ON-SITE WASTE DISPOSAL SYSTEMS
Types, Design, Inspection - Septic Systems

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Source: The Septic Systems Information Website - Inspecting, Testing, Designing, & Maintaining Residential Septic Systems - http://inspectapedia.com/septbook.htm

Watch out: Septic systems present cave-in, collapse, methane gas, & bacterial hazards that can lead to explosion, infection, even death. Inspectors must avoid personal injury, and are expected to recognize and take proper action for visible & readily apparent safety hazards at any site they enter. Don't fail to issue appropriate safety warnings if you detect unsafe conditions. Immediate, fatal hazards may be present. See
SEPTIC SYSTEM SAFETY WARNINGS - http://inspectapedia.com/septic/septicsafety.htm

Basics of Onsite Wastewater Treatment & Disposal

Blackwater – includes sewage (toilet waste)
Graywater – other fixture wastewater: sinks, showers, tubs, dishwashers, laundry
Biomat – the layer of bacteria and fungi that forms under & around a drainfield trench

Septic Wastewater Treatment:

Wastewater includes toxics and pathogens: bacteria, heavy metals, chemicals, nitrates, nitrites, other

Aerobic & anaerobic bacterial action reduces the level of pathogens for safe dispersal of effluent in environment
Solids are retained in septic tank for removal and approved solids-disposal

- Only about 40% treatment in typical septic tank
- Additional treatment occurs in the drainfield in the biomat and soils
- Up to 95% or better treatment in advanced systems (aerobic, filter media)
- Final treatment by disinfection in some advanced systems
- Cesspools and other "deep" systems cannot adequately treat pathogens

Failure to treat means environment or even local well, lake, stream contamination – illegal

Septic Wastewater Disposal: getting rid of the liquid effluent by soil dispersal (enters area groundwaters) and evaporation ("evaporation – transpiration")

I **Some Types of Septic Systems & Designs**

I-A. Basic Septic Systems/Designs

A. **Cesspools** – Hand dug pit, site built (block, stone) or pre-cast concrete, to accept blackwater

- May be the only wastewater disposal system
- May be accompanied by separate drywells (graywater)
- Only liquids permeate soil
- Solids require frequent removal
- Periodic relocation required
- Old property: may find a string of "extended" cesspools
- Site built, very dangerous, high risk of collapse, fatality
- Cannot adequately treat septic effluent (too deep, low oxygen)
- Failure criteria: waste within 12" of inlet; less than ½ days storage; too close to surface water; too close to well
- Cesspool restorers??
- Cesspool pumping????
- CESSPOOLS - http://inspectapedia.com/septic/septcesspools.htm

B. **Seepage pits** – Hand dug pit, like cesspools, but receives effluent from a septic tank for further "treatment" & disposal

- Work with an existing septic tank
- Used when insufficient space for a drainfield
- Cannot adequately treat septic effluent (too deep, low oxygen)

C. **Drywells** – hand dug pit, site built (block, stone), or pre-cast concrete, to accept graywater (laundry, sinks, tubs)

- If present with conventional tank & drainfield = clue about limited drainfield capacity
- Reduces load on drainfield
- Extend life with input filter
- Drywells are not "dry" in areas of seasonal wet soils or flooding

D. **Septic Tanks & Drainfields** (leach fields, leach beds, soakaway beds, dispersal beds)

- Tank + baffles retains solids, permits effluent to flow to drainfield or seepage pit
- Solids settle out and are partially decomposed
- Liquid effluent discharged into disposal area
- Fields can rarely be restored by chemicals, treatments (caustic, contaminants, illegal, or ineffective, lack science, questionable research, mostly testimonials, a few products may be helpful; aerobic conversions improve treatment level) – we have never had a report of a long-lasting septic drainfield rejuvenation;
- SEPTIC DRAINFIELD RESTORERS? - http://inspectapedia.com/septic/Drainfield_Rejuvenation.htm
- Periodic pumping of septic tank required
- SEPTIC TANK PUMPING SCHEDULE - http://inspectapedia.com/septic/tankpump.htm

Typical Gravity Septic Tank System: Tank, D-box, Drainfields

Septic Tanks

Septic Tank Materials:

- Steel – limited life, covers & baffles rust off; lost baffles = shortened field life; low levels = rusted out bottom or lower sides; collapse hazards. Steel tanks may have only a 5-year life!
- Concrete – long life; spalling, cracking, baffle erosion
- Plastic/Fiberglass – recent, durable, float up if not filled
- Site-built – concrete block, stone; unsafe, collapse risk, usually under-sized, limited capacity.
- Wood has no life;

Septic Tank Sizes

- 250 gal & 500 gal = obsolete, inadequate, not permitted in most new installations
- 1000g to 5000g
- Size needed based on daily wastewater flow
- Net free area: subtract scum & sludge
- Settlement time depends on net free area size & system usage – incoming wastewater volume & frequency
- Too-small net free area sends solids into drainfield

Multiple tanks or Tank compartments

- Improved separation of solids
- Increased net free area
- Longer drainfield life
- Improved effluent treatment
- Required for some designs (aerobic)

Junction/distribution Boxes (drop boxes)

- Junction box-connects tank discharge line to effluent disposal lines
- One or more drop boxes or d-boxes for individual fields, usually one
- May find multiple distribution boxes for multiple fields (fan type)

Septic Drainfields, Seepage Beds, Soakaway Beds, Leach Fields, Leaching Beds

- **Drainfield**: [leach field, leaching bed, soakaway bed, gravel trench, galleys, drainaway bed]: disposes of & treats septic effluent by soil absorption & soil bacteria, typically in trenches of buried pipes, surrounded by gravel, or in galleys of no-rock or gravelless designs.

- **Cesspool**: a pit lined with open stone, concrete block, pre-cast concrete, that receives black water and disposes of effluent into the soil. Cesspools do not adequately treat sewage effluent.

- **Seepage pit**: a pit constructed similar to a cesspool but designed to receive clarified effluent from a septic tank. Seepage pits do not fully treat septic effluent.

- **Drywell**: a pit constructed similar to a cesspool, but designed to receive only gray water such as from sinks, laundry, showers.

Note: these can be important distinctions as each of the pits above have significant but different implications for the probable capacity, condition, life, and safety of the onsite waste disposal at the property where they are found.

I-B. Advanced or Alternative Septic Systems/Designs

SEPTIC SYSTEM DESIGN ALTERNATIVES	http://inspectapedia.com/septic/septalts.htm
Master List of Septic System Types	http://inspectapedia.com/septic/SepticTypes.htm
AEROBIC SEPTIC SYSTEMS	http://inspectapedia.com/septic/altaerobic.htm
ALTERNATING BED SEPTIC SYSTEMS	http://inspectapedia.com/septic/Alternating_Bed_Septic.htm
BIOGAS PRODUCTION & USE	http://inspectapedia.com/heat/Biogas_Production.htm
CESSPOOLS	http://inspectapedia.com/septic/septcesspools.htm
DISINFECTION SYSTEMS, SEPTIC EFFLUENT	http://inspectapedia.com/septic/Effluent_Disinfection_Septic.htm
DRYWELL DESIGN & USES	http://inspectapedia.com/septic/septdrywell.htm
EVAPORATION-TRANSPIRATION SEPTIC SYSTEMS	http://inspectapedia.com/septic/altevaptrans.htm
FILTERS SEPTIC & GREYWATER	http://inspectapedia.com/septic/septicfilters.htm
FIXED-FILM PROCESS SEPTIC SYSTEMS	http://inspectapedia.com/septic/Fixed_Film_Septic.htm
GRAVELLESS SEPTIC SYSTEMS	http://inspectapedia.com/septic/gravelless.htm
GRAVITY/SIPHON DOSING SYSTEMS	http://inspectapedia.com/septic/altgravitydose.htm
GREYWATER SYSTEMS	http://inspectapedia.com/septic/altgreywater.htm
LAGOON SEPTIC SYSTEMS	http://inspectapedia.com/septic/Lagoons.htm
MEDIA FILTER SEPTIC SYSTEMS	http://inspectapedia.com/septic/altmedia.htm
MOUND SEPTIC SYSTEMS	http://inspectapedia.com/septic/altmound.htm
OUTHOUSES & LATRINES	http://inspectapedia.com/septic/Outhouse_Latrine.htm
PRESSURE DOSING SEPTIC SYSTEMS	http://inspectapedia.com/septic/altpressuredose.htm
RAISED BED SEPTIC SYSTEMS	http://inspectapedia.com/septic/altraised.htm
SAND BED SEPTIC SYSTEMS	http://inspectapedia.com/septic/altsandbed.htm
SEEPAGE PITS	http://inspectapedia.com/septic/Seepage_Pits.htm
SEPTIC SYSTEM PUMPS	http://inspectapedia.com/septic/SepticPumps.htm
SEQUENCING BATCH SEPTIC SYSTEMS	http://inspectapedia.com/septic/Sequencing_Batch_Septic.htm
SEWAGE TREATMENT SYSTEMS	http://inspectapedia.com/septic/sewagetreat.htm
TOILET ALTERNATIVES	http://inspectapedia.com/septic/waterless.htm
TOILET TYPES	http://inspectapedia.com/plumbing/Toilet_Types.htm
TRAPS on PLUMBING FIXTURES	http://inspectapedia.com/plumbing/Plumbing_Fixture_Traps.htm
VEGETATED SUBMERGED SEPTIC BEDS	http://inspectapedia.com/septic/Submerged_Septic_Beds.htm
CONTACT us to suggest changes/additions	http://inspectapedia.com/Contact.htm

From the list above, we next review some of the more common septic designs found in the Northeast.

Aerobic Septic Systems (ATUs)

- Septic tank aerator (pump, electrical power), pre-packaged or retrofit
- 3 chamber tank (trash tank, aeration chamber, clarification chamber)
- 4 chamber tank (sewage receiver, aeration, settling, pumping)
- High level of treatment (to 95%)
- Effluent may be dispersed conventionally or by surface spray
- Suspended-growth (dead bacteria suspended) or Attached-growth (fabric media)
- AKA saturated wastewater treatment system (oxygen-saturated wastewater)
- Retrofit aerobics promise drainfield rejuvenation (doubtful in short term & possible issue with single-chamber tanks)
- See AEROBIC SEPTIC SYSTEMS - http://inspectapedia.com/septic/altaerobic.htm

Alternating Bed Septic Systems (interspersed, interwoven, backup beds)

- Used when field area is limited with no room for expansion
- Field life is prolonged due to resting periods
- May be either gravity fed or a dosing system
- Required diverter valve may be either manual or automatic
- See ALTERNATING BED SEPTIC SYSTEMS - http://inspectapedia.com/septic/Alternating_Bed_Septic.htm

Dosing Systems [Septic Effluent]– pumped: effluent is pumped to a dispersal system at intervals

- Uphill sites
- Mounded systems
- Longer field life due to resting periods
- Allows system on otherwise unusable sites (nearby lake, rock, mound needed)
- More expensive to install and maintain; more complex tank, pump, alarm
- Require electrical power
- See PRESSURE DOSING SEPTIC SYSTEMS - http://inspectapedia.com/septic/altpressuredose.htm

Dosing Systems – Gravity: (or float or bell siphon)

- Methods:
  - Single effluent line, 4" PVC in gravel trench, may be in a loop
  - D-box/network of lines on flat or sloped sites
  - Serial relief line: multiple, serially connected trenches are built on a sloping site and used serially

- Drop box: multiple independent trenches are built on a sloping site, connected from drop boxes.
- Gravity Dosing, Bell Siphon Dosing, Float Dosing (discussed in this document): 4" perforated pipe, with or without a distribution box, are installed all at a single elevation.
- Float control dosing systems: Float controlled septic effluent dispersal systems use a combination of a mechanical float to open or close the septic effluent holding chamber and gravity to move effluent from the chamber to the soil absorption system or drainfield.
  Float Control Dosing Systems

- **Dipping or tipping system** - A hinged "bucket" chamber receives effluent and periodically, as it fills, the bucket tips to spill effluent into the piping system (A "dipping" or "tipping" system).
  Dipping or Tipping Dosing

- **Bell siphon dosing systems** - (since 1900, a bell and siphon method of moving effluent to the drainfield). use a bell-shaped cover over a vertical dosing chamber outlet pipe, combined with a vent pipe that lets air out of the bell chamber to control effluent flow.

  Effluent level in the dosing chamber rises in both the chamber and inside the bell (through the open bottom of the bell). As effluent rises, air inside the bell vents out through a small-diameter pipe. When effluent in the dosing chamber reaches the level of the bell-vent pipe outlet (which is letting air out of the bell), liquid rising inside the bell slows (as no more air escapes the bell) and the remaining air trapped inside the bell begins to push out of the dosing chamber outlet pipe and trap. When effluent reaches the maximum design level in the dosing chamber, air in the trap (at maximum pressure) is expelled through the dosing chamber trap and is followed by the dose of septic effluent, starting a siphon action.

  The siphon action moves effluent from the dosing chamber to the absorption field, leach field or sand filter bed. As effluent leaves the dosing chamber the effluent level in the chamber drops until it reaches the open bottom of the bell. At this point the siphon action is "broken" and siphoning of effluent out of the chamber stops.

  Bell siphon effluent dispersal designs deliver a fixed effluent dose to the absorption system or drainfield at a frequency which will depend on the rate of usage of the septic system, or the rate of flow of wastewater into the system.

  However because the effluent dose is "poured" suddenly into the drainfield, local spot or point overloading may still occur -
  Bell Siphon Septic Dosing

- See GRAVITY/SIPHON DOSING SYSTEMS - http://inspectapedia.com/septic/altgravitydose.htm

Drip System or Irrigation System Effluent Disposal, Surface or Subsurface drip system operated by effluent pump, timer, dosing

- Used when there is lack of earth surface over bedrock
- Landscaping concerns
- Small perforated tubing slowly emits wastewater through a system of electronics and valves through small disposal tubing
- Provides water for lawns and plants
- Requires annual pumping and filter cleaning to prevent clogging of tubing Perforations
- DRIP DOSING SYSTEMS http://inspectapedia.com/septic/altpressuredose.htm#altpressuredose9
- http://www.inspectapedia.com/septic/MA-Title5_dripguid.pdf

Gravelless or "no-rock" Septic Systems

- 3 Common designs
  - Chambers: Plastic chambers in series, set in soil with no gravel
  - Polystyrene-wrapped perforated pipe
  - Geotextile wrapped perforated pipe
- Cheaper, faster, more profitable for installers (but wider excavation)
- Wide footprint to obtain absorption area
- Shorter length, may fit on smaller site than gravel-trench system
- Used on rolling land, uneven slopes?
- Life expectancy: TBD.

Mound Septic Systems vs. Raised Bed Septic Systems

- **RAISED BED SEPTIC SYSTEMS**: a wastewater absorption trench system which has been constructed in soil-fill material which has been placed on top of the natural soil on a building lot.
- *Raised systems are often confused with "septic mound systems" but have different design requirements, and make at least partial use of existing soils for wastewater treatment. Raised bed septic systems are constructed in fill over soil which can accept septic effluent below the fill.*
- MOUND SEPTIC SYSTEMS are constructed in fill over soil which does not acceptably treat septic effluent below the fill - all of treatment occurs in the mound. Other requirements differ as well.

Sand Bed Septic Systems

- Sand "mound" or bed, may use a dosing system
- Sand covered with soil may not be obvious
- Intermittent Sand Bed – intermittent distribution
- Recirculating sand bed – recirculates through the sand back to tank etc.
- Disinfection system common as final treatment
- Direct discharge of effluent to a body of water is not approved (but common)
- Expensive to maintain, re-rake sand; rarely properly maintained
- Alternative design may be required at time of replacement or major repair
- See SAND BED SEPTIC SYSTEMS - http://inspectapedia.com/septic/altsandbed.htm

V. **Septic System Inspecting/testing**

Septic Inspection Safety: avoid fatalities & explosions

Visual warnings: notify all parties immediately

- Subsidence – rope off and prevent near access
- Steel tanks – old, rust, collapse risk
- Unsafe, missing covers – rope off, prevent access
- SEPTIC TANK COVERS

Olfactory warnings: odors

- Bacterial hazards
- Explosion hazards
- Methane gas asphyxiation hazards – don't lean over and never enter a septic tank
- No Smoking, no brush fires
- SEWER GAS ODORS

Information warnings:

- Cesspools – old, site built, high risk of collapse, do not water-jet, pump out, agitate (Long Island fatality case)
- Old properties, possible series of tanks, cesspools, improperly abandoned? Later collapses.

SEPTIC SYSTEM SAFETY WARNINGS
http://inspectapedia.com/septic/septicsafety.htm

SINKHOLES, WARNING SIGNS
http://inspectapedia.com/vision/sinkholes.htm

Septic System Inspection Procedure – the Basics

What Septic Failures Can Be Detected, Suspected, Confirmed?

- Collapse – visible subsidence – rope off, notify, investigate
- Smells – operation problems, investigate
- Drainfield failures – wet areas, odors, growth, contextual suspect (too small, too wet, area flooding, age, lack of maintenance, unknown location – if no one knows where the tank is located then no one has pumped it)
- Tank Failures – requires open tank inspection; lost baffles, leaks, damage, unsafe covers, too small, site built, impacted

How to Inspect & Evaluate the Condition of Septic Systems

Watch out: *follow safe procedures, do not work alone, do not enter, or even lean over an open septic tank; do not fail to immediately report and cause action on visible unsafe site conditions: subsidence, missing or open septic tank covers, cesspool warnings.*

1. Collect Historical Information about the Onsite Waste Disposal System
2. Visual Site Inspection of the Septic System:
3. Locate the Septic System
4. Performing Septic Loading & Dye Tests
5. Pumping Septic Tanks for Further Investigation of System Condition
6. Excavating & Inspecting Septic Distribution Boxes
7. Inspecting the Soil Absorption System of an Onsite Wastewater Disposal System

Collect Historical Information about the Onsite Waste Disposal System

- Where is the septic tank
- Where is the drainfield
- What type, size, materials were used (concrete, steel, plastic, etc)
- What is the maintenance history of the system

Visual Site Inspection of the Septic System – Procedures

- Note possible and implausible locations for tanks, drainfields – see our walk-the-site septic videos at VIDEO GUIDES: Septic Videos - http://inspectapedia.com/septic/Septic_Videos.htm

- Look inside the building at main waste piping
  - Exit points – indicate direction piping leaves building
  - History – conversion from septic to municipal – old system abandoned?
  - Multiple exits – multiple tanks, drywells, seepage pits
  - Evidence of backups, burst pipes, sewage contamination
  - Do not run water for a dye test without also checking immediately for in-building leaks or backups

- Walk the entire property or within 300' of the building, noting possibly pertinent areas to check later:
  - Storm drains
  - Open bodies of water, stream, lake, etc (check again with dye)
  - Location of well
  - Property boundaries
  - Roads, culverts (we find effluent piped under roads to neighboring fields)
  - Location of the flood plain – is the drainfield flooded?
  - Are there known high water tables that may flood the drainfield under-side?
  - Is there thick algae growth in nearby lake, pond, or stream?

Locate the Septic System

- Walk the known or most likely septic tank area
  - Subsidence
  - Evidence of recent work (tire tracks, excavation, pump out just before inspection)
  - SEPTIC TANK, HOW TO FIND - http://inspectapedia.com/septic/septankfind.htm

- Walk the known or most likely septic field area
  - Excessive grass growth
  - Wet or "boggy" areas
  - "Collapsing" fields
  - Odor
  - Evidence of recent work
  - SEPTIC DRAINFIELD LOCATION - http://inspectapedia.com/septic/DrainfieldLocation.htm

Performing Septic Loading & Dye Tests – Basic Guide

Septic Loading & Dye Tests Provide Added Information On Septic System Conditions

Dye test-not recommended by some septic specialists, especially pumpers who want to pump, or folks who figure if you don't look you won't be blamed for a problem.

Watch out: *do not permit the septic tank to be pumped before the septic inspection. Doing so prevents loading testing, obscures site clues, can dry out flooded drainfield, and misses opportunity to discover other failure indicators visible during and after pumping.*

Watch out:

- Do not perform a septic loading & dye test without owner permission
- Do not spill dye in the building – watch for toilet overflows & dust overflow
- Do not perform a septic loading & dye test improperly – too little water or too little dye form a false test and are actionable

Dye Test vs. *Loading* & Dye Test – very useful, inexpensive if combined with a home inspection (need time to run water) but can't find all defects. Use enough water. Use enough dye. Watch for bleach.

Septic dye does not itself make anything happen. It colors wastewater to permit tracing to a source. Well shocking (bleach) can accidentally or deliberately subvert the appearance of dye. (Vermilye)

SEPTIC DYE TEST PROCEDURE details are at
http://inspectapedia.com/septic/dyetest.htm

Inspecting the Soil Absorption System of an Onsite Wastewater Disposal System

- Inspect the building for leaks & piping routing *before* beginning a dye test – this permits a comparison with moisture levels later and also can identify a pre-existing failure and flood that otherwise is blamed on the test procedure.
- Document & report pre-existing conditions
- Check that all waste lines connect to main drain and not to a drywell
- Avoid "flooding" system. 100 gallons per bedroom, maximum 300 gallons.
- Check for dye breakout everywhere - including other than field area; house to tank; above tank
- At start of water loading & at intervals, & at end of water loading check field area for effluent breakout at ground surface
- Quickly and repeatedly check nearby open waterways for visible dye – don't wait or it may be gone.
- Probe suspect wet or smelly or lush growth areas gently (don't break pipes) – press a hole with any tool and look for rising effluent in the opening.
- Check alarm on lift pump systems (press button only; do not try confirming the relation between tank effluent levels & alarm – requires open tank & flooding)
- If inspection ports are installed check for flooding or saturation in the drainfield

Pumping Septic Tanks for Further Investigation of System Condition - Open septic tank inspection

Useful second step *after* history taking, visual property inspection, and loading/dye test.

- Not part of home inspection. Performed by specialist.
- Not part of a typical septic loading & dye test
- This inspection is useful but incomplete unless combined with a pump-out

- Useful checks in and at the septic tank
  - Septic tank location & thus maintenance history
  - Septic tank cover material, condition, safety
  - Tank materials & condition
  - Effluent level (leaks in tank?)
  - Condition of baffles
  - Measure scum and sludge thickness
  - Evidence of groundwater entering/flooding the tank
  - Effluent pump or backup pump not working
  - Tank alarm not working
  - Septic tank cracks, holes, rust-out
  - Dosing siphons not working

- More information from pumping out the tank
  - Backflow during pumpout = flooded fields
  - Cracks, breaks, holes, rust-out of steel tank bottoms

- SEPTIC SYSTEM SAFETY WARNINGS
  SEPTIC TANK BAFFLES
  SEPTIC TANK COVERS
  SEPTIC TANK, HOW TO FIND
  SEPTIC TANK INSPECTION PROCEDURE

Watch out: Septic Tank Inspection or Pumpout does not diagnose condition of the drainfield – the most frequent failing component – except indirectly by in-tank clues

Watch out: *do not permit the septic tank to be pumped before the septic inspection. Doing so prevents loading testing, obscures site clues, can dry out flooded drainfield, and misses opportunity to discover other failure indicators visible during and after pumping.*

Excavating & Inspecting Septic Distribution Boxes

- Not part of home inspection. Performed by specialist.
- Not part of a typical septic loading & dye test.
- Locate the D-box
- Uncover the D-box to inspect interior
- Note Defects
    - Broken, leaking D-box
    - Unsafe, damaged, missing cover
    - Open to or receiving groundwater (flooding)
    - Tipped – uneven effluent distribution – an easy fix
    - Used for manual switching between lines or fields – Vic's plastic coffee cup
    - Adjustable rotating port covers balance effluent flow

Septic System Maintenance Advice - The Essentials of Septic System Maintenance

- **Pump the septic tank on schedule**
- **Use a standard schedule or**
- **Open, inspect, measure scum & sludge levels & pump per specs**
- **See SEPTIC TANK PUMPING SCHEDULE**
  http://inspectapedia.com/septic/tankpump.htm
- **See** MEASURE SCUM & SLUDGE -
  http://inspectapedia.com/septic/septicsludge.htm

Rule of thumb:
Generally at a two year interval for septic tank pumping service the average septic tank in average size ranges will have a 400 mm scum layer with about a 200 mm sludge layer. With an average depth of 1600 mm, the solids content is about 600 mm thereby reducing the settling time by nearly 40%. [Up to 5 years for larger tanks in normal use, but see the pumping table for details]

Pump 20% to 40% more often if using a garbage grinder &/or heavy laundry use.

Opinion: *Dispersal failures form almost all of the septic failures that people observe.*

Studies reported at an Environmental Protection Agency seminar, Orlando FL, November 1979, show that over half [ST/SAS] fail prematurely due to improper operation or lack of adequate maintenance. Generally, these failures occur when the soil-absorption system [drainfield] becomes clogged. Preventable clogging, due to a buildup of solids in the [septic] system, is usually extensive enough to require expensive reconstruction of the system. Failures can also cause nearby ground areas, streams, lakes, and water supply systems to become contaminated. This exposed the public [and USDA, EPA, NPS, FPS, and other government employees] to health threats such as hepatitis, typhoid, diarrhea, and dysentery. - USDA

USDA Septic Tank Pumping Guide: 3 Scum & Sludge Thicknesses

Pump the septic tank when the total depth of scum plus sludge layers equals one-third of the depth of the tank

or
Pump the septic tank when the bottom of the septic tank outlet baffle has less than three inches of clearance from the bottom of the scum layer (this may vary depending on the length of your outlet baffle or tee)

or
Pump the septic tank when the bottom of the outlet baffle is less than 6 inches from the top of the sludge layer found on the septic tank bottom

A. **Don't Flush into the Septic Tank**:

- No grease; garbage disposal refuse; sanitary napkins; baby wipes; cigarette butts; condoms, toys, cat litter
- No solvents; paints; chemicals; etc.
- No additives

WHAT CAN GO INTO TOILETS & DRAINS?
http://inspectapedia.com/septic/dontflush.htm

B. **Don't Overload the Septic System Beyond its Design Point**

Load to within normal design, When testing a septic system, 150 gal min, 50 per bedroom min, 500 gal is a reasonable test max; typical family: 600g 2x/day or 200g per person per day.

- Repair all leaks in tanks, D-boxes, piping – both effluent out & groundwater in
- Prevent over-usage
    - Multiple laundry loads – spread out
    - Large parties – pump first
    - Offload graywater into a drywell?

C. **Septic Tank Pumping:** Septic tank pumping frequency depends on tank size and number of occupants & some special usages (garbage grinders)

Septic tank pumping on a regular schedule is the most important maintenance a homeowner can obtain to preserve the life of a septic system.

D. **Septic Drainfield Protection & Life**

1. **Do not plant** trees, shrubs over or near septic drainfields - roots can clog fields. 30' to 100' clearance depending on species.

PLANTS & TREES OVER SEPTIC SYSTEMS
http://inspectapedia.com/septic/fieldplants.htm

2. **Do not cover**: the drainfield with asphalt, pool, patio blocks, etc. interferes with
- oxygen needed by soil bacteria for further treatment of effluent
- evaporation/transpiration disposes of effluent

3. **Do not drive**: Driving over septic drainfields ruins the drainfield: compacting soil, breaking pipes

4. **Conserve water, add a graywater system or drywell, use a septic filter**

References – Septic System Inspection, Diagnosis, Repair

SEPTIC SYSTEM INSPECT DIAGNOSE REPAIR - The Septic Systems Information Website - Inspecting, Testing, Designing, & Maintaining Residential Septic Systems
http://inspectapedia.com/septbook.htm

SEPTIC INSPECTION & TEST GUIDE – how to test & inspect septic systems
http://inspectapedia.com/septic/SepticInspection.htm includes the following:

SEPTIC SYSTEMS INSPECTION COURSE - http://inspectapedia.com/septic/septicinsp.htm
- SEPTIC INSPECTION TYPES & LEVELS
- DISPOSAL vs. TREATMENT
- DRAINFIELD FAILURE DIAGNOSIS
- SEPTIC FAILURE CAUSES
- SEPTIC FAILURE CRITERIA
- SEPTIC FAILURE LAWSUIT
- SEPTIC D-BOX INSPECTION
- SEPTIC DRAINFIELD FAILURE DIAGNOSIS
- SEPTIC DRAINFIELD LIFE
- SEPTIC DRAINFIELD LOCATION
- SEPTIC DRAINFIELD INSPECTION & TEST
- SEPTIC DYE TEST PROCEDURE
- SEPTIC FAILURE CAUSES
- SEPTIC FAILURE CRITERIA
- SEPTIC FAILURE SIGNS
- SEPTIC FAILURE SPOTS
- SEPTIC FIELD FAILURE CAUSES
- SEPTIC SYSTEM INSPECTION WORK SHEETS
- SEPTIC SYSTEMS, PLANTS OVER
- SEPTIC TANK INSPECTION PROCEDURE
- SOIL CONDITIONS

SEPTIC INSPECTION TYPES & LEVELS
- LEVEL-0 SEPTIC INSPECTIONS
- LEVEL-1 SEPTIC INSPECTIONS
- LEVEL-2 SEPTIC INSPECTIONS
- LEVEL-3 SEPTIC INSPECTIONS

Sample Septic Inspection & Test Reports

SEPTIC SYSTEM SAFETY WARNINGS
http://inspectapedia.com/septic/septicsafety.htm

SINKHOLES, WARNING SIGNS
http://inspectapedia.com/vision/sinkholes.htm

PLANTS & TREES OVER SEPTIC SYSTEMS
http://inspectapedia.com/septic/fieldplants.htm

SEWAGE & SEPTIC CONTAMINANTS
http://inspectapedia.com/septic/contaminants.htm

Master List of Septic System Types
http://inspectapedia.com/septic/SepticTypes.htm

Septic System Maintenance

WHAT CAN GO INTO TOILETS & DRAINS?
http://inspectapedia.com/septic/dontflush.htm

SEPTIC TANK PUMPING SCHEDULE – when to pump the septic tank
http://inspectapedia.com/septic/tankpump.htm

SEPTIC TREATMENTS & CHEMICALS – what chemicals do what? Do they work? Are they legal?
http://inspectapedia.com/septic/septadds.htm

