (approximately 8 feet in length) with a minimum 1-inch diameter. The plastic tube is first wetted, then lowered into the tank, through the layers of scum, liquid and into the solid layer. As the tube enters, it collects the layers of the septic tank within the tube. The tube is moved to the bottom of the tank. The device at the bottom of the tube closes and holds the material and liquid that has collected inside the tube. The tube is then gently lifted straight out of the tank. The outside of the tube is rinsed. Then measuring the two layers caught within the tube can be done quite easily.

The best (and cleanest) recommendation to your client would be to simply pump the tank on a routine maintenance schedule.

Inspection Criteria

1. Check the levels. A satisfactory liquid level occurs when the liquid level is below the inlet invert and equal to the height of the outlet invert. If the treatment tank is

overfull, there may be a problem in the distribution system or in the absorption area.
2. Check the scum and sludge. The scum thickness and the sludge depth should be evaluated through the main access port by using an instrument like a Sludge Judge or Sludge Stick.
3. Confirm that all of the fixtures in the house drain into the treatment tank.
4. Flush every toilet at least once. Use the observation port over the inlet or main access to see any changes in the treatment tank's liquid level. Look to see if there is clog or backup condition.
5. Check for continuous flow through the building sewer and into the treatment tank.
6. Pump each tank one by one. Pump all tanks and compartments using the main access or largest opening. Inspection ports should not be used for pumping tanks. Septage should be removed to within at least two inches of the tank bottom. Look for any sewage flow into the tank from the absorption field (inflow) while a tank is being pumped. Listen for trickling sounds that may indicate either backflow from the soil absorption system or groundwater seepage through a crack in the tank.
7. There may be a mid-seam in the tank that may be susceptible to leakage. Check that seam area. Tanks with a concrete top can have leakage at the seam around the top.
8. Check for leakage at the inlets and outlets.
9. Look for damage or defective system components while a tank is being pumped.
10. As each tank is pumped, look for inflow, cracks, holes, deficiencies that were previously hidden below the liquid surface. Look at the tank bottom. Make notes in your report as to the condition of the tank and your observations of the tank interior.
11. Check the baffles in every tank and compartment by looking at them through the inspection ports, or by using a mirror and flashlight through the main access of the tank. If the tank is aerobic, the electrical and mechanical operation of the pumps and compressors should be checked. Observe them while they are operating.
12. Using a mirror on a 45-degree angle, check the underneath side of the tank top. Insert the mirror through the main access. Shine a flashlight on the mirror and have the light bounce off the mirror and illuminate the dark parts of the tank. Check the tank's structural integrity. Confirm what material the tank is made of. Check the condition of the tank, the baffles, the sides, and the underside of the tank's top.
13. Measure the tank's shape and dimensions to determine the tank's capacity. Do this calculation for each tank in the system.

A functional inspection of the onsite treatment system is not complete until every tank is pumped and its condition evaluated, unless there is reason not to pump a tank.

The following table presents some troubleshooting for flow problems based upon the liquid level observed in the septic tank.

Observation	Condition and Cause

Liquid level is about 2 inches below the inlet and even with the outlet bottom. There is no apparent wastewater flow in the tank.	Tank is installed properly and at rest with no indication of backup based on liquid level.
Liquid level is below the inlet and elevated less than 2 inches above the bottom of the outlet. Free flow of wastewater from inlet to outlet is apparent.	Tank is installed properly and is currently in use with no indication of backup based on liquid level.
Regardless of observed wastewater flowage in the tank, liquid level is at or above the inlet bottom or it is elevated by 2 inches or more above the outlet bottom.	Tank is probably installed properly, but elevated wastewater levels indicate probable backup in the system downstream of the tank. The inspector should perform further evaluations or tests.
Regardless of observed wastewater flowage in the tank, the liquid level is at or below the outlet and the inlet is submerged.	Tank is installed up-gradient or installed backwards. Up-gradient tanks may appear to slope up towards the outlet end. Tanks installed backwards may have tees and baffles in reverse positions. Either condition should be corrected.
Regardless of observed flowage in the tank, liquid level is more than 2 inches below the inlet and the liquid level appears no more than 2 inches above the outlet bottom.	Tank is sloped down gradient. Depending on the severity of the slope, the tank may actually appear to slope downward toward the outlet. If the slope is minimal, no repair is necessary. Consider further evaluation.
Regardless of observed flowage in the tank, liquid level is below the inlet and outlet.	Tank may be leaking and may have structural problems. Pump the system and have a professional further evaluate and make necessary corrections.

Inspect the Cesspools and Seepage Pits

1. Determine the capacity of the cesspool or seepage pit.
2. Measure the distance from the water level to the bottom of the inlet pipe. For seepage pits: if the liquid is at or above the inlet invert, high liquid level conditions should be reported. For cesspools: if the liquid is at or above the inlet invert, the system has a failed, non-functional condition. It should be upgraded to a standard system as soon as practical.
3. Determine the daily flow using the local standards.
4. Determine the available storage capacity of the cesspool or seepage pit below the bottom of the inlet pipe.
5. Determine if there is capacity for one day's flow. If there is less than one day's flow capacity available, then a high liquid level condition should be reported.
6. Evaluate the liquid, scum and sludge levels, then pump the cesspool or seepage pit. Look for deficiencies or inflow.

Some cesspools have one or more overflow pipes or other outlets. Some may discharge into another secondary absorption area. Overflow pipes or outlets are not legal installations and indicate a need for correction and further evaluation. If you find an outlet pipe discharging wastewater to the ground surface, that condition should be reported as unsatisfactory.

Inspect the Holding Tanks

Sometimes homes are located in remote areas, or the home is located in an environmentally protected place such as a mountain, a beach, or a wetland area. These areas can be poorly suited for a septic system. Shallow or thin soils to limiting layers, rapidly permeable sand and bedrock, or steep slopes can all limit the ability of the natural soil to renovate wastewater to protect the public health and the environment.

A holding tank is a watertight tank built to meet the same construction standards as a septic tank. All wastewater generated by the home must be contained until it can be removed. The pumping of the holding tanks is scheduled on a regular basis. The sewage is pumped out of the tank and treated somewhere else.

Typically, the tank will be at least 1500 gallons in size to accommodate 2 to 3 people. Depending upon the use, a 1,000-gallon tank may require weekly pumping. To prevent tank overflow or backup, the tank is usually equipped with a visual and audible alarm that activates when it is 75 percent full. You may find holding tanks located near the driveway so it is easy for the pumper truck to access the tank. If a holding tank is used in wet areas with a high water table, the empty tank could float and lift out of the ground or at least shift, breaking the sewer pipe. Steps must be taken to drain the tank area, anchor the tank or pump only a portion of the liquid from the tank to prevent flotation.

Holding tank installations are restricted or prohibited in many areas of the country. If you come across a holding tank, it can be evaluated using the following minimum steps:

1. Check for the audible and visual alarms. Holding tanks should have alarms installed.
2. Determine the tank's capacity. The typical minimum for a holding tank's capacity is three days of flow (as determined by the local authority) or 1,000 gallons, whichever is greater.
3. Measure and record the liquid level in the holding tank.
4. Pump all the hold tanks and compartments. As each tank is pumped, look for inflow, cracks, holes, and deficiencies that were previously hidden under the liquid surface.
5. Record that the tank appears to not leak and is apparently watertight.
6. Discuss with the client how this type of tank requires frequent pumping and the relatively high cost in maintaining that service.

Inspect the Dosing Pumps and Siphon Tanks

Dosing and lift pumps and siphon tanks should be inspected just as treatment tanks are inspected. Dosing and lift tanks contain a pump that either lifts the effluent to another elevation or delivers a specific volume of effluent to a pressure distribution system at a specific pressure. Siphon tanks contain a device that operates on atmospheric pressure, and at a factory-set "trigger depth," the accumulated effluent is moved downhill under pressure.

Inspection Steps

1. Always check the absorption area before turning on either a lift or a dosing pump. If the pump has recently been pumping, finish the inspection before checking the water level in the absorption area.
2. Check the condition of the pump and siphon tanks. Use the same inspection procedure used for inspecting regular treatment tanks.
3. Check the alarm system.
4. Verify the operation of each pump and its control system. Use a tool such as a simple non-conductive pole or PVC pipe with a hooking device on the end of it — to grab the float and elevate it. Elevating the float of the pump will activate the pump and various components. (Additionally you could mark the pole or pipe every foot to help with measuring the tank levels.)
5. Visually inspect the electrical lines, cables, conduit, junction boxes, receptacles, switches, etc. Do not touch any electrical wires or components unless you have turned off (or de-energized the circuit). This is an extremely dangerous environment. Use all cautionary measures to protect yourself. If in any way you are not comfortable with the situation or feel incapable of continuing this part of the inspection, remove yourself and hire someone who can continue the work.
6. Verify that the pump and the alarm are on separate individual electrical circuits. The disconnects or breakers at the electrical panel should be specifically labeled as to identify which two circuits are for the pump and the alarm.
7. The pumps should be mounted on concrete blocks and elevated above the bottom of the tank. The pump should not be resting on the bottom of a tank. Pumps should not be suspended.

8. For siphon pressurized systems, open the observation port and check for continuous trickling. Run enough water into the siphon tank to cause the siphon to cycle. Watch for proper operation.
9. Measure and record the liquid level. Then pump all pump tanks using the main access (largest opening) for cleaning. Septage should be pumped out to within at least two inches of the tank bottom.
10. As each tank is pumped, look for inflow, cracks, holes and deficiencies, including the top and bottom of the tank.

Inspect Mound, Bed & Trench Systems

1. Determine the type, location and approximate size of the absorption area.
2. Determine if there is standing liquid in the absorption area by probing or other means available.
3. If there is liquid, measure the depth of the effluent through the absorption area. Measure the difference between the liquid's depth and the invert of the laterals at the D-box or the base of a lateral. This depth is called the dry aggregate. Do not use the inspection ports for this evaluation.
4. If there are inspection ports present, record their location on the site plan or sketch. Measure the liquid levels below the ground surface and record the measurements in the report.
5. A sufficient number of probes should be made in the absorption area by the inspector.
6. If there are 6 or more inches of dry aggregate below the invert of the laterals, the absorption area is considered satisfactory. If there are less than 6 inches of dry aggregate, there is a problem and a high liquid level should be reported.
7. When liquid is present in an absorption area, it should be of an equal depth and evenly distributed throughout the entire bed. If it is not, there is a problem and further investigation is needed. The problem may be:

    - the bed was not excavated with a level bottom;
    - there is some clogging of the aggregate;
    - a pipe may be crushed, clogged or broken; or
    - the D-box has a problem such as being out of level

In a gravity supplied trench system, the trenches should receive an equal amount of effluent from the D-box and the subsurface conditions observed during the probing of the area should be similar. If not, there is a problem and further investigation is needed.

Probing

One technique for inspecting a septic field and locating septic system components is Probing. A long metal rod or probe is used in the drainage field to poke holes down to the depth of the absorption bed. If the hole quickly fills with water, then there probably is a problem with the system. However, this is only a presumptive test. One may not conclude that if the hole does not fill with water, that the system is okay. The sewage flow may be especially low at that time. If the real problem is rain-related and it is dry when the probing is done, then the real problem will not be discovered during the dry-probing. Probing should be done only by an expert. It must be done carefully so as not to damage the lines buried underground. Fiberglass septic tanks can be damaged/punctured by indiscriminate probing and unsecured piping can be dislodged or broken. A final caution: even with care and expertise, there is little assurance that the probing has been done where the problem is present.

For a mound system:

1. Probe the aggregate in the manner described previously. Check to see if there's standing water. The determination of the condition of the absorption area is the same for mound systems as it is for subsurface systems. If the fill is saturated, the system could be described as "satisfactory." Several probes in the mound of the absorption area should be done to make an overall evaluation of the mounds system.

2. Check the mound for:

    - leakage or breakout at the top, side slopes, and toes;
    - sufficient depth of soil cover at the top edges;
    - animal burrows;
    - deeply rooted vegetation; and
    - erosion.

Note: If the absorption area is completely saturated, do not pump the treatment tank. If the aggregate is saturated to its entire depth, do not conduct a hydraulic load test.

Performing a Hydraulic Load Test

A hydraulic load test is a way to evaluate the absorption area by introducing a known volume of clean water (clear liquid) to the absorption area and observing what happens to the water levels. It mimics the normal operating conditions in the absorption area. The level of liquid in the absorption area is recorded both before and after the water is introduced. The inspector returns the following day and repeats the process.

Purpose

The hydraulic load test determines the volume of clean water an absorption area can absorb in a 24-hour period. The test verifies that the absorption area can receive and transmit to the soil environment the volume of liquid that the system is expected and intended to be able to handle on a peak-flow day.

The inspector may recommend a hydraulic load test be conducted to determine if the system is properly functioning when any of the following observations are made:

- high water condition in the absorption areas;
- the house has been vacant for more than seven days;
- new fixtures were directed to the system recently;
- recent soil-fracturing activity;
- Less than a 24-hour storage capacity in the cesspool or seepage pit;
- the treatment tank has been recently pumped; and/or
- there's a significant difference in the current water usage compared to the expected future water use in the house.

When a hydraulic load test is recommended, the client should be informed about what the test entails, why the test is being recommended, and the possible results of the test. If the client elects not to go through with the hydraulic load test, the inspector should attain a signed document and release from the client acknowledging that the test was recommended, but the client refused. If the test is refused, the inspector should include in the report any concerns the inspectors has about the system.

Comments That Might Be Used in the Report

- During the inspection process, the liquid level in the treatment tank rose significantly above the outlet pipe invert. This indicates a possible blockage of the outlet pipe or a saturated drainage area.
- During partial hydraulic loading, the liquid level in the tank rose above the inlet pipe invert causing a back-up of sewage toward the home, which is not caused by a physical blockage of the internal plumbing. This condition is indicative that the system may be malfunctioning. This condition should be reported to the health department.
- Due to the limited length of vacancy, normal hydraulic loading on the drainage area could not be duplicated.
- Although partial hydraulic loading was performed, it cannot duplicate the actual water use of future occupants. Therefore, it is not possible to predict how the system will perform given an increase in occupants.
- Within the home there is a grinder/ejector pump present. This unit is a part of the interior plumbing system, not the external septic system, and is not subject to inspection as part of a septic system inspection. However, the use of grinder/ejector pumps or garbage grinders will increase the suspended solids loading to a septic system. Increased frequency of pumping and maintenance of the system should be conducted to extend its serviceable life.

Preparation

During the test, no effluent from the house may enter the absorption area. Use the treatment tank as an interim holding tank by pumping the treatment tank prior to the test. No effluent may enter a cesspool or seepage pit. The client and occupants should be cautioned in this regard.

If rain is forecast for the 24-to-48-hour test period, recommend that the test be postponed.

Determine the loading rate of the system (number of bedrooms in house, gallons per day (gpd) for nonresidential uses). Use the daily flow standards set by the regulatory agency for the area where the system is located.

For single-family homes, the minimum test volume is 350 gallons (for one to two bedrooms). Add 150 gallons for the third and each additional bedroom. This is the calculated volume.

If the onsite well is to be the water source for the test, the owner should authorize its use.

Select a location downstream from the treatment tank to introduce clean water, ensuring that no solids are flushed downstream of the tank. Make sure that whatever fixture is to be used to introduce the clean water into the system is cleaned and clear of any solids or other obstacles.

Procedure

- For all absorption or seepage beds, dig one observation hole to the surface of the aggregate at the center of the bed. Bore or dig into the aggregate to a depth sufficient to measure a liquid level or until the underlying soil/sand is reached.
- For all trench type systems, dig one observation hole to the surface of the aggregate in each trench. Bore or dig into the aggregate to a depth sufficient to measure a liquid level or until the underlying soil/sand is reached.
- For each hole, establish a fixed and recoverable reference point from which to measure.
- Measure the distance from the reference point to:
- the surface of the aggregate
- the surface of any liquid in the aggregate
- If the liquid level is at the top of the aggregate, do not add water. If the liquid level is below the top of the aggregate, introduce clean water into the absorption area until the calculated volume has been added, or until the liquid level rises to the top of the aggregate.
- After the water has been added, wait thirty minutes for the liquid level to stabilize; then measure the distance from the reference point to the surface of the water, and record the liquid depth in each hole.
- Return 24 hours later and measure and record the distance from the soil surface to the top of the liquid.

- Introduce additional clean water to bring the liquid level to the level achieved on the prior day, or introduce the calculated volume, whichever is less.
- Record the volume of water introduced on the second day.

Procedural Differences for Cesspools and Seepage Pits

For cesspools and seepage pits, establish one observation hole and reference point at which to conduct observations and measurements. The observation hole should allow direct viewing of the liquid level.

Introduce either the calculated volume or sufficient clean water to bring the liquid level to the level of the inlet pipe.

Two Conclusions

The hydraulic load test is intended to approximate a one-day load on the system. The absorptive capacity will be determined. The results will reveal if the absorption area can satisfactorily receive and allow to pass into the soil the volume of sewage effluent that current regulations currently assign to a structure with the daily flow indicated.

Two conclusions are possible following a hydraulic load test, they are:

- The system has accepted and dispersed a volume of liquid equal to the calculated volume (daily flow) that is expected from the structure served, and is, therefore, "satisfactory."
- The system has not accepted and dispersed a volume of liquid (daily flow) that is expected from the structure served, and is, therefore, "unsatisfactory."

Hydraulic Load Test Report

Suggested language to add to the inspection report:

- Over a 24-hour period, the absorption area received and distributed ____ gallons of clean water into the soil. This is indicative of a (choose one) satisfactory OR unsatisfactory system.
- We provide no warranty, express or implied, including any warranty of merchantability or fitness for purpose, or any other warranty whatsoever, that the system meets any code or specifications, or will function properly for any period of time whatsoever, or otherwise will not malfunction or cause contamination of the ground or waters.

Hydraulic Load Test Release Form (Sample)

You are advised that a Hydraulic Load Test is recommended for the onsite wastewater treatment system at:

Location of System: _____

Municipality: _____

Tax Block/Lot: _____

Date of Inspection: _____

Reason for test:

⟨ Structure vacant more than seven days

⟨ New water sources directed to the system within last 30 days

⟨ Soil fracturing activity within last 30 days

⟨ High water conditions are observed

⟨ Less than 24 hours storage capacity in a cesspool or seepage pit

⟨ Evidence that the treatment tank has been recently pumped

⟨ A significant difference in the current water use in a structure compared to the anticipated use
of the structure

⟨ Other:_____

A copy of the hydraulic load test is attached for your review and has been offered for a cost of $_____. Refusal of the test requires acknowledgement of the following statement prior to the release of the final report.

I have been advised of the conditions surrounding the inspection of subject onsite wastewater treatment system identified above. Although it is recommended to conduct a hydraulic load test to fully determine the extent of the problems or concerns with the intended future use of the system, this test is refused at this time. This refusal will not be construed as part of, or result in, an incomplete inspection.

Signed: _____ Date: _____

(client)

Inspect the Accessory Components

Any observed accessory component should be noted in the report. An accessory could be an effluent filter to an alarm system added on to an otherwise functional system. An

accessory component is something added to a system that does not affect the system's operation as a conventional system. You should be familiar with the accessory component before inspecting it.

Alternative or Innovative Technologies

Any system using alternative technologies or innovative technologies as part of the system should only be inspected by those trained or otherwise familiar with the specific technology.

Determine When to Pump a Tank

Treatment tanks must be pumped on a regular basis to ensure proper functioning. If the tank is not pumped and maintained, solids will pass by the effluent tee or baffle and clog the absorption system. This will eventually lead to the failure of the system, including breakout and backup of effluent and sewage.

Tanks are usually sized to allow a little more than half of their volume for the solids to accumulate. The remaining volume of the tank, called the "clear zone," is for holding wastewater so that the solids and liquids separate, with the solids falling to the bottom of the tank. A standard tank will have a flow depth of 48 inches. A standard tank can store 16 inches of solids (scum and sludge combined) before pumping should be considered. One-third of a tank can be filled with solids, but the level of solids should not be more than one-third.

A common recommendation for pumping the tank is when:

- the sludge depth of the tank reaches 13 inches; or
- the scum depth reaches 5 inches.

A combined solids accumulation of 16 to 34 inches during a routine maintenance inspection indicates a need to pump the tank. If the accumulation of solids is over 2 inches, the scheduling of the pumping service may need re-evaluation. If the solids accumulation is greater than 34 inches, then there is a potential for problems in the absorption area.

In general, sludge accumulates three to four times faster than scum.

The following table shows some pumping guidelines for conventional septic tanks.

Solids at a 48-inch Depth Tank		
Depth Criteria	**Nonstandard Depth Tank**	**Recommended Action**
Combined solids < 16 inches	Combined solids < 1/3 flow depth	Pump at owner's discretion

Combined solids = 16 to 34 inches	Combined solids = 1/3 to ¾ flow depth	Pump the tank and re-inspect
Combined solids > 34 inches, or Sludge > 26 inches, or Scum > 11 inches	Combined solids > ¾ flow depth, or Sludge > ½ flow depth, or Scum 1/5 flow depth	Pump the tank, further evaluation recommended. A new inspection of system, tank, and use is needed.

The following table shows the combined solids depths and the range of sludge depths.

Combined Solids (inches)	**Acceptable Range of Sludge Depth (inches)**
16	11-13
17	11-13
18	12-14
19	13-15
20	14-16
21	14-16
22	14-17
23	16-18
24	16-19
25	16-20
26	18-20
27	18-21
28	19-22
29	20-24
30	20-24
31	21-24
32	22-25
33	22-26
34	23-26

Measuring Solids Depths

Open the inspection port. If there are two ports, open the port on the effluent side. Put latex gloves on. Measure the depth of the scum and sludge layers with measuring device. Record the measurements. Use the previous tables to determine the need for pumping or other appropriate actions.

Scheduling Maintenance Inspections

All onsite wastewater treatment systems require regular maintenance, which includes maintenance inspections and pumping if necessary. We recommend that homeowners with onsite wastewater (septic) treatment systems should hire an inspector every year to perform a routine maintenance inspection as part of their regular home maintenance plan. Schedule a routine maintenance inspection with your client at the end of your onsite, field inspection of the system. Inform your client of the importance of having a trained professional perform routine maintenance inspections in order to ensure the system is functioning properly. Routine maintenance inspections can point out potential issues that can be attended to before they become major problems. Performing routine maintenance inspections is a cost-effective way of maintaining a very important system.

Pump-outs

Because pump-outs are the most regularly required type of maintenance, the maintenance schedules are commonly based upon the anticipated need for pumping. Some systems may go for long periods of time without needing a pump-out. Such systems should still be inspected at least once over 5 years with a complete functional inspection to ensure that other types of maintenance and repair are not needed.

Scheduling functional inspections should be based upon the tank volume and the household occupancy. The following table can be used to determine the maximum interval of time between functional inspections.

Tank size (gallons)	**Household Occupancy (number of people)**			
	1-4	4-6	6-8	10 or more
1000	5 years	3 years	Undersized tanks	
1250	5 years	4 years	3 years	Undersized tank
1500	5 years	5 years	4 years	3 years

Quiz

A satisfactory liquid level in a treatment tank occurs when the liquid level is _____ the inlet invert and equal to the height of the outlet invert.

- below
- above

T/F: A functional inspection of the onsite treatment system is not complete until every tank is pumped and its condition evaluated, unless there is reason not to pump a tank.

- True
- False

If you find an outlet pipe from a cesspool or seepage pit that is intended to discharge wastewater to the ground surface, that condition should be reported as _____.

- unsatisfactory
- satisfactory
- functional

T/F: Dosing and lift tanks contain a pump that either lifts the effluent to another elevation or delivers a specific volume of effluent to a pressure distribution system at a specific pressure.

- True
- False

At a dosing pump, verify the operation of each pump and its control system by using a tool to grab and elevate the _____ and activate the pump.

- float
- electrical wires
- sludge
- check valve

T/F: For a dosing tank, verify that the pump and the alarm are on separate individual electrical circuits. The disconnects at the electrical panel should be specifically labeled as to identify which two circuits are for the pump and the alarm.

- True
- False

When liquid is present in an absorption area, it should be of an equal depth and _____ distributed throughout the entire bed.

- evenly
- unevenly

T/F: The hydraulic load test determines the volume of clean water an absorption area can absorb in a twenty-four hour period.

- True
- False

Report to the Client

Preparing the Inspection Form and Report

There are four conclusions that an inspector would write in an inspection report:

- Satisfactory;
- Further investigation is necessary to reach a conclusion;
- Satisfactory with concerns; or
- Unsatisfactory.

In addition to these conclusions that could apply to all components of the system, one conclusion can be applied to the absorption area only:

- Water level is less than 6 inches below the invert of the laterals or high water condition.

In addition to the conclusions, certain unsatisfactory conditions should be reported to the local health department within 24 hours of the inspection. These conditions include:

- breakout or sewage or effluent to the ground surface;
- seepage of sewage or effluent into the house below ground;
- backup of sewage into the house that is not caused by a blockage of the drainage pipe; and
- any manner of leakage observed from or into septic tanks, connecting pipes, distribution boxes or other components that are not designed or intended to leak sewage or effluent.

Every component of the system that is inspected should have a conclusion drawn as to its apparent condition.

If a component of the system is determined to be unsatisfactory, the system is unsatisfactory until the component is repaired or replaced.

Reasons for Further Investigation

Reasons for recommending further investigation and evaluation can include, but are not limited to, the following:

- The absorption area cannot be located.
- The D-box could not be located.
- Pump discharge is not adequate.
- There is less than 24 hours of capacity in the cesspool or seepage pit. That is a high water level condition.
- The house has been vacant for more than seven days. A hydraulic load test should be conducted.
- There is unequal distribution within the absorption area.
- The treatment tank is over-full, where the liquid level is above the inlet, and the absorption area is satisfactory.
- There are signs of unsatisfactory performance, including:
    - stains in soils adjacent to the treatment tank, on the ground surface;
    - stains or water level marks on the treatment tank walls;
    - debris stuck to the tank interior-side ceiling;
    - stains at the top of the aggregate; and/or
    - sludge in the aggregate.
- There is deterioration of concrete components.
- There are new fixtures in the house that are directed to the existing onsite treatment system within the last 30 days.
- There has been recent soil fracturing activities.
- There is lush vegetation at or near the absorption area.
- A drainpipe termination has been found near the stream, road or storm sewer, etc., and its function has not been determined.
- There are less than 6 inches of dry aggregate below the invert of the laterals. There is a high water condition.
- There is a separate gray water disposal system.
- Septage odors are found to be coming from the exterior foundation drainage system pipes or the sump pump.

Reasons for Having Concerns

The following conditions are concerns that should be written in the inspection report and discussed with the client.

- A high water condition was observed inside the treatment tank or D-box. This observation of water within 6 inches below the inlet elevation of the laterals is an indication of impeded drainage with the disposal area. The closer the water levels approach the laterals, or cover them, the more substantial the concern. While this "high water level" condition is not a "failure" of the system, it indicates that the system may be at or approaching the end of its service life expectancy. A high water level may require major corrective measures. The future owner may need to monitor water usage.
- There are solids above one-third of the tank's holding capacity. There's been delayed pumping of the tank and the tank is filling up with solids.
- There are no solids or there are low levels of solids in the tank without the record of recent pumping.
- The system's age is over 25 years.
- There is a lack of regular maintenance of the system.
- The access ports are more than 12 inches below the ground surface.
- The sludge level in the pump tanks are within 3 inches of the pump inlet
- Soil fracturing has been used to correct a system problem. These remedies are temporary in nature and indicate potential problems with the continued operation of the system.
- Cesspools or seepage pit systems have less than one day's storage capacity available.
- The number of bedrooms has increased and the system may be overburdened.
- There a constant flow of water from the building sewer pipe into the treatment tank is observed.
- The sump pump, foundation drainage system, or downspouts are discharging to the areas near the absorption area.

Reasons for Unsatisfactory Condition

There are reasons for reporting that a system is "unsatisfactory" that include, but are not limited to, the following:

- Breakout or ponding of sewage or effluent to the ground surface
- Seepage of sewage or effluent into the house from below ground
- Direct leakage or discharge through pipes of any sewage or effluent into the house
- Backup of sewage into the house that is not caused by a blockage of the internal plumbing system
- A tank that is leaking
- Leakage into a tank, access hole, or observation port
- Leaking component that is not designed to leak
- A leaking absorption area
- Damaged or missing baffles in a treatment tank

- Deteriorated component (such as a rusted metal tank)
- Clogged or broken pipe that carry effluent or sewage
- Non-functional electrical component (such as an aerobic device, pump, control, alarm, etc.)
- The ultimate disposal or discharge location was not determined by a dye test
- The sump pump, foundation drainage system, roof drainage system, or downspouts are discharging towards the onsite treatment system
- A well is located in close proximity to the absorption area
- There is a discharge of effluent or sewage to a well, bored hole in the ground, natural or man-made cavern or cavity, sink hole, stream or natural waterway

Corrective Measures that May Be Recommended

There are corrective measures that may be recommended in an inspection report. The client should be informed about the permit process and requirements when performing corrections to the onsite system. The completion of repairs should be inspected, and the inspector should verify that the problems were corrected. The corrective measures that may be recommended include but are not limited to the following:

- Install a new absorption area
- Replace or repair tanks, baffles, pipes, etc.
- Repair or replace electrical components
- Repair or replace aerobic treatment units, filters, etc.
- Correct all the area of infiltration
- Install water conservation devices
- Evaluate existing water use data and compare to existing design flow and projected future use
- Reduce the loading to the absorption area by:
    - Relocating improperly installed, discharging pipes (sump pump, downspouts, etc.)
    - Redirect piping to create separate graywater and sewage systems
    - Install water saving devices

Quiz

T/F: If the treatment tank is over-full, where the liquid level is above the inlet, and the absorption area is satisfactory, then further investigation is needed.

- True
- False

T/F: If there are recently installed fixtures in the house that are directed to the existing onsite treatment system, then further investigation is needed.

- True
- False

T/F: If there has been recent soil fracturing activities at the property, then further investigation is needed.

- True
- False

T/F: If there are solids above 1/3 of the tank's holding capacity, then there's been delayed pumping of the tank and the tank is filling up with solids.

- True
- False

Damaged or missing baffles in a treatment tank is an _____ condition.

- unsatisfactory
- satisfactory
- functional
- good

When the ultimate disposal or discharge location cannot be determined by a dye test, the condition is _____.

- unsatisfactory
- satisfactory
- functional
- good

Inspection Forms and Report

The inspection form is used by the inspector during the inspection process. The inspection form may be used as part of the completed inspection report. The form provides information regarding the type of system, overall condition, record of any problems found at the system, and suggested corrective measures. The report may include additional information for clarification purposes, but this is not required.

All inspection forms and inspection reports should be prepared, signed and dated by the inspector that conducted the onsite field investigation.

Draw a site sketch of the property, including the location of the system and other relevant items, including the house, vegetation, well, waterways, etc.

- Measure and record on the sketch the distances to the treatment tank lid and D-box from two fixed and permanent points of the house. This makes it easy for the system and components to be located in the future.
- The sketch shall not serve as an engineered or surveyed plan as a basis for future work on the site.

Conduct your inspection of the system and components.

Based upon your inspection of the treatment tank, distribution system, absorption area, pumps and electrical components, determine the condition of each component.

Select from the following list of terms to describe each inspected component:

- Satisfactory;
- Further investigation is recommended;
- Satisfactory with concerns;
- Unsatisfactory;
- Condition cannot be determined; or
- Not Applicable (N/A) – The component does not exist at the inspected system.

The inspection report should clearly indicate the condition of each inspected component. If more investigation is needed, the report should indicate the component, the problem associated with the component, and the type of investigation to be performed. Estimated costs may be included in the report, but that is not required.

Within 10 days of the inspection, a copy of the inspection report should be given to the local authority having jurisdiction over the onsite wastewater disposal system. If there is a failed or unsatisfactory condition that requires the attention of the local authority, then the local authority should be notified within 24 hours of the inspection.

Sample Inspection Documents

Four Sample Inspection Forms

Instructions Document:

Instructions to Complete the Septic Inspection Documents

FORM #1:

FORM #1 is the Ordering Form for an onsite wastewater septic inspection. The person ordering the inspection must complete this form. The form gives us information that will be used by the inspector.

FORM #2:

FORM #2 is the Septic Inspection Agreement with the client. The client should read the agreement carefully. The client or their representative must understand and sign the agreement.

FORM #3:

FORM #3 is the Property Owner's Authorization Form. This must be signed by the owner of the property/house or their representative before the inspection can be scheduled. This form is necessary because the inspector will be digging and probing the ground, and opening lids/covers.

Your inspection will not be confirmed until all paperwork requiring a signature is returned.

We recommend that both the Buyer and Seller (or their representatives) be present during the time of the septic inspection.

If you have any questions or need assistance to complete your forms, please do not hesitate to call:

You

Your Company

(555)-555-5555

The following 3 forms can be faxed to (555)-555-555 or scanned and emailed to: you@yourcompany.com.

Form #1

FORM #1 is the Ordering Form for an onsite wastewater septic inspection. The person ordering the inspection must complete this form. The form gives us information that will be used by the inspector.

SEPTIC INSPECTION ORDER FORM

Inspection Address:_____

Owner Name: _____

Client Name: _____

Client Address: _____

Client Phone Number and Email: _____

Seller's Agent: _____ Seller's Agent Phone: _____

Buyer's Agent:_____ Buyer's Agent Phone: _____

County: _____ Township: _____

Additional Information: _____

Method of Payment: _____

Age of House: _____ House Occupied? _____

# of Bedrooms: _____ If Vacant, For How Long? _____

How many people moving into the house? _____

Date of Last Pumping of Tanks: _____

Have There Been Any Concerns, Problems or Corrections to the System? _____

_____

Have There Been Fixtures Added to the Plumbing System of the House Since the Original Septic System was Installed? _____

_____

Additional Comments or Information: _____

_____

_____

Form #2

FORM #2 is the Septic Inspection Agreement with the client. The client should read the agreement carefully. The client or their representative must understand and sign the agreement.

Onsite Wastewater Treatment and Disposal Septic System Inspection Agreement

Thank you for considering *YourCompany* for your septic system inspection. This inspection agreement is intended to give you an overview of the scope of the inspection, inspection costs and the limit of liability for *YourCompany*.

The septic system inspection includes:

- Contacting local authorities to review records, data, and permits
- Contacting previous owners
- Contacting maintenance providers and contractors who have worked on the property
- Entering the property
- Location and opening of the main lid(s) of the septic tank
- Confirmation that all fixtures flow from the house to the treatment tank
- Measurement of the tank's liquid level
- Confirmation of water flow to the drainage absorption area
- Pumping of the tank(s)
- Inspection of the interior walls of septic tank and baffles
- Location drainage area
- Inspection of drainage absorption area via probing and/or soil boring
- Identify areas of sewage breakout, lush vegetation and odors
- Sketching of the site's system and other items and component including location measurements
- Detailed inspection report describing the condition of the onsite septic system

We can help you arrange a pumping-out of the septic tank(s) for an additional for a charge of $_____ per 1,000 gallons.

There are many factors that may affect the result of a septic system inspection. Some important factors for you to consider include:

- System design and installation
- Age of the system
- Number of current occupants in comparison to the number of occupants moving in

Please read the following disclaimer carefully. It explains the terms under which *YourCompany* will perform a septic inspection.

Disclaimer:

The septic inspection is based on the condition of the onsite wastewater treatment system observed at the time of the inspection. It does not predict future conditions. *YourCompany* makes no representation that the system was designed, installed or meets current standards. *YourCompany* does not warrant, guarantee, or certify the proper functioning of the system for any period of time. Because of numerous factors (usage, soil type, installation, maintenance, etc.) which affect the proper operation of a onsite treatment system, as well as the inability of*YourCompany* to supervise or monitor the use and maintenance of the system, this inspection report shall not be construed as a warranty by *YourCompany* that the system will function properly for the current owner or for any prospective buyer. *YourCompany* disclaims any warranty, either expressed or implied, arising from the inspection of the septic system.*YourCompany's* liability is equal only to the cost of the inspection.

Our service charges:

- Inspection of the onsite wastewater treatment system (no pumping, and includes up to _____ hours of inspection activities): $____
- Inspection of each additional system or graywater system: $_____
- Additional hours of inspection activities on-site (over the 3 included hours): $_____ per hour
- Hydraulic load test (2-day inspection) $_____ includes 3 hours first day and 3-hours 2nd day
- Weekend inspection: $_____ for Saturday
- Septic tank pumping: $_____ per 1,000 gallons

I have read and understand the agreement and the fees. I understand that due to unforeseen circumstances, additional work may be required to complete the inspection.

Your signature: _____

Printed name: _____

Date: _____

YourCompany

123 Anywhere Avenue

Anywhere, State Zip

(555)-555-5555

you@yourcompany.com

Form #3

FORM #3 is the Property Owner's Authorization Form. This must be signed by the owner of the property/house or their representative before the inspection can be scheduled. This form is necessary because the inspector will be digging and probing the ground, and opening lids/covers.

Property Owner's Authorization Form

Date: _____

Owner's Name: _____

Address: _____

Phone: _____

Ordered by: _____

Property Owner's Authorization:

I authorize *Your Company* to enter our property for the purpose of performing an inspection of the onsite wastewater treatment system, possibly including a hydraulic load test of the drainage area. I understand the inspection will involve probing and/or digging and a disruption of sod, grass or soil.

If there is an underground sprinkler system please call your installer to "mark out" the lines to avoid any breakage. If the property is landscaped, please call your landscaper to temporarily remove any plants that may be in the area of the septic system components. *YourCompany* is not responsible for any incidental, consequential damage incurred at the time of inspection.

Any alterations to this document will immediately make it null and void.

Signature of owner or their representative: _____

Printed name: _____

I hereby authorize the release of information to a potential buyer regarding any previous inspections, treatments, alterations, pumping, repairs etc. performed on or to the onsite wastewater treatment system(s) to be inspected.

Property owner's initials: _____

Any digging that may take place requires a Utility-Marking (Call Before You Dig Service) by the utility company. This takes approximately three full business days. In order for us to perform your inspection safely and to protect your underground utilities, a Utility Marking will be ordered. All underground utilities will be marked by the companies that serve your area. This marking is usually done with colored flags or spray paint.

Sample Inspection Report

Your Company

Address of Your Company

YourCompany Phone #, Email and Website

Inspector's Name

Today's Date

Re: Onsite Wastewater Treatment System at Inspection Property Address

Dear Client:

As requested, *Your Company* inspect the onsite wastewater treatment system at the aforementioned property address on _____ [date of the inspection]. This letter provides you with a report of the inspection. Based on the preliminary information you provided and the field inspection,

(Satisfactory)

we found the onsite wastewater treatment system to be in a satisfactory condition on the date of the inspection.

(Satisfactory with Concerns)

we found the onsite wastewater treatment system to be in a satisfactory condition on the date of the inspection, but there are some items about which we have concerns. Those concerns are:

[List concerns.]

(Further Investigation Recommended)

we are unable to verify that the onsite wastewater treatment system is presently in satisfactory working condition for the following reasons:

[List reasons.]

(High Water Indications)

Standing liquid in the absorption area was observed within 6 inches below the inlet invert of the laterals. The observation does not mean that the observed water levels above the invert elevation of the laterals are a manifestation of a failure. The observation of water within 6 inches below the inlet elevation of the laterals is an indication of impeded drainage. The close the water levels approach the laterals, or encompasses them, the more substantial the concern. The current or future homeowner may wish to conduct water-use monitoring and/or conduct reduced water use. While this observation is not a failure, it is an indication that the system may be nearing the end of its serviceable life and may require corrective measures in the near future.

(Unsatisfactory)

Corrective measures are required to bring the system into satisfactory condition. Some or all of the suggested activities may require a permit from the local authority having jurisdiction or the local/state health department. The appropriate authority must be contacted prior to any corrective activities commencing.

(Hydraulic Load Test)

A condition resulting in the recommendation for conducting a hydraulic load test was observed during the onsite inspection. The hydraulic load test is not required, but highly recommended to determine the extent of the problem(s) found. If the test is not conducted, a signed release statement should be provided by the client prior to the release of this inspection or any of the information contained in it.

(The condition of the system requires informing the local authority and/or health department)

Condition observed at the system at the time of the inspection requires informing the local authority and/or health department within 24 hours of the inspection.

At the completion of any repairs or corrections, we recommend that *Your Company* be hired again to inspect the system and verify that the system has been restored to a satisfactory condition.

This is an inspection report and not a warranty. *Your Company* does not provide any warranty or guarantee, express or implied, including any warranty of merchantability or fitness for purpose, of any other warranty whatsoever, that the system meets any code or specifications, or will function properly for any period of time whatsoever, or otherwise will not malfunction or cause contamination of the ground or waters of the State.

Sincerely,

Inspector's Name: _____

Inspector's Signature: _____

Your Company

Suggested Comments for Report

Additional Suggested Comments

Weather

- It should be understood that because of the dry weather (drought), the soil moisture levels are low, which can cause the system to appear more favorable as compared with other weather conditions.
- Excessive rain during the last 72 hours may affect the water level in the absorption area.
- The snow covering has prevented or inhibited the observation of the ground surface. This is an inspection restriction.
- Certain components could not be located and identified because of the cold weather and frozen ground conditions.
- A lawn sprinkler/irrigation system was found in the absorption area and should be removed.

Age of the System

- This type of system might be permitted for an existing property, but it does not meet current standards. We cannot predict the system's remaining service life.
- Systems older than 20 years are beyond their service life expectancy and are likely to require correction, major repair or total replacement.
- An onsite treatment system has a limited service life expectancy. Systems that are at least 20 years old may be considered functional by the homeowner, but are actually past their service life expectancy.
- The system is beyond its service life expectancy and is likely in need of correction, major repair or total replacement, even if the system is functioning at the time of the inspection.

Number of Bedrooms

- The number of bedrooms at the house is greater than that identified by the records or permits available. The system that was approved back then by the local building authority may have been appropriately sized for the system, but now there are more bedrooms, and the system's size has not been changed. It is not possible to predict how the system will perform given this increase in the number of bedrooms.

Commercial Activities and/or High Impact Hobbies

- Commercial activities and certain hobbies may place excessive hydraulic loading on the system, which may result in the discharge of undesirable substances into the septic system.

Repair History

- This is a re-inspection after an outlet pipe blockage was cleared. Outlet blockages are typically caused by solids carry over from the treatment tank. Water is now flowing freely to the drainage area, however we cannot ascertain how much, if any, sludge made its way into the drainage area.
- There have been significant alterations made to the system, which are not consistent with available records. We cannot verify that the system was repaired according to health department standards or if the alterations have adequately corrected any problems.

Occupants

- All aspects of the septic system were in satisfactory condition at the time of inspection. The water use by the current number of occupants, being ____ is substantially lower than the design rate for a five bedroom home, and the anticipated water use of the new occupants, being _____, will be significantly higher and it is not possible to predict how the system will perform given this increase.
- The drainage area is near its maximum capacity with the current water use. Any additional occupants or higher water usage may cause a system overload.
- The system was functioning at the time of inspection with the volume of water used by the current number of occupants, being _____. That typical volume is substantially lower than the design rate for the home (_____ bedrooms) and normal hydraulic loading cannot be duplicated. We cannot predict how the system will operate if the number of occupants or water usage increases. A hydraulic loading test may be used to further evaluate this disparity.
- Due to the length of vacancy, normal hydraulic loading on the drainage area could not be duplicated and we cannot predict how the system will function when the home is occupied. A hydraulic loading test may be used to further evaluate this disparity.
- The property was vacant at the time of the inspection. As explained during the inspection, normal hydraulic loading on the drainage area could not be duplicated during the inspection. We cannot predict how the septic system will function when the property is occupied.
- We recommend that systems not in use for an extended period or minimally used, have a hydraulic load test, for a more conclusive examination of the drainage area.

Washing Machine

- The washing machine is discharging onto the surface of the ground, which is prohibited. The washing machine discharge should be re-directed into the septic system or into a separate seepage pit system to reduce the hydraulic load to the septic system, extending its serviceable life.

Garbage Disposal

- The kitchen is equipped with a garbage disposal unit, which will increase the solids content being loaded into the septic tank. The use of garbage grinders is not recommended for use with septic systems, but if used regularly, more frequent tank pumping is needed.
- Garbage disposals place a higher level of suspended solids loading on the septic system. The septic tank should be pumped at a greater frequency/annually.
- Garbage disposal grinders are known to increase the scum layer accumulation rates by approximately 20 percent. Egg shells and coffee grounds break down at a very slow rate. Disposal of such wastes into a septic system will necessitate more frequent maintenance.

Maintenance History

- The treatment tank has not been adequately maintained. There are excessive solids in the tank and solids carryover into the drainage area is likely.

Date of Last Pumping

- The septic tank was pumped one week prior to this inspection. The septic tank had not reached operating level at the time of this inspection and normal hydraulic loading on the drainage area could not be duplicated. Please read the report disclaimer carefully.
- The septic tank was pumped two weeks prior to this inspection. The system has not received normal hydraulic loading. Please read the report disclaimer carefully.

Water Softener

- The water softener backwash currently discharges into the septic system. This discharge may damage certain types of soils. Although current construction standards do not require a separate seepage pit for this discharge, it may be prudent to redirect that discharge into a separate area other than the septic system. This can reduce the hydraulic loading to the septic system and can extend the serviceable life of the system.

Treatment Tank

- The tank is compartmented with an access lid on each end.
- The tank is inadequately sized for the home and does not meet current construction standards.
- The treatment tank does not meet current construction standards for size or construction material.
- This type of system, a cesspool, is permitted for an existing use, although it does not meet current construction standards. Any future repair to a cesspool system must include upgrades, at a minimum, to include the installation of an appropriately sized septic tank prior to the cesspool.

- Steel septic tanks have a useful life of approximately twenty years and have not been approved for new installations for over fifteen years. We recommend replacing the existing septic tank.

Condition of Tank

- The liquid level in the tank was well below the outlet pipe due to a hole. The tank is no longer watertight and does not comply with the current standards. Inserting a hole is a technique used by installers, to prevent the septic tank from floating prior to it being filled with water. This hole is not permitted under code and you may elect to have it repaired or the tank replaced.
- Minor deterioration has occurred in the treatment tank.
- The inlet and/or outlet baffle is damaged, broken or missing and should be replaced. Solids carry over into the absorption area is likely.
- The septic tank was not pumped during this inspection; size and condition are unknown.
- A small hole in the bottom of the treatment tank was observed. This does not meet current construction standards and may allow ground water to infiltrate into the system or allow inadequately treated wastewater to negatively impact the environment.
- The treatment tank has not been adequately maintained. There are excessive solids in the tank; solids discharge into the drainage area is likely.

Liquid Level Above the Outlet Invert

- During the inspection process, the liquid level in the treatment tank rose significantly above the outlet pipe invert. This indicates a possible blockage of the outlet pipe or a saturated drainage area.
- The liquid level in the treatment tank is above the inlet invert. This created a back-up of sewage into the building served, which was not caused by a physical blockage of the internal plumbing. This also indicates a possible blockage of the outlet pipe or a saturated drainage area. The treatment tank was not pumped and its condition is unknown.
- The liquid level in the treatment tank is above the outlet invert. This indicates a possible blockage of the outlet pipe or a saturated drainage area. The treatment tank was not pumped and its condition is unknown.
- This is a re-inspection after an outlet pipe blockage was cleared. Outlet blockages may be caused by solids carryover from the treatment tank. Water is now flowing freely to the drainage area, however *The Company* cannot ascertain how much sludge, if any made its way into the drainage area.
- The liquid level in the treatment tank is above the outlet invert. The drainage area was not saturated indicating a blocked outlet pipe. The outlet pipe should be cleared and the system re-inspected.

Treatment Tank Pumped for this Inspection

- During pumping, effluent from the absorption area flowed into the treatment tank, indicating a possible blockage or a saturated absorption area.
- The treatment tank has not been adequately maintained. There are excessive solids in the tank. To remove the solids, a combination of high-pressure water and vacuum will be required.
- The treatment tank was not pumped at the customer's request.
- The liquid level in the treatment tank was above the outlet invert upon arrival the tank was not pumped its size and condition was not determined.
- The treatment tank was not pumped during this inspection, its size and condition was not determined.
- The treatment tank could not be located. Additional investigation is required to determine the location of the tank.
- The liquid level in the septic tank was above the inlet invert. The tank was not pumped and its condition is unknown.
- Due to a high water level in the absorption area, the treatment tank was not pumped during this inspection. Its size and condition were not determined.

Structures are Near the System

- System components that are not readily accessible can make maintenance difficult. Excessive weight from vehicles or other sources may damage the system.

Evidence that Sewage Has Surfaced Above the Top of the Treatment Tank

- There is evidence of sewage above the treatment tank indicating a previously surcharged condition; solids carryover to the drainage area is possible.

Depth to Top of Tank

- The treatment tank is in excess of two feet below grade. A septic tank "riser" provides easy access to the tank and should be considered.
- The septic tank is over three feet below grade. A riser extended to grade would improve maintenance access.

Depth to Main Lid

- The main lid was not accessible.

Absorption Area

- The absorption area could not be positively identified due to its excessive depth below grade or the due to the amount of rock on the site. Further investigation is necessary to locate the absorption area.
- Due to soil conditions and/or depth, it's not always possible to locate all components of the system. While there were no blatant signs of overflow on the surface, or drainage problems evident, we cannot complete an evaluation of drainage components unless they can actually be inspected, this will require additional investigation.
- Accumulated snow prevented location of the drainage area. No evaluation is possible on this component of the system at this time.
- Due to extended cold weather and frozen ground conditions, not all system components could be identified.
- Numerous obstructions prevented identification of all system components. Placing excessive weight over system components can cause significant damage to the system. These obstructions should be removed or relocated and further investigation of the system is necessary to identify all system components.
- Effluent measurements varied considerably between sides of the system, possibly indicating uneven distribution.
- The drainage area is at its maximum capacity under current water use. (Only one occupant), any additional occupants or higher water usage may cause a system overload. A hydraulic load test is recommended to further evaluate the system.
- The absorption area is near its capacity under current water use. A significant increase in occupants or higher water usage may cause a system overload.
- The liquid level in the drainage area is above the top of the crushed stone. The drainage area is at its maximum capacity under the current water use and any additional occupation or higher water use could cause a system overflow.
- Sewage visible above or near any system components indicates a saturated condition that should be identified to the local health department.
- There is lush vegetation above the drainage area. This is an indication of high water levels.

- Any breakout of water at the ground surface requires immediate notification to the local health department.

Distribution Box

- Sewage identified above the lateral inverts in the distribution box indicates a saturated drainage area.
- The distribution box is showing signs of its age with slight deterioration and/or small cracks, but it is intact and holding water as designed.
- The distribution box is significantly deteriorated and is leaking wastewater, bypassing the absorption area. The distribution box should be replaced.

Summary

- During the inspection process, the liquid level in the tank rose above the inlet pipe invert causing a back-up of sewage toward the home, which is not caused by a physical blockage of the internal plumbing. This observed condition should be reported to the local health department immediately.
- Water level above the invert elevation of the laterals or high water condition was observed. This observation of water within six-inches below the inlet elevation of the laterals is an indication of impeded drainage within the disposal area. The closer the water levels approach the laterals, or encompasses them, the more substantial the concern. While this observation is not a failure, it is an indication that the system may be nearing the end of its serviceable life and may require corrective measures in the near future. The current or future homeowner may wish to conduct water use monitoring, reduce water use and/or find a physical remedy to correct the condition.

Terra-Lift

- The drainage area has been treated by the "Terra-Lift " process. The long-term effectiveness of this remedial action cannot be predicted. Please read the following disclaimer carefully.

Cesspool or Seepage Pit

- At the time of inspection the water level in the cesspool/seepage pit was at or above the inlet pipe invert. This indicates a saturated condition in the zone of disposal area.
- The liquid level is not touching the inlet pipe invert, however there is less than 24 hours worth of storage capacity left in the cesspool/seepage pit.

Calculating Tank Volume

There are several methods to calculate the volume of the septic system tanks depending upon whether they are cylindrical, square or rectangular.

Cylindrical Tanks

Method A

3.14 x radius squared (feet) x depth (feet) equals cubic capacity.

7.5 x cubic capacity equals capacity in gallons.

Example: 60" dia. tank, 48" liquid depth

3.14 x (2.5 x 2.5) x 4 = 78.5 cu. capacity

78.5 x 7.5 = 588.75 gal.

Method B

Diameter squared (inches) divided by 292.5 equals gallons per inch of liquid depth in tank. Depth (inches) x gallons per inch.

Example: 60" dia. tank, 48" liquid depth

60 x 60 # 292.5 = 12.31 gal. per inch

12.31 gal. per inch x 48 = 590.88 gal.

Method C

Diameter squared (in inches) x depth (in inches) times .0034 equals total gallons.

Example: 60" dia. tank, 48" liquid depth

(60" x 60") x 48" x.0034 = 587.52 gal.

Square or Rectangular Tanks

Method A

Length (feet) x depth (feet) x width (feet) equals cubic ft.

Cubic ft. x 7.5 equals gallons.

Example: 96" = length, 48" = width, 60" = depth

8 x 5 x 4 =160 cu. ft.

160 x 7.5 = 1200 gal.

Method B

Length (inches) x width (inches) divided by 231 equals gallons in each inch of liquid depth. Tank depth (inches) x gallons per inch equals total gallons.

Example: 96" = length, 48" = width, 60" = depth

96" x 48" = 4608/231 = 19.95 gal. per inch

19.95 x 60" = 1,197 gal.

Volume in gallons	**Style**	**Dimensions** Outside length x outside width x flow depth in inches
1,000	Single compartment	102 x 58 x 48
1,000	Lowboy	126 x 68 x 40
1,250	Single compartment	126 x 60 x 48
1,500	Single compartment	126 x 68 x 48

Diameter(inches)	**Volume(gallons) and Flow Depth (inches)**			
	500	**600**	**750**	**900**
60	41	49	61	74
72		34	43	51
84			31	38

Sewage Flows

Volume of sanitary sewage

The criteria for estimating the volume of sanitary sewage from private residential sources shall be as follows:

The daily volume for each bedroom or dwelling unit shall be:

- First bedroom 200 gallons per day ("gal/day")
- Each additional bedroom 150 gal/day
- Minimum volume per dwelling unit 350 gal/day

Septic System Additives

A number of companies sell products under the claim that routine addition to the toilet or septic tank will improve the system's function and will restore the flow to "slow plumbing." Most experts consider these claims to be unsubstantiated. Your client should know that wastewater flow problems, which originate in a septic system, could be symptomatic of major system failure. Without the proper attention of a wastewater professional, such problems will usually get worse and more expensive to repair. Relying on additives to fix septic system problems is not recommended.

Quiz

When sketching the site, you should measure and record on the sketch the distances to the treatment tank lid and D-box from _____ fixed and permanent points of the house.

- two
- one
- four

Select from the following four of terms to describe each inspected component: (1) Satisfactory, (2) Further investigation is recommended, (3) Satisfactory with _____; and (4) Unsatisfactory.

- concerns
- worries
- troubles
- major defects

If there is a failed or unsatisfactory condition that requires the attention of the local authority, then the local authority should be notified within _____ hours of the inspection.

- 24
- 2
- 72

Onsite System Inspection Form

Onsite Wastewater Treatment System – Inspection Form

	Notes
Inspection Process Overview Preliminary system information Inspection of treatment tanks Inspection of absorption area	

Inspection of disposal/conveyance system
Identification of any alternative technology and approved components

Requires additional inspection

Client Information	Client name: _____ Owner name: _____ Client's address: _____ _____ _____ Phone: _____ ___ Email: _____ ___	Onsite System Information	Inspector name: _____ Date: _____ Property Address: _____ _____ _____ Additional Information: _____ _____ _____

Preliminary Information:
Weather:
_____
Last precipitation:
_____
Age of system: _____
Number of bedrooms: _____
Number of systems being inspected:
_____
Commercial activities or high impact activities: _____
_____
Prior problems and/or repair history including soil fracturing or use of chemical additives: _____
_____
_____
_____

Is there a site plan or septic map available?	Yes No
Is the house occupied?	Yes No
If yes, how many occupants? _____	
If no, date last occupied? _____	
Is washing machine draining to a separate gray water system?	Yes No
Are there any other gray water systems?	Yes No
Are there sump pumps discharging to the system?	Yes No
Any record of past sewage backups into the house?	Yes No
Do all of the fixtures drain into the treatment tank?	Yes No
Is the tank pumped regularly?	
What's the frequency of pumping? _____ _____	
Date of last pumping? _____	

Comments:

Form Continued

Treatment Tank:

Type of tank being inspected:

- Anaerobic
- Aerobic
- Cesspool
- Seepage pit
- Other: _____

Gray water tank: _____

Multi-compartment: _____

Material of tank:

Concrete Block Steel Plastic Other

_____

Approximate Volume of Tank: _____

_____

Condition of Tank:

Top and lids/covers	Satisfactory	Unsatisfactory	n/a
Inlet baffle	___	___	___

Main tank lid/cover was opened for inspection?	Yes No
· Liquid level below the tank's inlet invert?	Yes No
· Liquid level below the tank's outlet invert?	Yes No
· Treatment tank pumped for this inspection?	Yes No
· Are all tanks located away from structures and high impact areas?	Yes No
· Is the area clear of evidence of any breakout or seepage to the ground surface of effluent?	Yes No
· Does water flow unimpeded from the treatment tank?	Yes No
· Is there an effluent filter installed as part of the system?	Yes No
· Are there any types of accessory units installed? Yes No	Yes No
· Depth to top of tank: _____ inches	Yes No

Outlet baffle ____ ____ __ _ Cracks or leakage ____ ____ ____ Sewage Flow from house ____ ____ ____	· Depth to top of tank access: _____ inches · Comments:	Yes No

Absorption Area:
Type of absorption area:
Disposal bed
Seepage pit
Cesspool
Disposal trench
Mounded
Other: _____
Was the absorption area located? Yes No
Are inspection ports installed? Yes No
If yes, how many? _____
Was a separate probe dug in the absorption area to confirm the observations in the inspection ports? Yes No
Is the area of the absorption system free of sewage odors? Yes No
Does the sewage flow from the treatment tank to the absorption area without flowing backwards? Yes No
Are there areas with lush vegetation? Yes No
Is the distribution box (D-box) in satisfactory condition? Yes No

Comments:

Form Continued

Draw a sketch of the site plan, with location of house, system, tank, and other relevant items, including driveway, vegetation, well, etc.

Dosing or Pump Tank:	Yes	No	n/a
Does the system contain a pump tank?			
Is the pump operating?			
Does the alarm on the pump work?			
Is the pump elevated above the tank floor?			
Is the lid in satisfactory condition?			
Is the tank is satisfactory condition?			
Is the tank free of accumulated solids?			

Summary:	Satisfactory	Satisfactory with Concerns	Unsatisfactory	Requires further evaluation	n/a
Condition of the treatment tank(s)?					
Condition of the conveyance and pump system?					
Condition of the absorption area?					
Condition of any accessory components?					

Comments:

Reporting to Local Authority and/or Health Department:

Report if any of the following conditions were observed during the inspection:

Ponding or breakout of sewage or effluent onto the ground surface
Seepage of sewage or effluent into part of the house below ground
Backup of sewage into the house that is not caused by a physical blockage of the internal drainage plumbing
Any manner of leakage observed from or into the septic tanks, connecting pipes, distribution boxes, or other components that are not designed to emit sewage or effluent.

Notification of any observation that is consistent with a condition noted above should be reported to the local authority having jurisdiction within 24 hours of the observation. Regardless of the observations made, a copy of the inspection report should be provided to the local authority having jurisdiction over onsite wastewater treatment systems within 10 days of the inspection.

Describe any and all observed conditions that are of a concern in relation to the system:

Terminology for Onsite (Septic) Wastewater Treatment Systems

Terminology

A

Absorption area: an area to which effluent emerging from a septic tank, aerobic unit, or sand filter is distributed for infiltration into the soil; only certain soil types and geologic conditions are appropriate for absorption areas. Synonym: absorption bed, absorption field,leach field, drain field, soil absorption area.

Absorption bed: see absorption area.

Access port: see inspection port.

Aerate: to supply with air; in sewage treatment, to mix air with sewage to promote biological decomposition or treatment of the sewage.

Aerobic: living in the presence of oxygen; refers to sewage-degrading bacteria (usually in the soil) that must have oxygen to survive.

Aggregate: washed gravel or stone with a diameter of approximately ¾-inch to 1½ inches used as an effluent storage and distribution medium in the absorption area.

Anaerobic: not requiring oxygen to live; refers to certain species of sewage-degrading microorganisms in a septic tank. Also means anoxic.

Application rate: the rate at which the effluent from a septic tank or aerobic unit is applied to the absorption area; usually expressed in gallons/day/square foot (gpd/sq.ft.).

B

Back flush: usually refers to removing contaminants from a water softener and sending the brine discharge (containing high concentrations of sodium, calcium, and magnesium) to the sewage treatment unit; in some areas this is not allowed if the sewage treatment unit is a traditional septic system. Also called back-wash.

Baffle: a device installed in a septic tank or distribution box to slow the velocity of liquids and increase settling of solids; limits movement of solids to the absorption area. Also called a deflector.

Berm: a raised area of soil that diverts precipitation or runoff away from an absorption area; also, an earthen structure to support the sides of a sewage system that is above grade or on a slope.

Biomat: see organic mat.

Black water: liquid waste from toilets (as opposed to gray water, the liquid waste from sinks, washing machine, water treatment devices, showers, tubs, etc.).

C

Cesspool: perforated concrete tank that receives household sewage directly and does not follow a septic tank or aerobic unit; not considered by most health departments to be appropriate for sewage treatment; often mistakenly confused with a dry well or seepage pit.

Cleanout: see inspection port.

Conservation device: any device that limits the amount of water used in a given activity, such as low-flow showerheads, water-saving toilets, water-saving faucets, composting toilets, toilet dams. Also called water-conservation device or flow-restrictor.

Curtain drain: a drain installed below the soil surface to limit the flow of groundwater into a sewage treatment system. Also called vertical drain, under drain.

Cut-and-fill system: an absorption trench system in an area where impermeable soil is found above permeable soil; impermeable layer is replaced with permeable soil. Also called a soil-replacement system.

D

Decay-resistant: see inert solids.

Decomposition: rotting; in sewage treatment, reduction of volume and type of wastes due to action of microorganisms. Digestion.

Digestion: see decomposition.

Distribution box: a concrete, fiberglass, or plastic box that is situated between the septic tank and absorption area to evenly distribute effluent by gravity flow from the septic tank to the absorption area. Also called distribution device or D-box.

Dosing: using a pump or siphon to move effluent from the septic tank to the pipe network of an absorption area; movement through the pipe network is by gravity; dosing assists in even distribution of the wastewater into the absorption area; not the same as pressure distribution, which uses a pump to move effluent through the pipe network.

Dye test: a test to determine leaks/failure in the on-site sewage treatment system; a fluorescent dye is added to the toilet tank, and the sewage treatment system is examined for evidence of dye appearance. Fluorescent dye test. Typically not used for this purpose alone. Dye is used in conjunction with other investigation means. Dye is primarily used for confirming the discharge location of a particular fixture or confirming a leaky toilet.

E

Effluent: the liquid that is released to or from a septic tank or aerobic unit; raw effluent is that which has not been treated in any way; treated effluent is that which has gone through a septic tank, aerobic unit, or absorption area.

Enzymes: in sewage treatment, a substance produced by living cells that is marketed as an additive for septic tanks to speed decomposition of solids; enzyme addition is usually not necessary in a septic tank due to the large number of microorganisms present in human waste that are able to decompose the solids in the tank.

Evaporation-transpiration (El) systems: movement of effluent upward through the soil and overlying vegetation and into the atmosphere, rather than downward movement into the soil; usually used when more traditional sewage treatment systems are not suitable; very specific design criteria must be met for system to be approved.

F

Failed system: a sewage treatment system that no longer effectively treats household waste; generally has a visible surface discharge, or may be indicated by plumbing system back ups.

Flow restrictor: see conservation device.

G

Gas deflector: venting provisions in your septic tank that direct gases safely away.

Gas vent: vent for the accumulated gases that form in the septic tank during decomposition, mostly located on the roof of the house.

Geo-textile: permeable material used to cover aggregate in trenches to prevent soil from mixing with the aggregate following back-filling operations but allowing air and moisture to move through the soil and aggregate; aggregate may also be covered with untreated building paper or clean hay.

Gravel: filling material for trenches in which the distribution lines lie. It is used for eased discharge of wastewater to the soil.

Gravel-less absorption system: see absorption chamber.

Gray water: effluent from household sinks, shower/bathtub, clothes washer, water treatment units, etc., that does not contain toilet waste.

Groundwater: subsurface water that originates as rain or snow melt; groundwater seeps through the soil profile until reaching a depth where all soil/rock pores are filled; the top of this saturated zone is called the water table.

H

Holding tank: a watertight tank, similar to aseptic tank, that collects waste and holds it until it can be pumped and transported to a sewage treatment system; used on small lots with no suitable absorption area or in a location too isolated for a community system; use is frequently restricted by health department regulations.

Household hazardous waste: any of a number of products found in the kitchen, bathroom, garage, or garden shed that by their chemical nature can poison, corrode, explode, or burst into flame when handled improperly.

Hydraulic load: the amount of effluent applied to the absorption area; can be decreased by using water conservation devices; hydraulic overloading occurs when the absorption area receives more effluent than it can effectively treat; this can result in ponding.

I

Inert solids: the solid portion of household waste that cannot be decomposed by microorganisms such as sanitary napkins, grease and other solids. Grit, and decay resistant materials.

Infiltration rate: the amount of time necessary for effluent to flow from the absorption area into the soil; varies with soil type and other environmental factors, and is usually expressed in gallons/day/square foot (gpd/sq. ft.) measured by a percolation test.

Inspection port: an access hole in the septic tank to allow inspection of the tank or its contents; tank should always be pumped through central access manhole. Also called manhole, access port, clean-out.

L

Leach field: see absorption area.

Liquid layer: wastewater in a septic tank that is between the overlying layer (scum) and the underlying layer (sludge); after exiting the septic tank, the liquid layer becomes effluent that flows to the absorption area. The clear zone or clear space.

M

Manhole: see inspection port.

Mound: a type of soil absorption area that is raised above the natural soil surface using an appropriate fill material; smaller than a raised bed system; used when the depth of permeable soil is less than the required 4 feet or in areas of high water table.

Multi-compartment: a septic tank with more than one chamber to increase removal/separation of solids (primary treatment). Also called dual-chamber tank.

N

Nasty: term sometimes used when describing something that smells really bad.

O

Onsite treatment system: a general term referring to any of the various systems for treating waste emanating from a household plumbing fixture or water treatment unit.

Organic mat: the microorganisms and organic matter that build up around a soil absorption area at the media soil interface; can be especially prevalent with sand filters. Also biomat.

Outlet pipe: the pipe conveying wastewater out of a vessel (septic tank, distribution box, etc.).

Overflow pipe: a flow-relief pipe to convey excess wastewater from a vessel (drop manhole, dosing siphon, tank, cesspool, seepage pit, etc.).

P

Percolation or perc test: a method of determining the suitability of the soil for an absorption area; a test hole is dug, water added to the hole, and the rate of infiltration of water into the soil is determined.

Perforated pipe/tile: the pipe in an absorption area that contains regularly spaced holes to release effluent into the media, such as sand or aggregate and then into the soil.

Permeable: allowing liquid to pass through; used when describing soil absorption systems and their suitability for sewage treatment.

Ponding: if the hydraulic load is too high for the drain field, the water can come up to the surface and form small ponds of untreated wastewater.

Pressure distribution: using a pump to distribute septic tank or aerobic unit effluent through the pipe network of a soil absorption area resulting in a more even distribution of effluent over the soil than does gravity distribution.

Primary treatment: the treatment of household sewage that takes place in a septic tank; separates floating and settleable solids from raw wastewater.

R

Raised system: an absorption trench system constructed in appropriate fill material placed above the natural soil surface;larger than a mound system. Also called mound or raised-mound system.

S

Sanitary tee: see baffle.

Saturated soil: soil that has all spaces between soil particles filled with liquid.

Scum: the wastewater in a septic tank that is less dense than the liquid layer and floats on top of the liquid layer. Also scum cake.

Seasonal high water table: the top of the saturated soil layer at critical times of the year; groundwater that occasionally rises above its normal level in the soil and can interfere with the onsite sewage treatment system.

Secondary treatment: soil processes that treat effluent from a septic tank; primary treatment occurs in the septic tank.

Seepage pit: a covered pit with a perforated lining that accepts effluent from a septic tank and allows it to infiltrate the surrounding soil; may replace the soil absorption area and often incorrectly called a cesspool. Also leaching pit.

Septage: the contents (sludge, liquid layer, and scum) extracted from a septic tank.

Septic tank: a watertight concrete, fiberglass, polyethylene, or steel tank that is buried in the ground and accepts sewage from a household.

Septic tank additives: any of a number of products that are marketed to decompose waste in a septic tank; most are not necessary and some are actually harmful to the microorganism population in the tank.

Septic tank pumping: the process by which the contents of the septic tank (septage) are removed and hauled to a sewage treatment plant for further treatment or to a land-spreading operation.

Sewage: the human and household waste discharged through the home plumbing system. Also wastewater.

Sludge: the accumulated solids that settle to the bottom of a septic tank. Also solids layer.

Subsurface disposal system: any sewage treatment system that is buried beneath the soil surface.

Suspended solids: solid material that is suspended in the liquid layer.

T

Trench: an excavated area of soil in the absorption area into which aggregate and perforated pipe are laid for the purpose of distributing septic tank or aerobic unit effluent. Also absorption trench.

U

Untreated building paper: a permeable material often used to cover aggregate in trenches to prevent soil mixing with aggregate following back-filling operations while allowing air and moisture to move through soil and aggregate; aggregate may also be covered with geo-textile or clean hay.

Usable soil: the depth of soil available in an absorption area that is suitable for secondary treatment. Also available soil.

V

Vent: an outlet for gases from the sewage treatment system.

W

Wastewater: the human and household waste discharged through the home plumbing system. See sewage.

Water table: the top of the area in soil where all soil/ rock pores are filled with liquid.

Quiz

T/F: In this course we learned that relying on additives to fix septic system problems is not recommended.

- True
- False

_____ is defined as living in the presence of oxygen; refers to sewage-degrading bacteria (usually in the soil) that must have oxygen to survive.

- Aerobic
- Anaerobic

_____ a device installed in a septic tank or distribution box to slow the velocity of liquids and increase settling of solids; limits movement of solids to the absorption area.

- Baffle
- Berm
- Aerator
- Stopper

_____ box is defined as a concrete, fiberglass, or plastic box that is situated between the septic tank and absorption area to evenly distribute effluent by gravity flow from the septic tank to the absorption area.

- Distribution
- Sewage
- Scum
- Solids

_____ is the liquid that is released to or from a septic tank or aerobic unit; raw effluent is that which has not been treated in any way; treated effluent is that which has gone through a septic tank, aerobic unit, or absorption area.

- Effluent
- Sewage
- Clear water
- Septic

T/F: A sanitary tee is a baffle.

- True
- False

_____ refers to the accumulated solids that settle to the bottom of a septic tank.

- Sludge
- Scum

_____ refers to the human and household waste discharged through the home plumbing system, or sewage.

- Wastewater
- Effluent
- Liquid flow
- Solids

Homeowner's Guide to Septic Systems

A Homeowner’s Guide to Septic Systems

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.

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.

Top Four Things You Can Do to Protect Your Septic System

1. Regularly inspect your system and pump your tank as necessary.
2. Use water efficiently.
3. Don’t dispose of household hazardous wastes in sinks or toilets.
4. Care for your drainfield.

How does a septic system 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.

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.

Septic system aliases:

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

Tip

To prevent buildup, sludge and floating scum need to be removed through periodic pumping of the septic tank. Regular inspections and pumping 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 is a bargain when you consider the cost of replacing the entire system. Your system will need pumping 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 a typical 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). Alternative systems with electrical float switches, pumps, or mechanical components need to be inspected more often, generally once a year. 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.

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.

- 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 washing machine 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,
visit http://www.epa.gov/watersense/index.html.

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 or replacing your existing toilets with high-efficiency models.

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.

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.

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.

Septic System Dos and Don'ts

(adapted from National Small Flows Clearinghouse)

Dos

- Do ask your inspector if your system can handle your garbage disposal grinder.
- Do conserve water. Putting too much water into the system can eventually leak to system failure.
- Do repair leaky faucets or toilets, and install high-efficiency fixtures.
- Do avoid long showers.
- Do clean the toilets, sinks, showers, and tubs with a mild detergent or baking soda instead of commercial-grade cleaners and laundry detergents.
- Do ask your inspector about allowing the water softener to backflush into the septic system.
- Do keep records of repairs, pumpings, inspections, permits issued, and other system maintenance activities.

- Do keep a sketch of your system including measurements from two points on the house.
- Do have your septic system inspected and pumped as part of a regular home maintenance plan.
- Do have only grass over your septic system. Roots from nearby trees or shrubs could cause problems for the absorption area.
- Do make sure that a concrete riser is installed over the tank if the opening is not within 12 inches of the surface, providing easy access for measuring and pumping the tank.

Don'ts

- Don't use your septic system like 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 commercial-grade drain cleaners to clear a clogged drain. Instead, use boiling water or a drain snake to open clogs.
- Don't allow surface water to flow over the tank or absorption area.
- Don't drive heavy equipment, trucks or vehicles over 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.
- Don't dig in the absorption area.

Adapted from the public documents located at www.**epa**.gov/owm/**septic**/pubs.

Quiz

T/F: 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.

- True
- False

Emptying the _____ tub water into the septic system stirs the solids in the tank and pushes them out into the drainfield, causing it to clog and fail.

- hot
- laundry
- bath
- shower

T/F: Eliminating the use of a garbage disposal can reduce the amount of grease and solids entering the septic tank and possibly clogging the drainfield.

- True
- False