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Public Health
Seattle & King County



On-site Sewage System HOMEOWNER'S MANUAL

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- SAND FILTER / MOUND SYSTEM -

(THIS MANUAL INCLUDES SYSTEM SPECIFICATIONS AND INFORMATION
SPECIFICALLY FOR THE SEWAGE SYSTEM AT THE ADDRESS BELOW)

Provided By

Designer of the On-site Sewage System Serving The Address Above

Developed by Public Health – Seattle & King County

April, 1999

(Produced with funding from the Public Involvement And Education Project, financed by proceeds from the Washington State Water Quality Account and administered by the Puget Sound Water Quality Action Team.)

Address: _____

Parcel Number: _____

Dear Property Owner:

Please take some time to read through this manual. Familiarity with its contents is essential for proper operation and maintenance of your on-site sewage ("septic") system (**OSS**). This manual is for your use, and maintenance persons will need the manual for reference in order to correctly service and adjust your OSS. Proper operation and maintenance will assure the maximum life span from your OSS, potentially saving you thousands of dollars. **Waiting until the OSS malfunctions before informing yourself about its operation can be very costly.** As outlined in this manual (See OSS CARE), state and county board of health regulations include a number of requirements that OSS owners must fulfill. Your habits and life style must accommodate the limitations of the OSS serving your property, as described in this manual. Keep the manual with your important papers.

OVERVIEW

This brief OVERVIEW is intended to provide a general orientation concerning your OSS and guide you to some key sections of this manual. We strongly suggest that you also refer to the **Table of Contents on page 7** and review the entire manual.

Historically, the most common type of OSS was a simple system consisting of a septic tank, some pipe in gravel, and the soils found on the site. Septic tanks with gravity flow drainfields have been used for many years in areas not served by public sewers. However, in King County and many other areas, soil and other conditions on sites now available for new construction often are not well suited for these conventional systems. To protect public health and water quality, alternative systems are used in these areas where conventional systems cannot assure safe, effective sewage treatment for the life of the home or facility being served. **Your property is served by such an alternative on-site sewage treatment and disposal system, a SAND FILTER / MOUND SYSTEM".** This is one of the most complex types of OSS used in King County.

This manual will help you understand your sand filter / mound system and keep it operating safely at the lowest possible cost. **The key to proper operation of any OSS is to provide conditions under which sewage that has been clarified in a septic tank (called "effluent") is kept in an environment where air can contact the effluent.** This allows beneficial bacteria to consume the harmful components of the effluent, such as disease-causing bacteria, and allows other harmful components, such as viruses, to be retained in relatively dry soils or sand until they are decomposed. The sand filter helps ensure that wastewater will have adequate contact with air to facilitate treatment.

YOUR AS-BUILT DRAWING

"As-built" is short for "as it is built". An *as-built drawing* is a scaled drawing showing the location of all OSS components (e.g., septic tank, pump tank, reserve area, etc.) in relation to buildings and property boundaries. You should become familiar with this drawing and the location of your OSS components. The drawing is included in this manual (see APPENDIX B).

SYSTEM MAINTENANCE

Information that follows will outline maintenance procedures (see PERIODIC MAINTENANCE) and special precautions (see DOs AND DON'Ts and OSS CARE you should take to maximize OSS effectiveness and life expectancy. Some of these are legally required (see OSS CARE). There is a lot more to maintaining a sand filter / mound system than just pumping the septic tank. Since you, the owner, are responsible for the operation and maintenance of your OSS, it is in your best interest to understand how your sand filter / mound system functions and the maintenance it requires. **Waiting to educate yourself about your OSS until the system backs up or sewage surfaces in your yard will virtually guarantee that the system will require an expensive repair. Repair or replacement of a sand filter commonly costs in excess of \$5,000. Repair or replacement of a mound is similarly costly.**

SYSTEM MALFUNCTIONS

The purpose of any individual OSS is to treat and dispose of all wastewater being produced by a household or business. Part of the treatment process is the removal of harmful microorganisms from the wastewater before they can contaminate ground or surface waters. Many of the microorganisms in sewage are known to cause human diseases such as hepatitis, shigellosis, poliomyelitis, cholera, typhoid, bacillary dysentery, amoebic dysentery, and various parasitic worm infestations. **Untreated sewage is definitely capable of spreading disease.**

If an OSS malfunctions, wastewater will often leak to the ground's surface before being adequately treated. This poses a serious health concern. If this happens you should:

1. Avoid contact with the sewage.
2. Contact the County Health Department for more specific information (see IMPORTANT NAMES AND PHONE NUMBERS).
3. Call the appropriate service company, generally your system maintainer (see IMPORTANT NAMES AND PHONE NUMBERS).
4. Begin immediately to severely limit water use (see WATER CONSERVATION).
5. Contain the surfacing sewage and do not allow pets or children near it.

Note: *If sewage backs up into the house, contact the Health Department for details concerning appropriate ways to cleanup and sanitize the contaminated area. The brochure *Guidelines For Cleaning Indoor Sewage Spills* may be obtained by calling the Health*

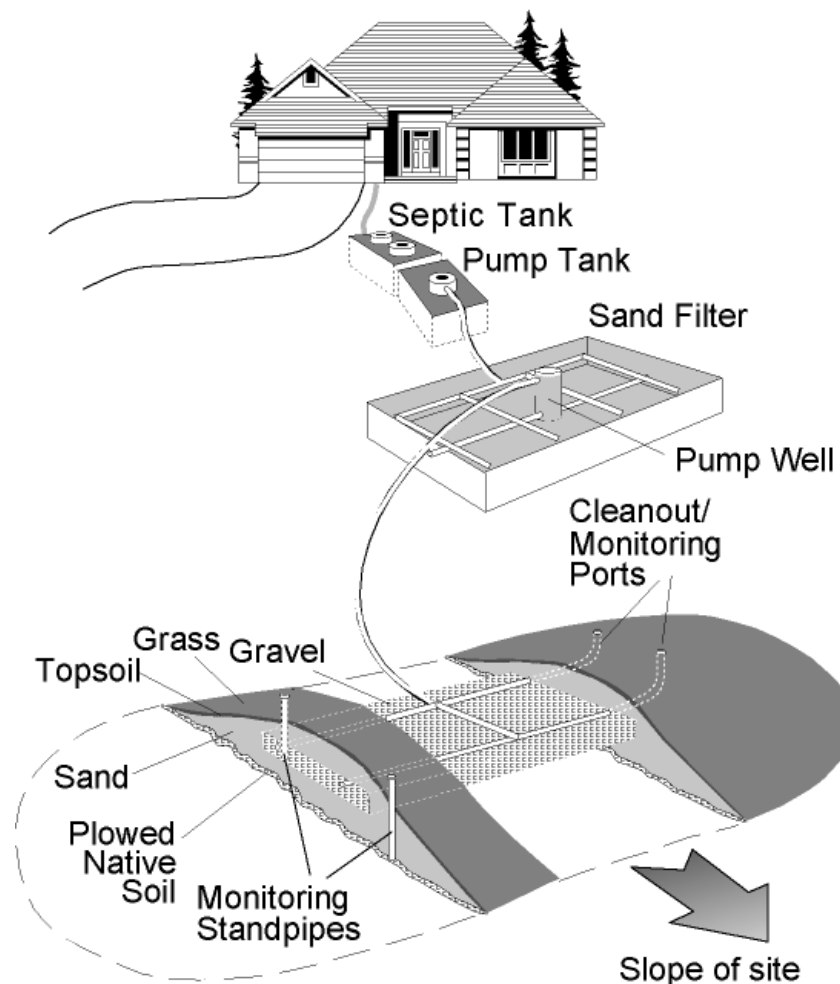
Department, at (206) 296-4932. See ALARM TROUBLESHOOTING, HOW MUCH WATER CAN YOUR OSS HANDLE, POWER FAILURES, AND PERIODIC MAINTENANCE for more information related to OSS malfunctions.

THE SAND FILTER / MOUND SYSTEM

A typical sand filter / mound system has six main parts:

1. The septic tank with its outlet baffle filter (see SEPTIC TANK PUMPING and TANK BAFFLES),
2. The pump tank with its pump, controls, and alarm system (see SEPTIC TANK PUMPING and PUMP TANK AND PUMP CONTROLS),
3. The sand filter itself (see SAND FILTER AND SITE INSPECTION),
4. The pumping system for conveying the effluent from sand filter to mound,
5. The mound where effluent from the sand filter receives final treatment and is disposed (see SAND FILTER AND SITE INSPECTION), and
6. The area for a replacement mound, the “reserve area” (see THE RESERVE AREA).

Sand Filter System with Mound



The sand filter is a watertight, plastic fabric (or, occasionally, concrete) box containing a specific sand fill material. Within the sand fill is a gravel bed (or system of plastic chambers) supporting a network of small diameter pipes. Septic tank effluent is pumped through the pipes in controlled doses to insure uniform distribution through the gravel bed. The effluent squirts from the pipes under low pressure through small-diameter holes and trickles downward into the sand. Treatment of the effluent occurs as it comes into contact with air while slowly moving through the sand before flowing into a gravel underdrain. From this underdrain the treated sewage effluent is pumped into a mound drainfield. The pump used is located in a large vertical tube in the center of the sand filter itself. The purpose of the sand filter is to purify household wastewater before it is discharged into the mound and from there into the site's native soil, where it receives final treatment and disposal.

The sand filter is generally built with its top just above the final grade of the surrounding area, but sometimes its sidewalls may be exposed, when they are built of concrete. The top of the sand filter is covered with permeable soil, generally planted with grass, to allow airflow to the sewage effluent in the sand filter.

Sand filters are used on sites with little permeable soil above the water table or over an impermeable soil layer. On these sites, during the wet fall and winter months, there are generally less than 2.5 feet of permeable, unsaturated soil above the water table. This is not enough soil to adequately treat sewage effluent. Unsaturated conditions are essential for on-site sewage treatment. Unsaturated soil provides oxygen required for beneficial soil bacteria to treat and purify the wastewater, reducing the level of harmful bacteria. It is important to understand that once soil becomes saturated it loses most of its treatment capacity.

The sand filter is not truly a filter. Instead, it is a relatively simple way of replacing unsaturated soil, which is in very short supply on your lot, with a specific blend of unsaturated sand in an enclosed area, to facilitate sewage treatment. The sand filter gives beneficial bacteria space in which to cleanup the wastewater. Upon leaving the sand filter, the wastewater is sufficiently purified to allow final treatment and disposal into a mound sited over as little as twelve inches of native, unsaturated soil.

The mound is a drainfield constructed using a specific sand fill material. Built above the original soil surface, it appears as a rise, bump or berm in the yard. Within the sand fill is a gravel bed (or system of plastic chambers) supporting a network of small diameter pipes. Septic tank effluent is pumped through the pipes in controlled doses to insure uniform distribution through the bed. The effluent squirts from the pipes under low pressure through small diameter holes and trickles downward into the sand. Final treatment of the effluent occurs as it comes into contact with air while slowly moving through the sand and into the natural soil below. The purpose of the mound is to purify household wastewater before it comes into contact with groundwater.

Sand filter/mound systems are often used on sites where conditions are minimally adequate for on-site sewage treatment and disposal. These systems and sites require special care, as described in this manual, to avoid sewage treatment and disposal problems.

THE RESERVE AREA

Every new mound is required to have a designated replacement (reserve) area. This reserve area must be protected for future use when the existing mound needs an addition or replacement. When, hopefully after many years of operation, your mound needs to be replaced, the reserve area should be ready to accommodate a new mound installation. If you damage the reserve area it will not be usable as a mound site. Soil-disturbing activities such as paving, grading, excavating, construction, or compaction must not occur in and around this dedicated area and designated setback areas. *It is imperative that you maintain and protect the reserve area like your house depended on it, because it does!* The location of your reserve area is shown on your system's as-built drawing (see APPENDIX B).

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SAND FILTER / MOUND SYSTEM

DOS AND DON'TS

DOs

1. Become familiar with your sand filter system's operation by reading this manual.
2. Practice water conservation measures. (see **WATER CONSERVATION** and **HOW MUCH WATER CAN YOUR OSS HANDLE?**)
3. Compost food wastes, rather than grinding them through the garbage disposal and into the sand filter / mound system (see **GARBAGE DISPOSALS**).
4. Divert all surface drainage and roof drains away from the sewage tanks, sand filter, and mound (see **ACTIVITIES NEAR THE SYSTEM** and **LANDSCAPING AND SOIL PROTECTION**).
5. Maintain your system by having it checked by a professional annually, and by protecting the system from physical damage (see **OWNER RESPONSIBILITIES** and **PERIODIC MAINTENANCE**).
6. Know where all your septic system components are located. (see **APPENDIX B, AS-BUILT DRAWING**).
7. Space your laundry loads throughout the week to avoid periodic OSS overloading (see **HOW MUCH WATER CAN YOUR OSS HANDLE?**).
8. Perform regular inspections around the sand filter and mound looking for wet soils and other signs of problems (see **SAND FILTER AND SITE INSPECTION**).
9. Watch an educational video, e.g., *Understanding and Maintaining Alternative On-site Sewage Disposal Systems* available from the Health Department. Phone (206) 296-4932 (see **IMPORTANT NAMES AND PHONE NUMBERS**).
10. Plant a drought-resistant grass or other shallow-rooted ground cover to prevent erosion of the sand filter and mound surfaces (see **LANDSCAPING AND SOIL PROTECTION**).

DON'Ts

1. Don't dig into or around the sand filter and or the mound and its reserve area (see **LANDSCAPING AND SOIL PROTECTION**).
2. Don't raise or lower the level of the ground on the sand filter or mound and its reserve area (see **LANDSCAPING AND SOIL PROTECTION**).
3. Don't cover the sand filter or mound and the area around it with impermeable materials (e.g., clay soils, plastic sheets, concrete blocks, or paved walkways) (see **LANDSCAPING AND SOIL PROTECTION**).
4. Don't disturb or compact the soil over the sand filter and mound or in the area within 30 feet down slope from the mound (see **ACTIVITIES NEAR THE SYSTEM**).
5. Don't remove or damage the inspection ports in the sand filter and mound (see **SAND FILTER AND SITE INSPECTION**).
6. Don't plant plants other than shallow rooted ones on or near the sand filter and mound (see **LANDSCAPING AND SOIL PROTECTION**).
7. Don't do more than one or two loads of laundry on any one day (see **HOW MUCH WATER CAN YOUR OSS HANDLE?**).
8. Don't use a garbage disposal (see **GARBAGE DISPOSALS**).
9. Don't drive on the sand filter or the mound or within about 30 feet from the mound (see **ACTIVITIES NEAR THE SYSTEM**).
10. Don't dispose of any inappropriate materials, such as cooking grease or oil wastes, paint products, or hazardous chemicals down the drains (see **WHAT CAN AND CANNOT GO DOWN THE DRAIN**).
11. Don't use septic tank additives. They are rarely, if ever, useful (see **ADDITIVES**).
12. Don't build any structure in the reserve area, over the tanks, or on the sand filter or mound, or within about 30 feet from the mound (see **ACTIVITIES NEAR THE SYSTEM**).
13. Don't drain a hot tub (or large amounts of water in general) into your on-site sewage system (see **HOW MUCH WATER CAN YOUR OSS HANDLE?**).
14. Don't clean paintbrushes (used for either oil-based or water-based paint) into sinks or other drains that lead to the OSS (see **WHAT CAN AND CANNOT GO DOWN THE DRAIN**).
15. Don't install a sprinkler system on or within about 10 feet from the sand filter, and mound, and tanks (see **ACTIVITIES NEAR THE SYSTEM**). Also, make sure that your sprinkler system is equipped with approved back-flow prevention devices

SPECIFICATIONS AND TROUBLESHOOTING

Installation Permit #: _____

Parcel #: _____

Designer: _____

Master Installer: _____

Date of OSS Testing: _____

Permanent wiring of OSS and connection to electric utility completed at time of test?

☐ Yes ☐ No

SPECIFICATIONS FOR ELECTRICAL AND MECHANICAL COMPONENTS

1. Septic Tank

- a. Manufacturer: _____ Model #: _____
- b. Supplier: _____
- c. Size (gallons): _____

2. Effluent Filter Baffle Installed ☐ Yes ☐ No

- a. Manufacturer: _____ Model #: _____
- b. Supplier: _____
- c. Access for Service Is Via: _____

(Items numbered 3-6 concern mechanisms related to the pump tank and its pump.)

3. Pump Tank

- a. Manufacturer: _____ Model #: _____
- b. Supplier: _____
- c. Size (gallons): _____
- d. Access to Ground Surface: ☐ Yes ☐ No
- e. Gallons Per Inch of Tank Depth: _____

4. Pump

- a. Type: _____ H.P.: _____ Voltage: _____ Amperage: _____
- b. Total Dynamic Head: _____
- c. Manufacturer: _____ Model #: _____
- d. Supplier: _____
- e. System Dose Volume (gallons): _____
- f. Inches of Drawdown Per Dose Cycle: _____
- g. Number of Doses Per 24 Hours: _____

5. Pump Electrical Controls

- a. Panel
 - (1) Manufacturer: _____ Model #: _____
 - (2) Supplier: _____
 - (3) Location: _____

(4) Pump Elapsed Time Meter? ☐ Yes ☐ No

(5) Pump Cycle Counter? ☐ Yes ☐ No

b. Alarm-Visual and Audible? ☐ Yes ☐ No

(1) Manufacturer: _____ Model #: _____

(2) Supplier: _____

(3) Location: _____

c. Floats

(1) Type: _____ Model #: _____

(2) Manufacturer: _____

(3) Supplier: _____

(4) Settings - elevation in pump chamber for:

On: _____

Off: _____

Redundant Off: _____

Alarm: _____

d. Which circuit breaker in the main electric service panel controls the:

(1) Pump Controls: _____

(2) Alarm: _____

6. Timer: This pump system: Does ☐ Does Not ☐ Have A Timer.

a. Location: _____

b. Manufacturer: _____, Model # _____

c. Supplier: _____

d. It is set to allow pump operation when needed for _____ minutes (to nearest tenth of a minute) with _____ hours (to nearest tenth of a hour) off between doses, to deliver _____ gallons per dose up to _____ time(s) per day.

e. The timer runs - continuously (A) ☐ - only when the float switch is "on" (B) ☐
If (B), when timer starts running, it allows pump to begin running after _____ hours.

7. Sand filter Distribution System

a. Check valves in manifold? ☐ Yes ☐ No

b. Check valves accessible from ground's surface? ☐ Yes ☐ No

Exact location of all valves: _____

c. Lateral Diameter: _____

d. Orifice Diameter: _____

e. Orifice Orientation: ☐ 6 o'clock ☐ 12 o'clock

f. Orifice Shields Installed ☐ Yes ☐ No

g.

Laterals	#1	#2	#3	#4	#5	#6	#7
Lateral Length (feet)							
Lateral Elevation - relative to pump intake (feet)							
Number of Orifices							
Orifice Spacing							
Residual head (feet) at lateral end							

h. Method used for estimating residual head? _____

(Items numbered 8 and 9 concern the pump within the sand filter.)

8. Pump in Sand Filter

- a. Type: _____ H.P.: _____ Voltage: _____ Amperage: _____
 b. Total Dynamic Head: _____
 c. Manufacturer: _____ Model #: _____
 d. Supplier: _____
 e. System Dose Volume (gallons): _____
 f. Inches of Drawdown Per Dose Cycle: _____

9. Pump Electrical Controls

a. Panel

- (1) Manufacturer: _____ Model #: _____
 (2) Supplier: _____
 (3) Location of Panel: _____
 (4) Pump Elapsed Time Meter Present? ☐ Yes ☐ No
 (5) Pump Cycle Counter? ☐ Yes ☐ No

b. Alarm-Visual and Audible? ☐ Yes ☐ No

- (1) Manufacturer: _____ Model #: _____
 (2) Supplier: _____
 (3) Location: _____

c. Floats

- (1) Type: _____ Model #: _____
 (2) Manufacturer: _____
 (3) Supplier: _____
 (4) Settings - elevation off bottom of pump chamber for:
 On: _____
 Off: _____
 Redundant Off: _____
 Alarm: _____

d. Which circuit breaker in the main electric service panel controls the:

(1) Pump: _____

(2) Alarm: _____

10. Mound System

a. Check valves in manifold? ☐ Yes ☐ No

b. Check valves accessible from ground surface? ☐ Yes ☐ No

Exact location of all valves: _____

c. Lateral Diameter: _____

d. Orifice Diameter: _____

e. Orifice Orientation: ☐ 6 o'clock ☐ 12 o'clock

f. Orifice Shields Installed ☐ Yes ☐ No (Not required with the 6 o'clock orientation)

g.

Laterals	#1	#2	#3	#4	#5	#6	#7
Lateral Length (feet)							
Lateral Elevation - relative to pump intake (feet)							
Number of Orifices							
Orifice Spacing							
Residual head (feet) at lateral end							

h. Method used for estimating residual head? _____

ALARM

Code requires that the pump and alarm be on different breakers so that, if the pump breaker trips, the alarm can still operate. If the fluid within the pump tank rises beyond the normal pump "on" level, the alarm warning light will come on and an alarm will sound. This indicates that the pump probably has malfunctioned, or, if the system is equipped with a timer, the water level in the pump tank is unusually high because you are using more water than the system is designed to handle. Either way, you should immediately begin severe water conservation measures, which would include avoiding showers, baths, and washing clothes or dishes.

NOTE: To silence the alarm, push the reset button on the alarm box. The audible signal will be deactivated but this will not solve the problem.

There is at least one day's emergency wastewater storage capacity of _____ gallons built into the system. This should allow you enough time to get the problem corrected. Generally you will want to call the company that installed your OSS or an OSS maintenance firm that employs a qualified electrician to help to diagnose and correct the problem (see IMPORTANT NAMES AND PHONE NUMBERS).

ALARM TROUBLESHOOTING

(Also see **TIMERS** and **POWER FAILURES**.)

If an Alarm Sounds –At this point, you may want to check for any obvious problems before calling a service company:

- (1) Check for a tripped circuit breaker in your home's circuit breaker panel;
- (2) Determine whether an unusual amount of water has been used within the last eight hours that may have overloaded the pump tank (if so, using little water for up to twelve hours should cause the problem to correct itself);
- (3) Check for a pump or float switch plug that has come disengaged. Look for a plug-in electrical box on the outside wall of the house near the pump tank. If you cannot find such a box, your system is probably wired direct.

If there are no obvious problems you can identify, the problem may be 1) within the pump tank, or the pipe from the pump to the sand filter, or within the sand filter could be clogged, or 2) within the sand filter pump well or the pipes to the mound or in the mound. It is best to contact a service person to troubleshoot the system from here (see **IMPORTANT NAMES AND PHONE NUMBERS**). Be aware that sand filters are sophisticated on-site systems and not every OSS maintainer, installer, or designer will be well versed or equally capable of troubleshooting or repairing them. Consult the Health Department for more information.

WARNING

NEVER ENTER A SEPTIC TANK OR PUMP TANK. PEOPLE HAVE DIED IN SEPTIC AND PUMP TANKS. THEY CONTAIN TOXIC GASES AND LITTLE OR NO OXYGEN.

TIMERS

The timer is used as a safeguard, protecting the sand filter from receiving too much wastewater during a given time period. The timer controls the maximum number of pump cycles per day and ensures that the doses are spread out to allow adequate resting periods between doses. Each pump cycle is designed to deliver a calculated amount, or dose, of effluent to the sand filter. The size and frequency of the doses are based on the quantity of wastewater that the sand filter can handle without becoming overloaded. If your household generates more than that quantity, the timer will limit the amount sent to the sand filter. The remaining wastewater will be stored in the pump tank until the timer activates the next pump cycle. In instances where more wastewater is generated than the sand filter is designed to accept, the tank may temporarily overflow and the alarm will sound. You must then determine the cause for the alarm (see **ALARM TROUBLESHOOTING**). **If the cause is not mechanical in nature, then the problem is probably too much water entering the septic and pump tanks.** You are probably using more water in a short time than your sand filter will handle (or water could be leaking into one of your tanks). Checking your water bill will help determine whether you are using too much water.

When the problem is due to excessive wastewater generated within the household, immediately begin water conservation measures until the pump can catch up with the wastewater overload. This becomes a warning that you are exceeding the design capacity of the system. Appropriate water use habits will eliminate this problem. If you have been generating excessive wastewater loads even though you do not feel that you have been using excessive water, the source of the excess water could be either a leaking plumbing fixture (toilet or faucet) or ground and surface water entering the tanks. A check of all indoor plumbing fixtures (e.g., toilet tanks) can rule them out as the source.

If you are not using excess water, leakage into the tanks could be a problem (see **HOW MUCH WATER CAN YOUR OSS HANDLE?**).

IMPORTANT: You must not attempt to remedy alarm warnings by making adjustments to the timer or switching the system to A manual operating mode. Only your system maintainer, designer, or installer should ever adjust the timer settings. Most timers are complex. Altering the timer settings can void any warranty on the OSS. Adjustments could cause an overdosing of the sand filter and/or mound, which leads to system failure. Sand filter and mound failures are very expensive to correct.

IMPORTANT NAMES AND PHONE NUMBERS

(1) System Designer

Name: _____ Company: _____

Address: _____ Phone: (____) _____

The designer is the person responsible for the design of your sand filter OSS and providing you with this manual. This individual oversaw the installation, testing, and final soil cover placement, and completed the as-built drawings of your system. The designer can answer specific questions regarding your systems operation and performance. Some design firms may provide OSS monitoring and maintenance services as well.

(2) System Installer

Name: _____ Company: _____

Address: _____ Phone: (____) _____

The installer is the person or company that built your system, based upon the designer's specifications and design drawings. Installers are certified to repair existing systems as well as construct new systems. County regulations, based on years of experience, require almost all repair work to be done by a certified installer.

NOTE: Any repairs to your OSS will require a repair permit from the Health Department (See # (4), below). For simple repairs the permitting process has been greatly streamlined.

(3) System Maintainer

Name: _____ Company: _____

Address: _____ Phone: (____) _____

The system maintainer is a person certified to perform the **required periodic monitoring** of this OSS. In some cases this may be the same person who designed the OSS. For sand filter / mound systems OSS regulations require that the following periodic monitoring be performed by a county certified OSS maintainer:

- 6 months after the approval of the installation of the sand filter / mound system (This first monitoring may be done by either your OSS designer or system maintainer.), and
- Annually

The System Maintainer is to complete an annual OSS operation and performance inspection and report its results, on forms provided by the health officer, to the OSS owner at the time of monitoring and to the health officer within 30 days of the monitoring. A sample monitoring form is attached to this manual (see APPENDIX A). System maintainers also may do simple “limited repairs” (such as repair to a broken pipe, lid, or pump) to the OSS. Only an OSS installer may do more complex repairs.

(4) Health Department (Seattle/King County Department of Public Health)

The Eastgate district office handles most OSS related activity within King County.

Address: 14350 SE Eastgate Way, Bellevue, 98007 Phone: (206) 296-4932

The Health Department is the educational and regulatory agency for all activities related to your OSS. It can provide you with answers to general questions and printed information. They also keep records on file of your system's design, installation and as-built drawing. They can provide lists of OSS maintainers, designers, installers, and pumpers certified to practice in King County. The Health Department issues permits for the installation and repair of all OSS's and can answer any questions regarding repair procedures and requirements.

(5) OSS Pumpers

These businesses must be certified by the health department to pump sewage tanks in King County. They can do routine or emergency pumping of your septic tank and can do tank inspection. They are not permitted to repair septic systems or do overall OSS inspection unless they also have a valid installer or maintainer's certificate from the health department.

(6) Plumbers

Plumbers can troubleshoot and repair any plumbing problems inside your home. They are not allowed to do repairs to your OSS unless they have a valid OSS installer's certificate.

OSS CARE

OWNER RESPONSIBILITIES

For sand filter / mound systems, OSS regulations require that periodic maintenance is performed by a county-certified OSS maintainer (See IMPORTANT NAMES AND PHONE NUMBERS):

- **6 months after the approval of the installation of the sand filter / mound system (this first monitoring may be done by either your OSS designer or system maintainer), and**
- **Annually, on or before the anniversary of the date of approval of the installation.**

A complete OSS performance monitoring evaluation is to be conducted. A system performance monitoring report, on forms provided by the health department (see APPENDIX A), is to be provided to the OSS owner by the person inspecting the OSS at the time of inspection and to the health department within 30 days of the inspection

As stated in Title 13 of the Code of the King County Board of Health, the OSS owner is responsible for the continuous proper operation and maintenance of the OSS, and must:

1. For residential systems with no garbage disposal determine the level of solids and scum in the septic tank at least once every three (3) years. If a garbage disposal is installed, or the OSS serves a business, make this determination once every year.
2. Employ an approved pumper to remove the septage from the septic tank when the level of solids and scum indicates that removal is necessary. (See PERIODIC MAINTENANCE for instructions regarding how this is determined.)
3. Have regular preventive maintenance/system performance monitoring inspections conducted and any indicated service performed by a certified person.
4. Operate and maintain the OSS in accordance with Title 13, with pertinent alternative system guidelines issued by the Washington Department of Health (DOH), and with this OSS owner's manual. Title 13 requirements and DOH requirements are summarized in this manual.
5. Protect the OSS area, including the reserve area, from:
 - a. Cover by structures or impervious material;
 - b. Surface drainage;
 - c. Soil compaction, for example, by vehicular traffic or livestock; and
 - d. Damage by soil removal and grade alteration.
6. Maintain the flow of sewage to the OSS at or below the approved design limits for both quantity and waste strength.
7. Direct drains, such as footing or roof drains, and surface water away from the area where the OSS is located.

The owner must not allow:

1. Use or introduction of strong bases, strong acids or organic solvents into the OSS for the purpose of system cleaning.
2. Use of a sewage system additive unless it is specifically approved by the DOH, and
3. Use of an OSS to dispose of waste components atypical of residential wastewater, for example, but not limited to, petroleum products, paints (including latex), solvents, or pesticides.

The following is practical advice concerning how to extend the operating life of your OSS and meet the requirements listed above.

ACTIVITIES NEAR THE SYSTEM

You should not build on, excavate, pave, drive over, or allow livestock on any parts of the system, including the reserve area. Particularly critical to a mound on a sloping site is the area within 30 feet down slope from the mound. This is the area where most of the treated wastewater will travel as it is absorbed into the native soils. For mounds on relatively flat, level sites it is important not to compact the soils or alter the site within 30 feet in any direction from the mound. It is very important that this area remain undisturbed. Homeowners should protect the sand filter and mound and surrounding area and inspect them on a regular basis. Wet spots on or near the sand filter or mound are potential indicators of advanced problems or OSS failure.

LANDSCAPING AND SOIL PROTECTION

Grass or vegetation with shallow non-penetrating roots is the best cover for your sand filter and mound. The grass should be of a shallow rooted but drought resistance type. Perennial rye mixed 50/50 with tall or fine fescue, “Northwest Mix”, is a readily available good choice. New blends, which include these grasses along with clover and other broadleaf plants, will stay greener in the summer without watering and fertilizer. *Eco-lawn* and *Fleur de Lawn* are two available brands.

Since the native, natural soil is required for completing the treatment process, it must not be disturbed or altered. Digging through it or compacting it, e.g., by driving over it, destroys the structure of the soil and greatly reduces its ability to provide sewage treatment. Anyone who has dug a hole and then tried to refill it has witnessed the destruction of soil structure. That is why there rarely seems to be enough dirt left to refill the hole.

Sprinkler systems should not be installed in or within about 10 feet from the OSS for three reasons:

- (1) damage to the sand filter by digging into it to install the sprinkler;
- (2) the additional water load to the sand filter, and
- (3) the crossing of sewer and water lines is generally not permitted due to the potential for direct contamination of drinking water with sewage.

With lawn care equipment, such as riding lawn mowers or tractors, be careful not to travel on the sand filter and mound, or the downslope area when the soil is saturated, as during wet wintertime. Winter landscape work on the sand filter and mound should be avoided to minimize frost penetration or compaction.

Any landscaping you choose to do must not adversely alter or disturb the sand filter or mound or the soils around them. You should not place fill soils over the sand filter, or mound, or the ground around them. This will block airflow into the sand filter and mound and greatly reduce their effectiveness and shorten their operating lives. Placing concrete or asphalt sections or plastic sheets over the sand filter or mound also reduces the supply of oxygen necessary for the sewage treatment process.

Planting a vegetable garden over the mound is not recommended.

IMPORTANT:

Do not allow any surface runoff to be directed onto or around the sand filter, or mound, or the reserve area. Equally important, do not allow any construction or ground compaction in the reserve area or within 30 feet down slope from the mound.

ADDITIVES

The Health Department recommends against the use of septic tank additives of any type. Septic tank additives will not reduce the need for septic tank pumping. Some additives may actually cause solids to be carried out of the septic tank and into the sand filter. This will begin plugging the sand filter bed, gradually causing it to fail. Other additives may pass into the soil and pollute the groundwater. In Washington State, persons may not use, sell, or distribute any septic system additive unless the Washington State Department of Health (DOH) has reviewed the additive for safety. DOH approval indicates only that an additive is not known to be harmful, not that it is known to be useful. DOH evaluation of additives does not include investigation of the validity of performance claims by manufacturers. Manufacturers' use of the word "approved" is prohibited, but a product may be advertised as "complying with Washington laws regarding harm to public health and water quality."

WHAT CAN AND CANNOT GO DOWN THE DRAIN

Your OSS is for treatment of typical kitchen, bathroom, and laundry wastewater and should not be used as a disposal site for other types of waste. Any materials that do not readily biodegrade within the septic tank should not be flushed down a toilet or poured down a drain. This would include sanitary napkins, tampons, coffee grounds, grease or oils of any kind, hair, "disposable" diapers, cigarette butts, paper towels, paper napkins, newspaper, all paints (**latex paint is very bad for filter baffles and the sand filter**), solvents, degreasers, pesticides, caustic drain cleaners or oven cleaner, or any toxins. Even dental floss has been known to cause problems. Large quantities of disinfectants (e.g., bleach) should also be kept out of your septic tank. Normally spaced clothes washing or household cleaning chores should not pose a threat to your system.

Prolonged, routine use of some types of prescription drugs, such as chemotherapy drugs or antibiotics, may be harmful to your system. If you suspect that drugs might be disrupting your OSS your system maintainer can arrange for sample collection and testing of the system effluent. S/he can check your OSS and determine whether problems are occurring. Early detection will prevent permanent harm. There is also evidence that the repeated, frequent purging associated with the eating disorder bulimia can damage an OSS by making the sewage very acidic, killing bacteria required for normal OSS operation.

GARBAGE DISPOSALS

It is recommended that a garbage disposal not be used. If you must use it, do so very sparingly. Garbage disposals by design use large volumes of water and pass significant quantities of suspended solids into the septic tank. Garbage disposals very commonly overload OSSs. If you use the disposal you will need to have the septic tank pumped much more frequently. Regardless of the frequency of septic tank pumping, garbage disposals will increase the waste concentration, which can overload the sand filter. When you consider the total cost associated with operating a garbage disposal, it might be the most expensive appliance in your home.

HOW MUCH WATER CAN YOUR OSS HANDLE?

Each OSS is designed based upon a residence's anticipated wastewater production, called the "loading rate". Loading rate projections are based on the expected maximum number of people that will reside in a house (usually considered to be two people per bedroom) with a maximum daily wastewater production per person of about 60-75 gallons per day. Exceeding the expected loading rate can seriously damage the OSS. The normal average monthly water use, as indicated by your water bills, should be no more than about two-thirds of the system's design loading rate. This will allow for occasional higher peak flows without damaging the OSS.

If your water bill indicates that you have been using excessive water, the source of the excess water could be either a leaking plumbing fixture (toilet or faucet). A check of all indoor plumbing fixtures (e.g., toilet tanks) can rule them out as the source.

Also, sometimes surface water or ground water leaking into the septic tank can overload a drainfield. Surface runoff should always be diverted away from the tank. Groundwater intrusion is a more difficult problem, suggesting tank or piping damage, and you should consult the system designer or installer or an OSS maintenance firm to help with diagnosis and corrective measures. Tank leaks are most common during winter months, when sites are wettest and sealing-mastics harden and fail. A test for the level of dissolved oxygen in the septic tank wastewater can often reveal the presence of water leaking into a tank. Ground and surface water contain more dissolved oxygen than does sewage.

The OSS will not continue to operate properly at a loading rate higher than that for which it is designed. The maximum designed loading rate for your system is _____ gallons per day.

A common cause of periodic overloading is saving a number of wastewater generating activities for the weekend, when the laundry, dishwasher, bathtub and shower are used heavily. This overloads the system on weekends while a lower loading rate occurs during the weekdays. This high weekend water use can cause the system alarm to go off if the OSS is equipped with a pump timer, or can literally "blow out" a sand filter, doing *permanent* damage, if the OSS is not equipped with a properly adjusted timer.

These peak load spikes should be avoided by spreading wastewater-producing activities (e.g., clothes washing) evenly throughout the week. **In many cases, life styles may need to be adjusted to accommodate living within the limitations of an OSS.**

Remember that all OSSs have a limited capacity to treat and dispose of wastewater. Monitoring your family's water use habits will help you to estimate how you are impacting your OSS. This is especially useful if your home has no water meter. The following are some typical water use figures for various household activities. These figures will help you calculate your families OSS loading rate.

1. Showers typically use 25 gallons of water.
2. Clothes washing - 40 gallons per load. (Front loading washers and the new spray-rinse washers use much less.)
3. Dishwasher - 9 gallons per load.
4. Toilet flushing - 1.6 gallons-per-flush toilets are now the standard for new construction.
5. Garbage disposal - 2+ gallons per use.

WATER CONSERVATION

It is important that you practice good water use habits to get the maximum life span from your OSS. Laundry washing should be spaced throughout the week and not all done on a single day. Wash only full loads of laundry or dishes. Low flow plumbing fixtures (toilets, faucet aerators, and showerheads) should be installed if not already present in the house. (Low flow fixtures will be present in homes built since 1993.) Water-conserving appliances, such as front-loading clothes washers or the new spray-rinse washers, should be chosen when replacing your appliances. Any water-generating activity should be thought of in terms of its impact on the OSS.

If your system has a pump timer, the alarm will sound should the design capacity of the system be exceeded (see TIMERS). If this happens repeatedly it can serve as a warning of excessive OSS loading.

NOTE: You can obtain water conservation pamphlets from the Health Department, at (206) 296-4932.

POWER FAILURES

During a power failure, the wastewater cannot be pumped to the sand filter, and therefore will accumulate in the pump tank. You should begin severe water conservation measures as soon as the power goes out. All new systems using pumps are now equipped with timers. The timer limits the frequency with which the pump starts, and thereby manages how much effluent goes into the sand filter in a 24 hour period. This ensures that the sand filter gets only as much effluent as it was designed to handle. A timer-controlled system will take care of itself over time once the power comes back on, if it hasn't been overloaded with too much water (i.e. wastewater isn't backing up into the house). In order to let your pump system catch up, continue to conserve water for an additional day or more once power is restored. If the high water alarm sounds when the power comes back on, this indicates that wastewater has backed up into the reserve storage area of the pump tank. The alarm can be silenced manually and will shut itself off once the pump system has pumped the excess wastewater from the tank.

If the system is not equipped with a timer controlling the pump tank's pump, that pump should be turned off at the pump's control panel or your circuit breaker box. Do not turn off the pump located in the sand filter unless it is shut off by the same circuit breaker used to turn off the pump tank's pump.

Without a timer, if the power outage is extended (e.g., 6 hours or more), precautionary measures should be taken when the power returns, to avoid flooding the sand filter with excessive effluent. In the absence of a timer, after the power returns, switch the pump on and let it run for no more than 5 minutes, then turn the pump off again. Repeat this manual switching not more frequently than every 6 hours until the pump switches off on its own. (Often you will be able to hear a hum when the pump is running, which stops when the pump shuts off. Also, if your pump control panel includes an hour meter, it will show time accumulating if the pump is running.) At this point, the normal, automatic cycling will once again be appropriate, and you may resume normal water usage. If there has been little water use during the outage, the pump may automatically turn off during the first manual switching. In this case the switch can be left "on".

PERIODIC MAINTENANCE

It is essential that your OSS be inspected and maintained on a regular basis. This will catch most problems before they harm the system. Recent amendments to the state and county OSS regulations require periodic system monitoring. (See “System Maintainer” in IMPORTANT NAMES AND PHONE NUMBERS, also see SAND FILTER AND SITE INSPECTION, below.) Sand filter / mound systems are complex, susceptible to abuse, and costly to repair, and therefore must be monitored six months after installation, again six months later and annually thereafter. **The first monitoring of your system must be completed by _____ (date).**

SEPTIC TANK PUMPING

Wastewater from all plumbing fixtures drains into the septic tank. Heavy solids settle to the bottom where bacterial action produces digested sludge and gases. Lighter solids that float, such as grease, fats and oils, rise to the top and form a scum layer. Sludge and solids that are not decomposed remain in the septic tank. These solids must be removed periodically by pumping the tank.

Septic tank pumping is only one aspect of OSS maintenance, but it is the first line of defense for your OSS and should not be neglected. The average pumping service interval recommended by the Health Department is 3-5 years. However, this interval depends on the septic tank’s size and the amount of solids and oil and grease put down the drain. A more frequent pumping schedule may be necessary depending on your family’s garbage disposal use and cooking and cleaning (especially dish washing) habits. **Inspecting the sludge and scum accumulation annually is the only sure way to determine whether a tank needs to be pumped.** As sludge and scum gradually accumulate, less and less room is available for the sewage coming into the tank. This results in the sewage passing through the tank more and more quickly, allowing less time for scum and solids to separate from the sewage before it leaves the tank, as “effluent”. Therefore the tank becomes decreasingly effective in protecting the sand filter from contaminants.

The tank should be pumped before either the scum mat or sludge layer is twelve inches thick. Once your characteristic sludge accumulation rate is known, pumping frequency can be adjusted accordingly. The County Health Department can supply you with a brochure including information on how to measure accumulated scum and sludge. Measuring the sludge and scum levels can be an awkward process. OSS maintainers or septic tank pumpers can do this for you if you prefer.

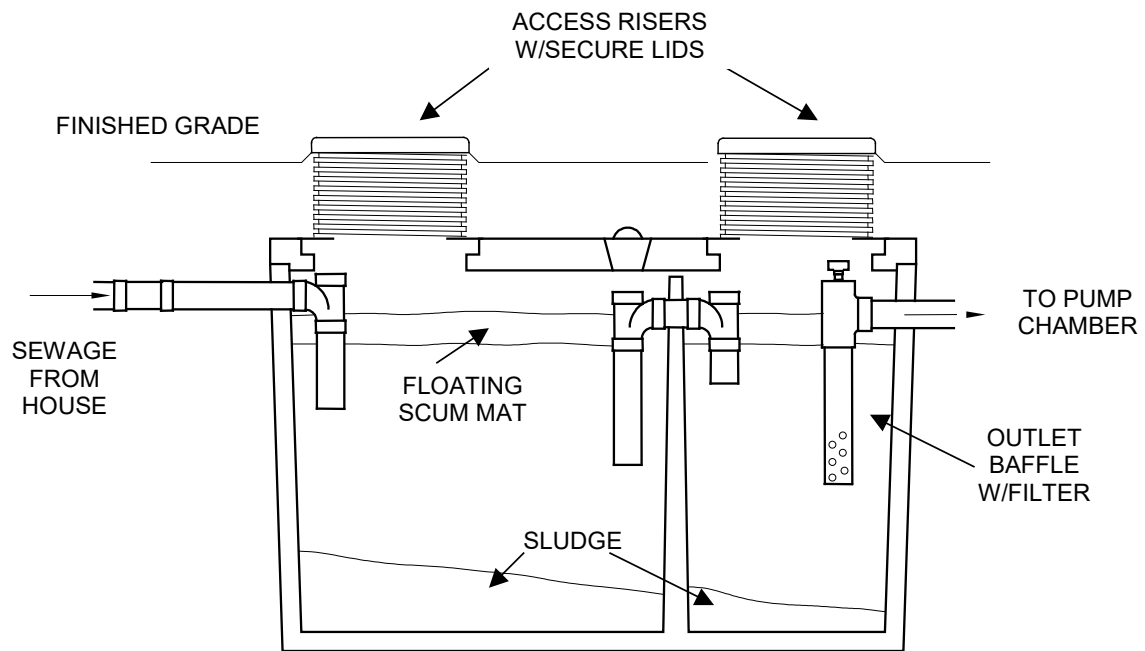
Knowing the location of your septic tank and pump tank will save time and money when it is time to have them checked or pumped. Current code requires that newly installed tanks have access lids at the surface. Also, you can locate your septic tank by referring to your OSS as-built drawing, attached to this manual. Once you have located the tank, contact the Health Department, at (206) 296-4932, for a list of septic tank pumpers currently certified to operate in King County. You may want to call several, because prices and details of the service provided may vary. For instance, some companies might insist on pumping the tank whether or not accumulated sludge and scum levels warrant it, and the thoroughness of the tank inspections may vary.

After the tank accesses are opened the pumper will note the odor and appearance of the wastewater inside. If the tank is working properly there should be a layer of scum on top and the wastewater should smell musty, like compost, not sour or nauseating. Before the pumper begins pumping the tank s/he will measure the scum and sludge layer thicknesses. Knowing the thicknesses you can judge the rate at which the solids have accumulated in the tank, and estimate the required pumping frequency. Required pumping frequency can change as household conditions, such as the number of residents, change.

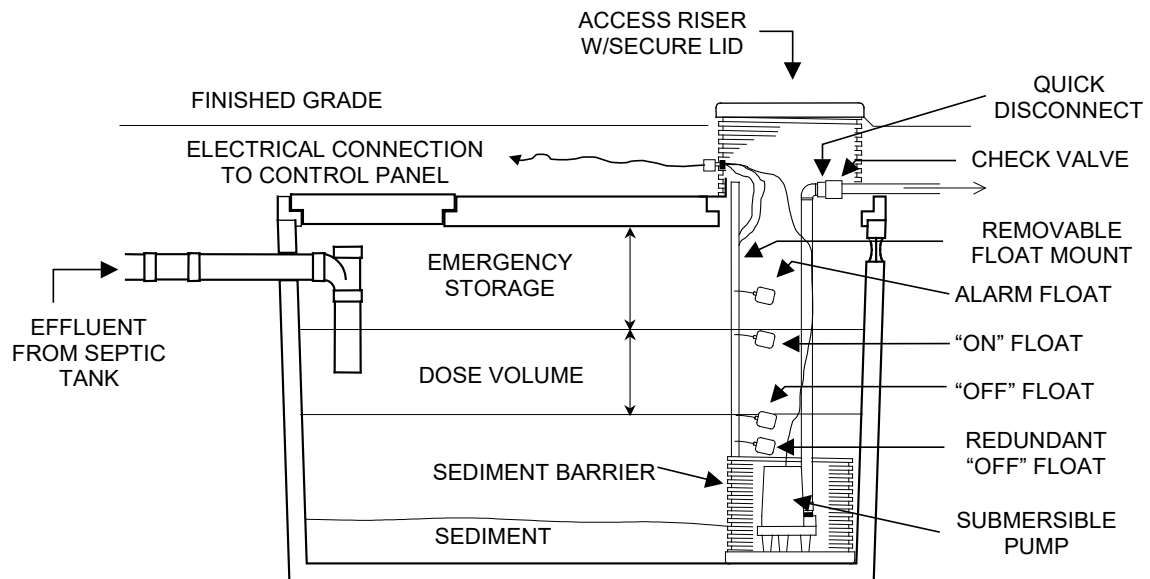
When the septic tank is pumped, make sure that both septic tank compartments are pumped and that the pump tank is also pumped. Upon completion of pumping, the pumper is to provide you with a report detailing the service. At a minimum this report is to include:

1. Name, address, and phone number of the pumping firm;
2. Name, address, and phone number of the owner/occupant of property serviced;
3. Date service performed;
4. Depth in inches of floating scum mat and sludge layer for both the septic tank and pump tank;
5. Type of tanks and number of compartments pumped;
6. Number of gallons pumped;
7. General tank condition observed;
8. Condition of baffles, noting whether the filter baffle was cleaned;
9. Description of any other service performed; and
10. Signature and certificate of competency number of person performing the work.

Failure to provide this report is a violation of King County regulations.



TYPICAL SEPTIC TANK



TYPICAL PUMP TANK

TANK BAFFLES

Septic tank baffles are devices in the septic tank that are essential to keep the solids in the tank, where they belong, separate the floating scum layer from the liquid layer, promote settling of solids to the bottom of the tank, and allow only clarified liquid to enter the sand filter. There are three baffles located in a two compartment septic tank -- one on the inlet, where the sewage enters the tank; one on the wall dividing the tank into two compartments; and one on the outlet. All tank baffles should be inspected whenever the sludge and scum levels are measured, but to thoroughly inspect the baffles it is sometimes necessary to pump the tank.

A broken outlet baffle can allow floating scum to leave the tank through its outlet, so that the tank retains no scum. This defeats the purpose of the tank and makes it appear that it does not require pumping. Sewage scum entering the sand filter can ruin it. Baffles must be replaced if they are in poor condition.

The outlet baffle will probably contain a filter to keep any solids larger than 1/8th inch from passing into the pump tank and being pumped into the sand filter. This filter will need periodic checking and cleaning. If the filter clogs, plumbing drains may drain slowly or sewage may backup in the house. The filter baffle should be checked, and generally cleaned, annually, e.g., as part of your annual sand filter / mound system monitoring performed by your system maintainer, or the annual septic tank inspection, which you can do yourself. No water should be used inside the house while the filter is removed for checking and cleaning. This will minimize the escape of sludge and scum from the septic tank. Cleaning the filter generally involves simply removing it and hosing it off into the access for the inlet compartment of the tank.

CAUTION: Some of the filter baffles when removed for cleaning may pass solids into the pump tank. If this is the case, the septic tank might need to be pumped down before removing the filter baffle for cleaning. Consult the manufacturer of your baffle or your system maintainer (see SPECIFICATIONS FOR ELECTRICAL AND MECHANICAL COMPONENTS).

If there is not a filter baffle at the septic tank outlet there should be a screen around the pump, located in the pump tank. Make sure that the pump screen or the filter baffles are cleaned at the time of tank pumping. Any time that the tanks are checked, these screens should also be checked for blockage. The frequency of cleaning required will depend on user habits but is rarely greater than once a year.

PUMP TANK AND PUMP CONTROLS

Wastewater leaving the septic tank is a liquid called "effluent". While it has received some treatment in the septic tank, it is still unpleasant smelling and contains disease organisms, organic wastes, and other pollutants. This effluent requires proper treatment and disposal; otherwise there can be significant environmental and public health problems.

In a sand filter / mound system a pump is used to convey the effluent to the sand filter and another pump is used to transfer the effluent from the sand filter to the mound for final treatment and disposal. A pump tank containing a sewage effluent pump, control floats, and a high water alarm is placed between the septic tank and the sand filter. The control floats are set so that a specific volume of effluent is sent to the sand filter. This specific amount is referred to as a "dose". A timer generally determines the time between doses. When the timer determines that the sand filter has been rested long enough, and the effluent in the pump tank rises to the level of the "on" float setting, the pump is activated and pumps the effluent into the sand filter until it reaches the "off" float setting. In turn, the pump in the sand filter is set to pump a specific dose of effluent out of the filter when the level of effluent at the bottom of the sand filter rises to a predetermined level. That effluent is pumped into the mound.

As part of your OSS annual monitoring, your system maintainer will check to see that the float switches are clean and free in their movements and will test the alarm float by lifting it. The alarm should sound. If it does not, and the circuit breaker is not tripped, servicing is required. The maintainer will also adjust the

pump cycles to make sure that they meet the original specifications of the design. (See SPECIFICATIONS FOR ELECTRICAL AND MECHANICAL COMPONENTS for the original pumping doses and time.) If the pump tank's pump cycle is too long (or the residual pressure in the sand filter's distribution lines is too high), this may indicate that some orifices within the sand filter pressure lines are plugged. This can damage your sand filter by causing some portions of it to be overloaded with effluent. A cleaning of the pressurized lines may be in order; consult your system maintainer for corrective action. If the sand filter pump's cycle is too long, this suggests that the orifices within the mound's distribution pipes are plugged and should be cleaned before the system is damaged.

SAND FILTER AND SITE INSPECTION

Annually (and six months after installation) the sand filter and mound (and the operation of the system in general) must be inspected by your system maintainer to determine its condition. This is required by a combination of state and county board of health regulations and is intended to save you money in the long run while protecting public health. More frequent inspections are sometimes desirable, e.g., if there is reason to expect that the sand filter is damaged or is being overloaded with effluent.

At a minimum the inspections must include:

1. Sand Filter and Mound Area Evaluation for -
 - Indications of surfacing effluent or ponding in the monitoring standpipes in the sand filter or mound
 - Appropriateness of vegetation, landscaping impacts, etc.
 - Absence of:
 - Heavy traffic
 - Inappropriate building
 - Impervious materials or surfaces
 - Abnormal settling or erosion
2. Sand Filter and Mound Piping System Evaluation for –
 - Residual pressure at the distal ends (Confirm that pressures are as shown in this manual).
 - Equal flows in each lateral
 - Need for cleaning. Clean laterals and orifices as needed
3. Pump System Evaluation for –
 - Pump run time per dose (compare with designed time noted in this manual).
 - Correct timer settings, float switch operation and placement, and pipe condition
4. Alarm Test -
 - Assure proper operation
5. Septic Tank and Pump Tank Inspection for (homeowner may perform) –
 - Sludge and scum accumulation (i.e., need for pumping)
 - Clogging, damage, or improper placement of the outlet baffle filter (Clean as needed).
 - Evidence of tank leakage
 - Risers and lids are at or above grade and lids are secured

As noted above, the maintainer will check liquid levels in the inspection ports; look for seepage around the sand filter and mound; verify that the pump switches, alarm, and timer are set and operating correctly; and complete a number of other observations. If these procedures detect potential problems, additional tests might be needed. These tests sometimes include sampling and laboratory testing of effluent or sand filter materials. (See the APPENDIX A inspection form for a full list of the components of the periodic inspection.)

The system maintainer will be required to locate the sand filter and mound inspection ports, which are capped plastic stand pipes. Do not alter or remove these inspection ports, as they provide “windows” into the sand filter and mound. If liquid within these pipes is observed to be ponding 4-6 inches or more

continuously (i.e., for more than a day), or increases in depth over time, then there may be a problem with the functioning of the sand filter or mound.

In order for the sand filter to treat the wastewater, the wastewater must be able to move through it and pass into the underdrain. Continuous ponding seen through the inspection ports is a sign that this process is not working. Corrective measures should be taken before the system actually fails. Replacement of a failed sand filter costs thousands of dollars. If you notice any potential problems, you should contact your OSS maintainer and the Health Department for a consultation.

Partial plugging of the sand filter's distribution piping may occur over time and is not unusual. This results in uneven distribution of effluent, overloading portions of the sand filter. This plugging can sometimes be detected by increased dosing times, that is, the pump runs longer than its normal dose time, or the drawdown of effluent from the pump tank per dose is less than the designed drawdown. A more sensitive monitoring procedure is to check for increased residual pressure at the ends of the distribution pipes in the sand filter (see SPECIFICATIONS AND TROUBLESHOOTING). System monitoring will include a check for plugging. If evidence of plugging is found, the ends of the distribution laterals should be exposed and the pump activated to flush any solid material. If necessary, the pipe can be rodded. State guidelines require that the ends of all distribution lateral pipes be equipped with cleanouts and monitoring ports with access to the ground's surface.

MAINTENANCE LOG

The following log sheet will allow you to accurately document any service done to your sand filter / mound system. You may wish to keep a log of the monitoring done by your system maintainer on this sheet as well. Keep this manual together with the reports you receive from you system maintainer and the company(s) that pump the septic tank. Having these documents available can save you hundreds or even thousands of dollars in maintenance, diagnosis, and repair costs over the life of your home. At the time of sale of your property these records will provide the buyer assurance that your OSS has been well maintained.

MAINTENANCE RECORD	
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