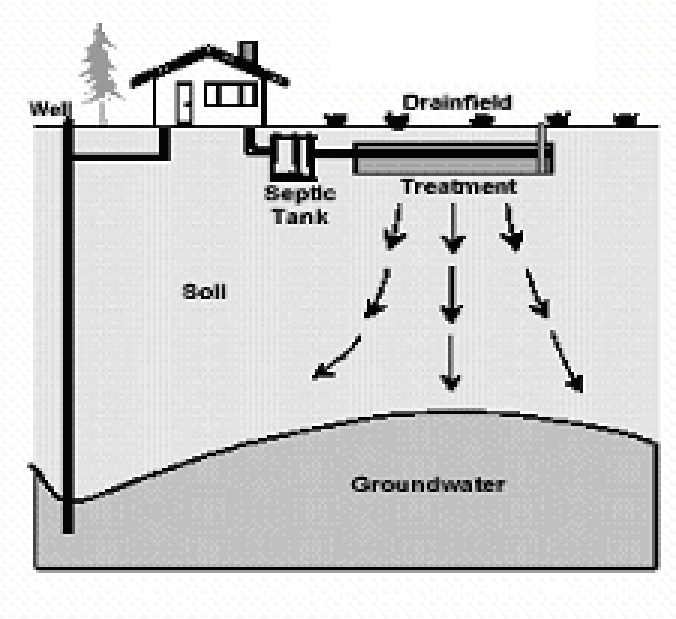
THURSTON COUNTY SEPTIC TANK PUMPERS' MANUAL



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PUMPER MANUAL

Purpose

The purposes of this manual are to insure that all personnel involved in the septic tank servicing business in Thurston County:

1. have a basic understanding of the operation of on-site systems

2. can perform maintenance tasks in a manner that will promote long term operation of on-site systems

3. maintain consistency in the performance of maintenance tasks on on-site systems

4. Use safe and hygienic methods in the performance of maintenance tasks on on-site systems

5. advise owners of on-site systems in the best use and maintenance practices for proper functioning and long system life

BASIC CONCEPTS IN ON-SITE SEWAGE SYSTEMS

An on-site sewage system (OSS) is designed to treat wastewater and household wastes from the kitchen, bathroom and laundry. When properly designed, constructed and maintained, the OSS allows domestic sewage to be treated and disposed of with minimal public health affects.

OSS Components

The Septic Tank

The septic tank and drainfield are the two main components of most on-site sewage systems. Sewage flows from the building into the septic tank, which is where the sewage receives an initial level of treatment. From the septic tank, the sewage flows to the drainfield for final treatment and disposal.

The septic tank is designed to collect and hold household wastes. The heavier solids such as feces, food residues and soils sink to the bottom as "sludge". Here, bacteria feed on the organic matter, reduce its volume, and produce by-products such as stable solids and gases. The lighter materials, such as grease, oils and soaps, float on the water surface as "scum" and also partially decompose with time. This scum builds in volume just as the sludge does. If these sludge and scum layers are not removed by pumping, they can eventually flow from the septic tank into the soil absorption system, clogging the pipe, rock and soil pores, causing failure of the system. On the other hand, a properly functioning septic tank produces a relatively clear liquid, called effluent, which is easier to treat and dispose of.

One of the most critical parts of all septic tanks are the baffles. The baffles allow the solids to settle at the tank's bottom while allowing the materials that form the scum to float to the surface. If the baffles are missing, or in disrepair, scum and sludge can leave the septic tank and cause the rest of the OSS to fail.

A modern septic tank is a two compartment tank made of concrete, fiberglass or plastic and holds approximately 1,200 gallons of liquid and solids. Older tanks are usually single compartment tanks with varying capacities (generally 500 to 1,000 gallons) and are primarily made of steel or concrete. The septic tank should be water tight, and fitted with baffles at the inlet, outlet and interior walls. With normal household use, an empty tank will fill in two to four days and then begin discharging the effluent to the soil absorption field, or drainfield.

Drainfields

Most OSS's use some sort of drainfield, and they rely on the soil as the final treatment and disposal site for the effluent. The soil can do an excellent job in both capacities, but it works best when it is unsaturated. The waste particles and microorganisms in the effluent move through the soil pores, stick to the walls of the soil particle and then combine with oxygen to complete the treatment process. Microorganisms and chemical reactions that take place in the soil are also important in treating the wastewater. In saturated or soaked soils, water fills the soil pores and surrounds the walls of the soil particles, stopping the proper treatment from taking place. If oxygen cannot combine with the soilless effective cleaning action results. Saturated soil conditions can be due to seasonally high ground water tables, shallow, rain soaked soils, limited

permeable soil depth, or a drain field system that is too small for the amount of effluent it is supposed to treat.

Types of On-Site Systems

Conventional Drainfields

In a conventional or gravity ass, the drainfield is a network of perforated pipes buried underground in gravel filled trenches that are usually two to three feet wide, and anywhere from one to several feet deep. A minimum of one foot of washed drain-rock is placed in the bottom of the trenches. Running near the top of the rock in the trench, is a four inch pipe which distributes the effluent, via gravity, through the trench. Uniform distribution is not possible with this type of disposal method.

Alternative Systems

There are a variety of alternative or enhanced treatment systems that are used when the soil or overall site conditions are not adequate to treat the effluent. The most commonly used alternative systems are: Mounds, Sand Filters, and Pressure Distribution systems. These systems incorporate more stringent design criteria and require the addition of one or more pump chambers, and one or more pumps.

The pump chamber is made of concrete, fiberglass, or plastic and collects septic tank effluent. The chamber contains a pump, pump control floats and a high water alarm float. The pump is used to produce low pressure for distributing effluent into the enhanced treatment systems. Older systems may use the pump as a lift station for gravity distribution into a drain field at a higher elevation. These pumps may not contain the same type or number of floats and alarms that modern systems contain.

Pressure Distribution

Pressure distribution uses a pump to pressurize and distribute effluent through a network of small diameter pipes placed in gravel filled trenches, similar to those used for gravity systems. The depth of the rock in the trenches is nine to ten inches, and the holes in the pipe are smaller and farther apart than those found in a conventional system. The advantage of a pressure distribution system is that uniform distribution of the wastewater throughout the entire drain field is insured by the addition of the pump and low pressure.

Mound or Fill Systems

The mound is a drain field bed raised above the natural soil and placed in a sand fill. A gravel filled bed with a network of small diameter pipes is located within that fill. Effluent is pumped through the pipes in controlled doses to insure uniform distribution. The effluent leaves the pipes under low pressure and trickles downward through the gravel, into the sand, and into the natural soil. The sand bed treats the effluent before it reaches the native soil, which enhances the ability of that soil to accept and treat the effluent.

Sand Filters

The typical sand filter is a concrete or PVC lined box filled with carefully selected sand material. The effluent is pumped under low pressure, in controlled doses into a network of small diameter pipes placed above the layer of sand. Treatment occurs as the effluent filters through the sand. A gravel under-drain collects and moves the effluent to a second pump chamber for distribution into a mound or pressure distribution system.

Older Systems

Seepage pits are deep excavations filled with drain rock which utilize gravity as the means of distributing the effluent through 4 inch pipes located in the upper portion of the pit. A seepage pit is used for subsurface disposal only. The treatment that the wastewater receives when trickling through the soil in shallow systems is nullified by the removal of the natural soil when constructing the seepage pit. Most local health departments no longer allow the installation of seepage pits.

A cesspool is a brick lined underground pit which mimics the functions of a septic tank and disposal field. No effective treatment of the solid waste and household wastewater occurs when using a cesspool. The solids and water are dumped into the brick lined pit, the water begins to disperse or percolate into the narrow disposal area created by the construction of the cesspool. A saturated condition in the surrounding soil occurs which prevents treatment of the wastewater and the solids are not broken down as effectively as in a septic tank. The net result is considered the worst type of treatment and disposal system that can be installed. Cesspools are not permitted for use in Thurston County.

Other Considerations

It is important to remember that the oss is not a chemical treatment unit. It relies on biological processes to perform properly. Harsh chemicals should not be disposed of into an oss because they can kill the bacteria that reduce the solids, and the chemicals can eventually enter ground or surface water and contaminate those resources. The oss provides initial treatment of household wastes before they are further purified by the filtering action of the soil.

Septic tank starters of any kind are not needed. The bacteria and organisms that are needed to treat sewage are naturally present in domestic wastes. Adding things like miracle septic tank cleaners, yeast, hamburger and the like are not needed, and they may actually be harmful to the on-site system.

SAFETY

Electrical

Do not attempt to service or repair any electrical equipment related to any on-site sewage disposal system, without first disconnecting the electrical power source and testing the circuit to make sure it is off. Check with the Washington State Department of Labor and Industries to see what tasks must be done by a licensed electrician. These rules will pertain to any equipment that is hard wired.

Hygiene

Hygiene is extremely important when servicing any sewage disposal or treatment system components. Many infectious diseases can be contracted and spread through handling of service equipment during servicing operations.

Microorganisms

Microorganisms are living organisms that are too small to be seen except through a microscope. These organisms include bacteria, viruses, protozoans and fungi. The organisms that are most commonly reported in Thurston County, and therefore most likely to be encountered by a septic tank pumper, are:

A. Campylobacter
B. Giardia
C. E. Coli 0157:H7
D. Salmonella
E. Shigella
F. Hepatitis A

Some symptoms that may indicate illness or infection from these microorganisms include:

A. Severe, persistent or bloody diarrhea
B. Fever
C. Severe muscle spasms, neurological symptoms

If you suspect illness or infection, contact your physician.

The ways that a septic tank pumper may be exposed to these microorganisms include:

A. Respiratory Tract: breathed in with air
B. Gastrointestinal Tract: taken in with food or drink
C. Skin and Surface Membranes: infect or penetrate skin
D. Parenteral (blood): puncture or injection

Prevention

Gloves

It is recommended that persons employed in the septic tank, sewer, and drain cleaning industry use disposable gloves during performance of work. The gloves should be properly disposed of after use and hands thoroughly cleaned after taking off and disposing of the gloves.

Wash Hands

Avoid any hand to face contact during performance of work, especially eating, drinking or smoking. Always wash hands thoroughly after performance of work and after handling any equipment that was exposed to sewage.

Goggles and Dust Masks

It is recommended that eye goggles and dust masks (the filter type that fit over nose and mouth) be worn to help prevent microorganisms from entering the respiratory tract, eyes or skin.

Protective Clothing and Shoes

Protective clothing and shoes should be changed at the end of the day, to prevent taking "bugs" home with you.

Vaccinations

It is recommended that septic tank pumpers and their families contact their physicians about vaccinations, especially:

A. Tetanus, Diphtheria (adults)
   Tetanus, Diphtheria, Pertussis (children under 7)
B. Polio

OPERATIONS

Locating the septic tank

There are several methods for locating the septic tank:

1. Record drawing (formerly called “asbuilt”) obtained from the homeowner or Thurston County Health Department.
2. Contractor's drawings obtained from the homeowner.
3. Probing
4. Visual Signs
5. Cleanouts, sewer lines leaving the building, roof vents, etc.
6. Snake method

The first step in locating the septic tank should be a request that the homeowners check their records to see if they have a record drawing that shows the location of the system, or the original contractor's drawings. If the homeowner does not have these records, check to see if Thurston County Permit Assistance Center has them. To request a copy of a record drawing, call (360) 754-3355 x-7293 (you will need the property parcel number).

If no records can be found, the pumper will have to locate the system visually, or by other methods. The most widely used method of locating a septic tank is with the use of a metal probe or pry bar. The probe is inserted into the ground in the area adjacent to the main plumbing wall of the building, usually in the area of five to ten feet from the foundation of the building. It is advisable to visually locate the plumbing vent on the roof, as this usually indicates the location of the main plumbing, and helps orient the pumper as to the probable location of the septic tank.

There are electronic locating devices on the market that use a small radio direction sender. The device is flushed down the toilet and then located with the use of a radio direction finder. A snake can also be run into the cleanout. Generally, the snake will continue into the tank and stop when it hits the inlet baffle. Take out the snake and measure the distance to where it stopped. This should indicate where the tank inlet is located.

Once the tank has been located, uncover the inlet and outlet baffle inspection lids, and both compartment lids. (Some older tanks may have only one compartment lid or some may not have baffle inspection lids.) If there is a dosing tank or pump chamber, uncover this lid as well.

Assessing the septic tank condition

The next step in the servicing process is to observe the liquid level in the tank. The liquid level should not be above the bottom of the outlet pipe. If the liquid level is too high, it is an indication of a possible malfunction. Look for solid build-up or overflow at the baffles and check the undersides of the lids for undigested solids (which will appear as black slime). These will be signs of elevated liquid levels due to flooding. (See the troubleshooting guide at the end of this manual.)

If the liquid level is below the bottom of the outlet pipe, this is an indication of a crack or leak in the tank. Staining and etching on the tank walls below the outlet baffle is another indication of leaking. (See the troubleshooting guide at the end of this manual.)

Check to see that proper bacterial action is occurring in the tank by how well the solids have broken down. If there seems to be a problem, inquire about the homeowner's use of bleach and cleansers and the possibility that the homeowner disposed of chemicals into the tank.

If problems are noted, advise the homeowner about ***moderate*** use of bleach and cleansers, never disposing of chemicals in the tank, spreading out water usage over the week, avoiding septic tank additives, etc.

Determining if the tank needs to be pumped

The next step is to measure the scum and sludge layers. Refer to the attached instruction sheet "Inspecting Your Septic Tank" for step-by-step instructions for measuring scum and sludge layers.

If you prefer, you may use one of the measuring tools that are on the market instead of the sticks that are mentioned in the instructions.

When to pump the tank

When the sludge and scum equal 1/3 or more of the working depth (water depth), the tank needs to be pumped.

Pumping the Tank

Once you have determined that the tank needs to be pumped, you will first pump the liquid level down below the level of the outlet baffle. Next, break up the scum layer by raking or stirring. ***Do not backflush to break up the scum layer.***

Pump the entire contents of all compartments. Pump only through the lids, never through the baffles. Do not leave sludge in the bottom of the tank as a "starter".

Confined Spaces

Do not enter any septic tank, pump chamber, sewer manhole, or any other confined space where sewage has been present without first ventilating the space and then using proper and approved safety equipment.

1. At least one other person should be on the site that will not enter the confined space. For more information about approved safety equipment (safety harnesses, etc) contact the Washington State Department of Labor and Industries.

2. The presence of sewage in septic tanks, pump chambers, sewer manholes or any other confined space can produce hydrogen sulfide gas and other elements. These elements can be fatal if inhaled.

Evaluating the septic tank's condition

After pumping, listen for water running back into the tank. If water is running into the tank from the outlet, there is a possibility that the drainfield is malfunctioning, that the tank has settled, that the grade of the outlet is wrong or that the pump is not working. (See the troubleshooting guide at the end of this manual.) Report your findings to the homeowner.

Cracks

Rinse the sides of the tank with fresh water and look for air bubbles in the tank walls. The bubbles will indicate a crack. Do not wash the tank with any cleansers or disinfectants.
At this time, you can repair cracks or leaks, if possible by patching with cement. If the tank appears to be damaged beyond repair, notify the homeowner and Thurston County Environmental Health Department. A permit must be obtained in order to replace a tank.

Baffles

Check to see that the baffles are intact and functioning. A visual check will show if the etching is heavy and the cement looks crumbly. If so, scrape around the top of the baffle with a shovel or pry bar to remove the crumbled cement. If the baffle is still intact after scraping, clean the vent holes by clearing the solids out with a stick or pry bar. If the baffles are not intact, replace them. In most cases, you will use 4 inch plastic pipe and tees. You will also need a tape measure, mortar, glue gun and a saw.

The first step in replacing a baffle is to determine where the liquid level of the tank should be.

The liquid level in the tank should be at the bottom of the outlet pipe. The inlet baffle must extend 12 inches below the bottom of the outlet pipe.

The outlet baffle must extend into 40% of the liquid depth. To determine this distance, measure from the bottom of the outlet pipe to the floor of the tank, multiply this' number by 40%. The answer is the number of inches that the outlet baffle needs to extend below the bottom of the outlet pipe.

EXAMPLE Distance from bottom of outlet pipe to floor of tank is 60 inches:
60 X .40 = 24
Bottom of baffle should be 24 inches below the bottom of outlet pipe.

EXAMPLE Distance from bottom of outlet pipe to floor of tank is 55 inches:
55 X .40 = 22
Bottom of baffle should be 22 inches below bottom of outlet pipe.

Attach the new baffle to the tank. In most cases, you will glue the plastic baffle to the pipe, then mortar in and around the pipe.

Pump Chambers

If there is a pump chamber, inspect it as you would inspect a chamber of the septic tank. Again, look for scum and sludge build up, staining and etching, leaks or groundwater intrusion. Pump

out the entire pump chamber. Again, listen for water running back into the chamber from the drainfield. If the pump has a screen, carefully clean it, using the manufacturer's instructions. Many times, cleaning the screen will involve hosing it off with clean water. Be sure to hose it off over the septic tank so than any sewage washing off the filter will go into the tank, not on the yard or driveway.

Check to see that the pump is working by filling it with clean water until the pump turns on. If the water reaches the level of the "on" float and the pump doesn't turn on, or if it reaches the level of the high water alarm and the alarm doesn't turn on, then the pump isn't working properly. It is not recommended that floats be checked by simply lifting them with a hoe or stick. This is due to the variances in types of pumps and floats. If there are obvious problems, notify the owner. Pump installations and repairs should be done by a licensed septic system installer.

Reporting the Condition of the Tank

If your client has asked you to pump the tank as part of his routine maintenance schedule, you must report to him the conditions you found on inspecting the tank:

1. Were the liquid levels normal?
2. Was bacterial action occurring properly?
3. Did scum and sludge measurements indicate that pumping schedule is satisfactory? 4. Were baffles intact and in good condition?
5. Was tank cracked or leaking?
6. Were there signs of flooding?

Advice to Homeowners

This is the proper time to advise the homeowner about proper use of the system. The following guidelines should be discussed with the homeowner:

1. Do not overuse bleach and household cleansers.
2. Do not dispose of chemicals, paint, solvents, oil or grease into the tank.
3. If the home has a garbage disposal, it should be used as little as possible.
4. Never use septic tank additives or cleaners or any type of "home remedy" to assist the tank's functioning.
5. Do not dispose of solid materials into the tank such as plastics, cigarettes, tampons, disposable diapers, newspapers, or any other materials that are difficult to break down.
6. Spread out the laundry over the week, rather than running several loads in one day. (It is best to use liquid detergents, rather than powders, and do not overuse bleach).
7. Never drain a hot tub or spa through the septic tank.

Health Letters

If your client has asked you to pump the tank in preparation for a Health Department inspection, you must also report your findings on a health department report form, called a "pumper report". It is most advisable to fill out the slip while on the site. Be specific and thorough in reporting your findings. Include the tank construction, size and condition, baffle. Condition and details of any repairs done (see **sample pumper report**).

If your report is to include information about the drainfield, follow these steps:

1. Uncover a portion of the drainfield that is at least 10ft from the tank or d-box.
2. The exposed portion should be approximately 12 to 18 inches square.
3. Expose the trench down to the perforated pipe.

Make notes on your pumper slip as to the condition of the drainfield. Look for ponding (standing liquid) in the trench or black slime on the drainrock. These factors are indications of drainfield malfunction. Note the materials used in the construction of the trench. If the system consists of a seepage pit or cesspool instead of a drainfield, note that fact on the pumper report. Inform the owner of the condition of the drainfield.

TROUBLESHOOTING

PROBLEM	CAUSE	SOLUTION
Sewage Backup	Blockage in sewer line to tank or in baffles.	Clean out line. Check to see line is not crushed or corroded.
* (See also "Blockage at soil surface in drainfield".)	Tank full of solids due to lack of timely pumping. Tank full of solids due to overuse of garbage disposal.	Pump tank and advise homeowner on maintenance schedule and CAUTIOUS use of garbage disposal.
	Blockage in house plumbing. Improper plumbing in house.	Call qualified plumber.
	Blockage in effluent line to drainfield.	Clean out line. Check to see that line is not crushed or corroded.
	Improper elevations in system. Blockage at soil surface in drainfield.	Call qualified installer or designer.
	Pump failure.	Check pump operation. Licensed installer should repair or replace pumps.

	Excess water entering system.	Check tank for signs of flooding or groundwater intrusion. Check with owner on water usage habits or use of water softener. Check for leaking valves or water lines.
SEWAGE SURFACING IN YARD	Excess water entering system.	Check tank for signs of flooding or groundwater intrusion, check with owner on water usage habits or use of water softener.
* (See also: “Tank full of solids”.)	Blockage at drain field soil surface. (Drainfield failing.) Improper installation of drainfield. Improper elevations.	Call qualified installer or designer.
	Blockage in d-box. D-box not level or backwards (results m one lateral flooding).	Expose, clean and level d-box.
	Blockage in effluent line.	Clean lines. Check for crushed or corroded lines.
	Blockage in house plumbing	Call qualified plumber.
	Saturation of drainfield area due to surface water run-off.	Redirect roof drains and downspout away from drain field.
* (See also “Blockage at soil surface in drainfield”.)	Solids overflow from tank due to overuse of garbage disposal	Pump tank and advise homeowner of CAUTIOUS use of garbage disposal.
	High water table causing groundwater intrusion.	Call qualified installer or designer.