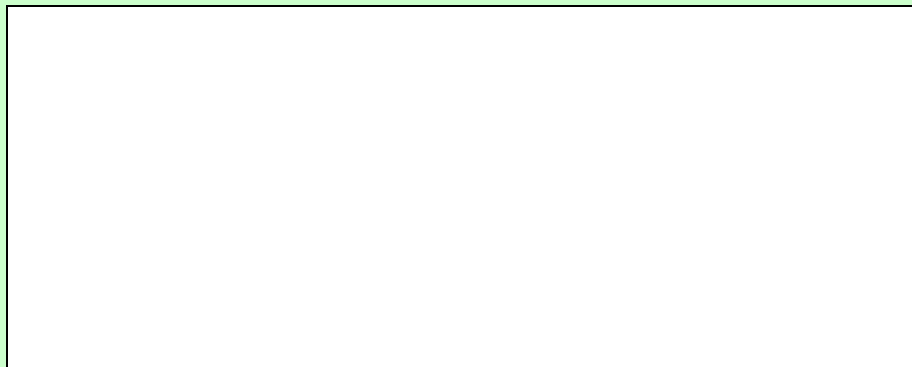


LAGOON SEWAGE TREATMENT SYSTEMS

It's Your On-Site System



Operation and Maintenance Guide for Homeowners



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THE COST OF YOUR SYSTEM

While initial cost of a system is often "the bottom line", don't forget the yearly maintenance costs of a system or the total five year cost of the system. Yearly maintenance costs vary with each type of system that will affect the 5-year total cost of the system. The initial cost plus the maintenance cost over a five year period provides a different view of "the bottom line". While the cost represented below will vary based on which part of the state you live, it does provide a fair representation of basic costs and are for illustration purposes.

Aerobic Treatment with Drip or Surface Irrigation

Five Major Components

- Trash tank or Septic Tank
- Aerobic Treatment Unit (ATU)
- Disinfection Device
- Dispersal method – drip or spray

Average installation cost - \$\$\$\$\$

Average annual maintenance cost – \$

Average 5-year Total Cost -\$\$\$\$\$

Evapotranspiration/Absorption (ET/A)

Two Major Components

- Septic Tank
- Evapotranspiration/Absorption Field

Average installation cost - \$\$\$\$\$

Average annual maintenance cost – \$

Average 5-year Total Cost -\$\$\$\$\$

Lagoon Treatment

Two Major Components

- Septic Tank
- Lagoon

Average installation cost - \$\$\$

Average annual maintenance cost – \$

Average 5-year Total Cost -\$\$\$\$

Subsurface Absorption

Two Major Components

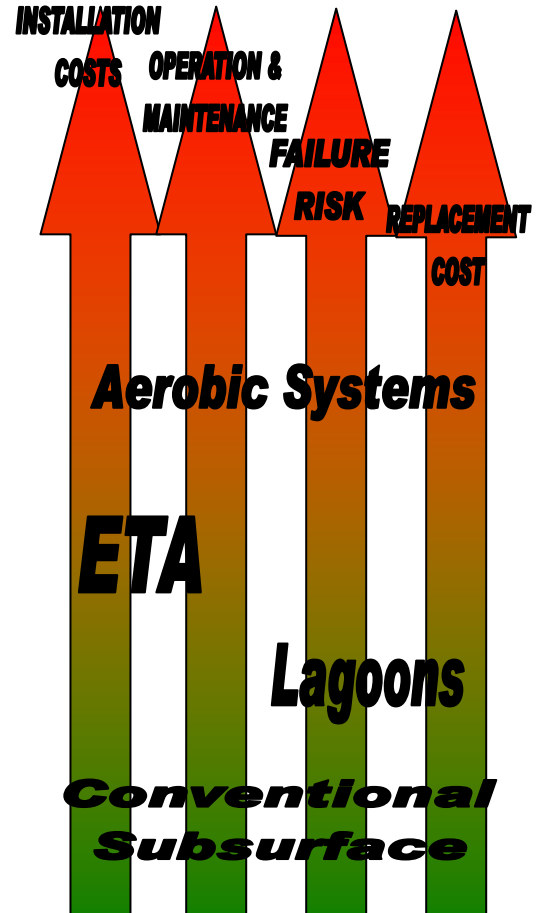
- Septic Tank
- Absorption Field

Average installation cost - \$\$\$

Average annual maintenance cost – \$

Average 5-year Total Cost -\$\$\$\$

**DECISION
FACTORS
HIGH**



LOW

\$=Low Cost-----\$\$\$\$\$=High Cost

WHAT ARE THEY?

Many of our daily chores such as bathing, doing laundry, flushing toilets, preparing meals, washing dishes and other activities generate domestic wastewater. Few people give thought to where wastewater goes after it disappears down the drain. Domestic wastewater (i.e. sewage) must be properly treated because it contains nutrients, bacteria/viruses and household chemicals that may contaminate the

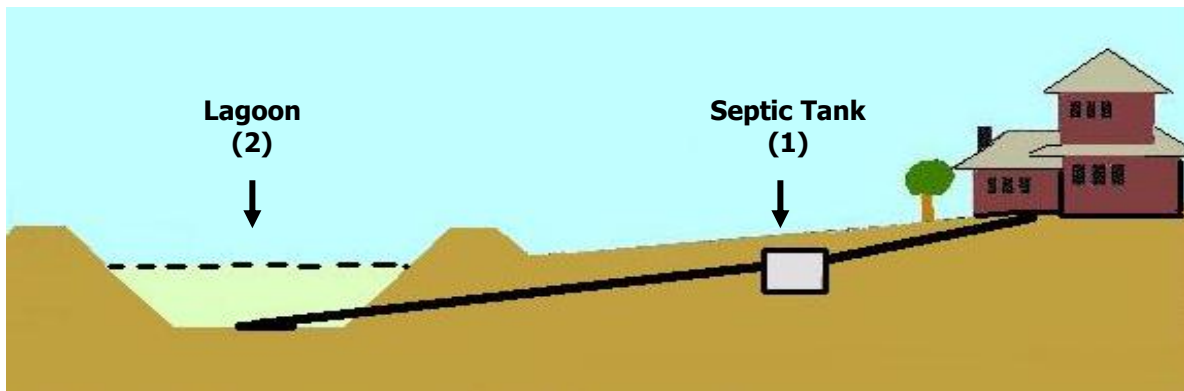


land and waters of our state. In the U.S., we are fortunate to have the technology and the resources available to properly treat our wastewater. Lagoons for both residential and small-public facilities can accomplish proper treatment.

A lagoon is a treatment method that utilizes a septic tank for primary treatment with the clarified effluent from the tank being discharged into a lagoon where sunlight, temperature, and wind provide the final treatment. Lagoon size increases from west to east across the state of Oklahoma. Lagoons are a much more effective treatment method in central and western Oklahoma. Lagoon sizes in the southeastern counties of Oklahoma can be quite large due to the high rainfall and low evaporation rates. DEQ regulations do not allow lagoons to be constructed on tracts of land that are less than 2 ½ acres in size. Lagoons are a very effective treatment method and relatively easy to maintain.

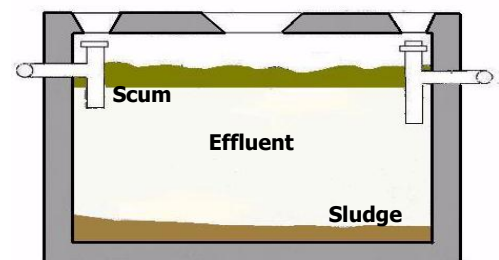
COMPONENTS OF A LAGOON

Lagoon systems are comprised of a septic tank (1) and the lagoon (2). When lagoon systems are properly designed, operated and maintained, the wastewater will receive proper treatment.

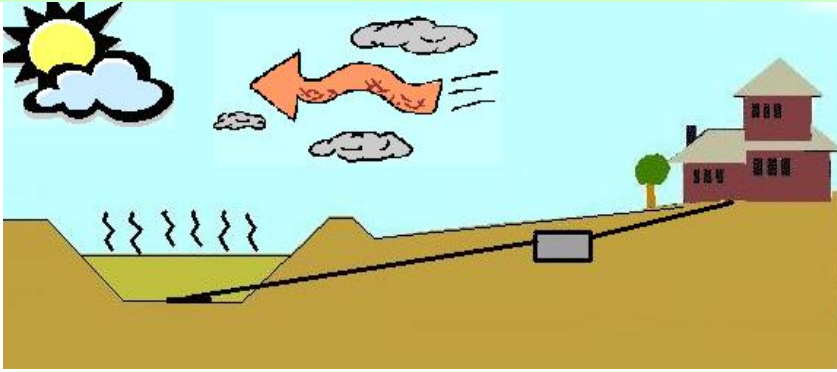


THE SEPTIC TANK - PRIMARY TREATMENT

Primary treatment occurs when wastewater flows into the septic tank where the liquids separate from the solids. The heavier solids settle to the bottom of the tank while the lighter greases and scum float to the top. This material is retained in the tank by vertical baffles. The settling process takes about 24 hours. The natural bacteria in the septic tank begin to breakdown the organic material found in the wastewater. Only the treated liquid (effluent) found in the center level of the tank flows out of the septic tank and into the lagoon. The sludge and scum remain in the septic tank and must be periodically removed to insure that they do not clog the outlet and/or spill into the lagoon. A properly designed and maintained septic tank will allow only the clarified effluent to discharge from the tank to the lagoon.



THE LAGOON



The clarified effluent is discharged under the surface of the water to the center of the lagoon. This allows even distribution and more effective treatment. Exposure to sunlight is extremely important to lagoons because it contributes to the growth of green algae on the water surface. Because algae are plants, they live by a process called photosynthesis. This process produces oxygen which many of the bacteria in the water use to breakdown the waste. Lagoons are

designed to operate with three to five feet of wastewater, any more than this and the bacteria cannot receive enough sunlight. The amount of water in the lagoon is reduced through evaporation and wind action. Lagoons should be built in locations where trees or other structures will not restrict sunlight exposure or air movement. A dike is constructed on all sides of the lagoon to prevent inflow of surface water and discharge of effluent. Properly located lagoons must be constructed in clay soil or be lined to prevent leakage. Lagoons are designed to have no discharge (total retention) to the environment, and if properly designed, operated, and maintained, lagoons normally have no undesirable odors and provide effective treatment with minimal threat to the environment.

MAINTENANCE OF LAGOON SYSTEMS

Long-term efficient operation of your lagoon system is directly dependent upon how you maintain it. The lagoon serving your home is not a permanent or lifetime unit. It will malfunction if not properly maintained. Malfunctioning systems can cause serious risks and degradation of the environment and are often expensive to repair.



A permanent vegetative cover should be established on the lagoon dike as soon as possible to prevent erosion of the dike. If the lagoon is not constructed during the normal growing season, a temporary vegetative cover should be planted, or other erosion control measures should be utilized.



Vegetative growth should be controlled to assure necessary sunlight exposure and air movement. Grass should be mowed on a regular basis during the growing season. It is not recommended to allow livestock to graze to keep the vegetation controlled. Livestock can damage the dikes. No trees should be allowed to grow around the lagoon.



A fence shall be constructed to discourage entry and control access. The fence can be around the lagoon area only or the entire property so long as it is access controlled. The fence shall be at least four feet tall and provide protection equivalent to the protection afforded by a chain link or equally spaced five wires. Fencing placed around the lagoon should be placed on the outside toe of the lagoon dike to make mowing easier.



WHEN TO PUMP YOUR SEPTIC TANK

Under average conditions, you should have your septic tank pumped every three to five years. However, a number of factors impact the frequency of pumping. You may contact a professional to inspect your tank or you can check it yourself. You can measure the depth (see pictures on the next page) by using a pipe, rod or pole about six feet in length. Generally speaking, the tank should be pumped when the sludge depth reaches 40 percent of the tank depth or about 25 inches on the pole. If the sludge and surface scum combined are one-third or more of the liquid depth of your tank, have its contents pumped and properly disposed of by a contractor licensed by the DEQ.



Checking the sludge depth yourself



Insert six-foot long rod all the way to the bottom of the tank and let it remain for about 45-60 seconds.



After removing, measure from the bottom of the rod to the top of the sludge layer



If the sludge depth measures 20 inches, or a scum and sludge depth of more than one-third of the liquid depth, have a professional pump your tank.

If you or a professional cannot check the tank, tank-pumping frequency can be estimated on the number of people using the system. The following chart may be used as a guideline and should not take the place of a professional inspection or actual measuring of the sludge.

Have all contents removed from the tank. It is not necessary to leave anything in the tank for seeding. Incoming sewage contains all of the necessary bacteria to maintain proper treatment. It is also not necessary to scrub and/or disinfect the tank after pumping. To ensure continued effective

operation, have your septic tank inspected annually. For a list of licensed septic tank cleaners in your area, contact your local DEQ office or look in your telephone directory.

1000 gallon capacity septic tank					
# people using system	1	2	4	6	8
Years between each pumping	12	6	3	2	1

Tips to keep your lagoon working properly

- **Mark the location of your septic tank.** This will help prevent activities that may damage the tank, like someone driving a vehicle over the tank.
- **Conserve water.** 1,000 gallons is the minimum septic tank capacity. Retention time in the septic tank is important. Putting too much water into your septic tank does not allow enough time for the solids to break down and separate.
- **Use of septic tank additives is not recommended.** More than enough bacteria are naturally present in your system to provide the necessary treatment and no product eliminates the need for periodic pumping and inspection. Some products kill the beneficial bacteria in the tank, which leads to improper treatment.
- **Minimize or eliminate the use of a garbage disposal.** Food wastes can fill your septic tank quickly, causing the tank to require more frequent pumping. Also, food wastes that float can increase the thickness of the scum layer. If you plan to use a garbage disposal, increase the size of the tank by 20% and have the tank pumped every one to two years.
- **Do not flush** paper towels, newspapers, rags, plastics, sanitary napkins, tampons, condoms, disposable diapers, dental floss, cat litter, grease, cooking oil, cigarette butts, coffee grounds or other non-biodegradable materials. The microorganisms in the septic tank cannot readily break down these materials.
- **Do not flush harmful substances** such as pesticides, disinfectants, acids, medicines, paints, varnishes, solvents, photo developing solutions, thinners, gasoline, or used motor oil.
- **Minimize the use of harmful substances** such as bleach and drain cleaners. These substances can kill the naturally occurring microorganisms in your system that is essential to proper function. Normal household use of soap, detergents and other household cleaners should not cause problems.
- **Do not drain water** from swimming pools, whirlpools or hot tubs into the system, especially if the water is chlorinated. This can flush the tank of the natural bacteria needed for treatment.
- **Spread out laundry** over several days as opposed to doing many loads in one day. Too much laundry can overload the tank and flush out the natural bacteria.

Lagoon Troubleshooting Guide for Homeowners

Problem	Risks	Potential Causes	Potential Remedies
Sewage backs up into house and/or plumbing fixtures don't drain or are sluggish	Human contact with sewage is a serious public health risk.	<ul style="list-style-type: none"> • Excess water entering system • Improper system design • Improper operation • Pump failure • Blockage in plumbing 	<ul style="list-style-type: none"> • Fix leaks • Install water-saving fixtures or practice water conservation • Pump out septic tank and check pumps • Seal pipe connections • Stop using garbage disposal
Sewage discharging from lagoon	Human contact with sewage is a serious public health risk.	<ul style="list-style-type: none"> • Excess water use • Improper system elevations • Improperly designed lagoon 	<ul style="list-style-type: none"> • Fix leaks • Install water-saving fixture or practice water conservation • Pump out septic tank and check pumps • Fence off area until problem is repaired • Consult professional
Sewage odors— indoors	Toxic gases can cause discomfort and illness in confined spaces.	<ul style="list-style-type: none"> • Improper plumbing • Sewage backup in house • Roof vent pipe clogged or closed 	<ul style="list-style-type: none"> • Repair plumbing • Pump out septic tank and check pumps • Replace water in drain traps
Sewage odors— outdoors	Major nuisance, but no serious health risk	<ul style="list-style-type: none"> • Overloading lagoon • Obstructing sunlight or wind action • Source other than owner's system 	<ul style="list-style-type: none"> • Pump out septic tank and check pumps • Remove any overgrown vegetation or trees • Reduce the amount of chemical poured down drains
Lift station alarm activated	Tank effluent may back up into the house	<ul style="list-style-type: none"> • Pump failed • Fuse breaker tripped • Pump unplugged • Controls malfunctioning 	<ul style="list-style-type: none"> • Check breaker and plugs • Check controls and pump • Make sure professional replaces pump with proper size unit
Scum layer forming on surface of lagoon	Odor problems and breeding spots for insects	<ul style="list-style-type: none"> • Poor wind action • Overloading lagoon with grease and oil 	<ul style="list-style-type: none"> • Break up scum layer with rake • Remove overgrown vegetation or trees

