Understanding and Caring For Your Domestic Aerobic Treatment Unit System

...With Tips on Conserving Water

Domestic Aerobic Tank Systems

In many cases a septic tank system is not suitable due to geological or topographical situations. Septic tanks provide primary treatment to wastewater by biological breakdown and allowing heavier solids and floatable fats, oils and greases to separate. Final treatment is provided in the soil through continued biological breakdown and filtration through the soil pores. When the soil is too shallow, advanced treatment is required to make up for what the soil can not provide. Severe slopes may require non-conventional disposal methods that require more advanced treatment than a standard septic tank can provide. Newer methods have been developed to provide necessary pretreatment when soil conditions are unfavorable. Aerobic Treatment Units (ATUs) provide an oxygen rich environment in which aerobic bacteria can reduce the wastewater strength more efficiently than the anaerobic bacteria found in a septic tank. In addition to the increased treatment, aerobic bacteria do not produce the smelly sulfuric by-products associated with a septic tank.

ATU systems that meet today's construction standards can cost thousands of dollars. It is important to keep several things in mind in order to protect your investment and your health:

1. *Be careful about what goes into the system.*
2. *Maintain the system properly to extend its life*
3. *Conserve water to prevent system overload.*
4. *Have the system properly installed to avoid creating health hazards and to comply with state laws.*

Persons whose households are served by water wells and ATU systems benefit from water conservation measures in two important ways:

1. *Conserving water reduces the total demand on the aquifer.*
2. *Conserving water extends the life of your disposal area.*

Water conservation can also be realized through disposal methods commonly used with ATUs such as surface and drip irrigation.

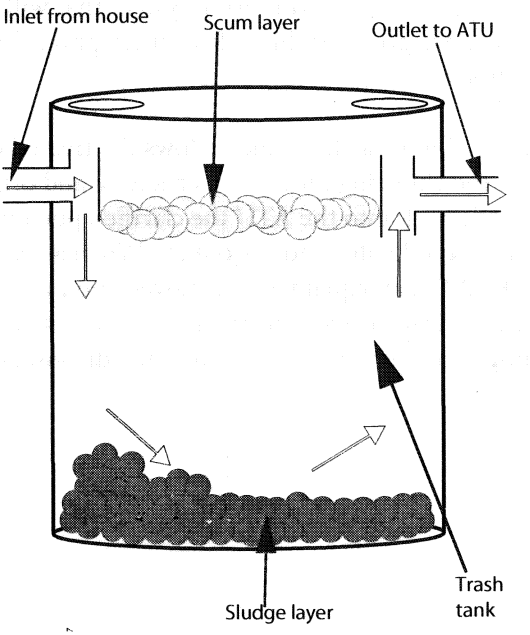
How does it work?

Wastewaters entering the system can include human and kitchen wastes as well as laundry and bath water. These wastewaters are collected in a watertight trash tank or chamber which can vary in capacity, depending on the size and make of the ATU. *(Note: Not all ATUs require a trash tank.)*

The trash tank allows heavier solid material, called sludge, to sink to the bottom. The materials that remain near the top of the tank are called scum. Scum is composed of paper, hair, fats, oils, greases, vegetable molds and gasses formed during the process of sludge digestion. Naturally occurring bacteria act to digest the solids.

The tank liquid level will fill to the outlet, which is on the opposite side of the tank from the inlet. When a given volume of wastewater enters the tank, an equal volume exits through the outlet. This liquid, known as effluent, then enters the ATU.

Example of a trash tank.

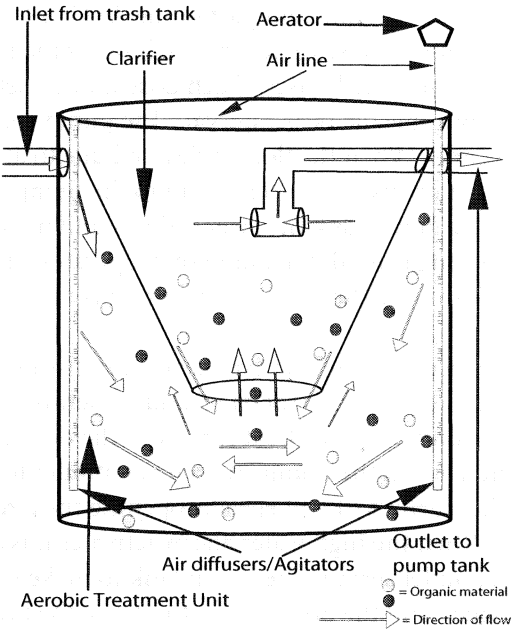


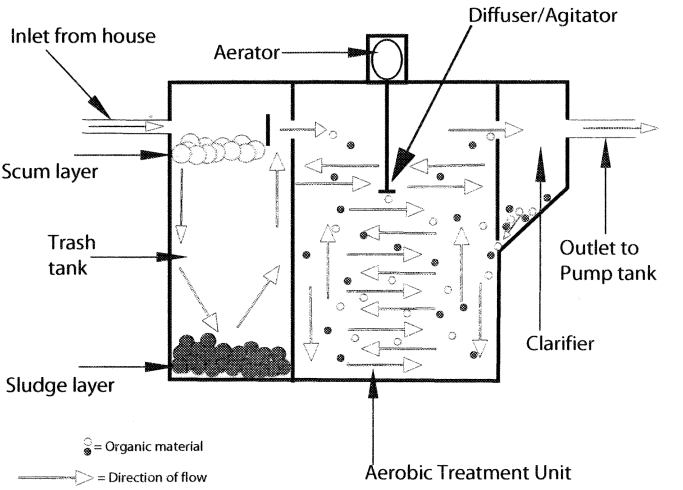
In an ATU, air is constantly introduced to the tank liquid by an aerator pump. The air is often dispersed in tiny bubbles, which increases the surface area of contact with the liquid. The increased surface area facilitates free oxygen molecules to be absorbed into the liquid. This free oxygen is consumed by bacteria for digestion of organic matter. The introduction of air into the wastewater also causes a churning motion. This churning prevents both the bacteria and organic matter from settling to the bottom and the air bubbles from rising directly to the top of the ATU. In constant agitation, they remain in contact with each other. Some ATUs also provide a porous media within the tank for the bacteria to attach to. As the organic matter circulates through the media it comes into contact with the bacteria which consumes it.

As with any motorized product, air pump failure will eventually occur. If the aerator is unable to properly inject air into the ATU, the wastewater can become anaerobic. An anaerobic ATU functions the same as a septic tank and will not provide the intended treatment. When an aerator stops working, an audio/visual alarm will activate at the ATU control panel. This alarm is to alert the system operator of the problem who should then contact their maintenance provider to make the necessary repairs. Some ATUs may be equipped with a monitoring system that will automatically notify the maintenance provider through your telephone line when there is an alarm condition.

Also within the ATU is a clarifier which allows the treated effluent to move away from the churning motion. As bacteria and organic wastes are allowed to settle back into the ATU the clarified portion exits. As in the trash tank, the liquid will fill to the outlet. When a given volume of effluent enters the ATU, an equal volume moves into the clarifier. That same volume is then transferred directly from the clarifier to the disposal area or to a pump chamber where it is sent to the disposal area in doses.

Examples of ATU's



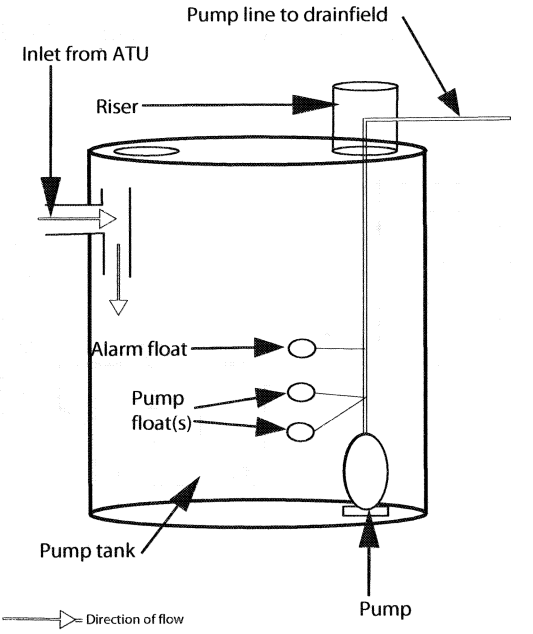


Pumps

A pump chamber may be an inherent part of the ATU or be a separate tank. The pump chamber houses a pump which sends the treated effluent to the disposal area in specified doses. Each dose may be set by a prescribed volume or by a specific time interval. The pump will have a float attached to it by a cord. When the float is elevated due to an increased liquid level the switch opens the power circuit to the pump. As the pump lowers the level in the pump tank the switch closes and turns the pump off. When timed dosing is used, the pump only operates when the liquid level is high enough to raise the float and the timer is activated.

When pump failure occurs a high-water alarm will activate. The alarm should be associated with the control panel and air sensor alarm for the ATU. The alarm is connected to a float similar to the one attached to the pump. If the liquid level in the pump chamber continues to rise because of pump failure, the alarm float will elevate, opening the circuit and activating the alarm. When the high water alarm activates it is a good idea to check the electrical outlet serving the pump tank to make sure the pump cord wasn't unplugged and the breaker box to ensure the breaker switch wasn't tripped. If both of these items are OK the pump or float may need to be replaced. Contact your maintenance provider to ensure the work is done properly.

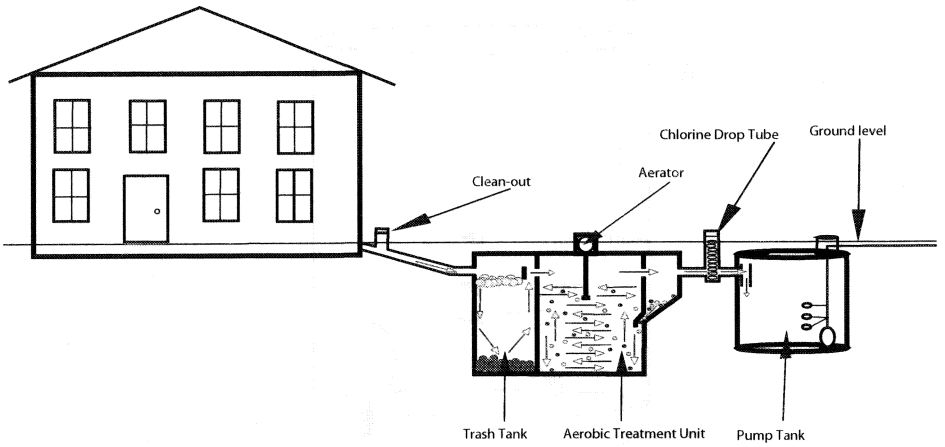
Example of a pump tank

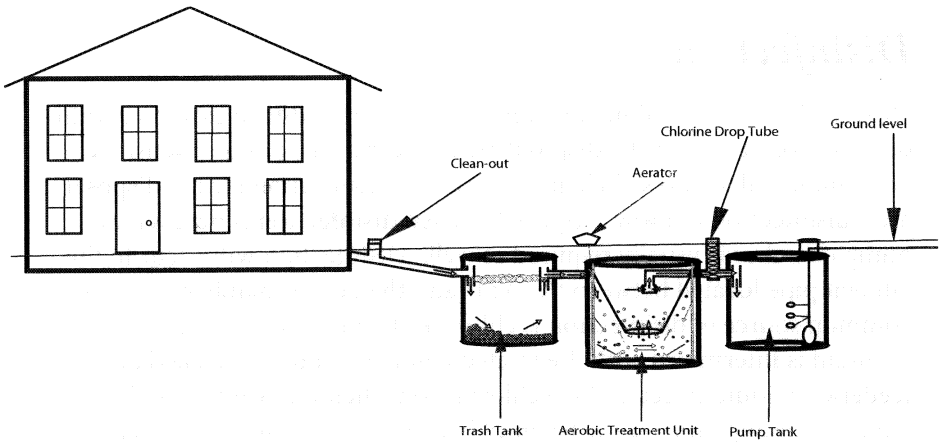


Disinfection

Disinfection of ATU effluent is sometimes required due to extremely thin or rocky soils or when the disposal area is near a lake or other sensitive environmental features. When using surface application for the disposal area, disinfection is always required. When disinfection is necessary a pump chamber is usually required as well. Disinfection will occur in the effluent pipe located between the ATU and the pump chamber. The most common source of disinfection is chlorine. Chlorine composition tablets or liquid is intermixed with the treated effluent through a stacked tablet feeder or a liquid injector. Free chlorine ions then mix with the effluent in the pump tank killing harmful bacteria and viruses before being released into the environment. Other types of allowable disinfection are Ultra-Violet (UV) light and ozone. Proper exposure to both UV light and ozone is also lethal to bacteria and viruses.

Typical pretreatment and dosing tank arrangements, with disinfection





Disposal Area

From either the pump tank or directly from the ATU, treated effluent is sent to the dispersal area or disposal area. Effluent dispersal will be by soil absorption, evapotranspiration (ET) or spray irrigation. In soil absorption, effluent is absorbed into the ground where it travels to a ground water source. In ET disposal areas effluent is taken up by plant roots and released by transpiration or evaporates from the ground surface. Some disposal areas utilize both soil absorption and evapotranspiration. When surface irrigation is used, the treated and disinfected effluent is sprinkled over a vegetated area during the night hours. When the sun rises, the liquid effluent not absorbed by plants or soil will evaporate. Although the wastewater is highly treated and disinfected, it is illegal to irrigate plants intended for human consumption with reclaimed wastewater.

Maintenance

All ATUs are approved under the guidelines of the National Sanitation Foundation Standard 40 or by an independent, state-approved testing regimen. During the initial two years of operation, all ATUs must have a maintenance contract with an approved individual or company. The maintenance provider must have the proper state license and certification from the ATU manufacturer to operate in this capacity.

The maintenance provider is responsible for routine inspections to determine when and if the trash tank or ATU needs to be pumped, ensure the ATU is operating properly and, if applicable, verify proper disinfection. If disinfection is required and chlorine is used, restocking the liquid injector or tablet feeder may be performed by the maintenance provider or homeowner. The responsibility should be a specific condition of the contract. Reports of each inspection must be submitted to the homeowner and the regulatory agency. The maintenance provider will also respond to emergency calls and perform repairs and replacements of damaged or worn-out parts. These additional services may require additional fees. The frequency of routine inspections can vary depending on whether or not the system provides automatic notification to the maintenance company when an alarm condition occurs.

As of Sept. 1, 2006, after the initial two year maintenance contract expires the homeowner of a single-family residence has the option of providing his/her own maintenance. The homeowner must pass a certified maintenance class of not more than 6 hours and be certified by the ATU manufacturer. The homeowner must provide all necessary routine inspections, submit reports to the regulatory agency, and repair or replace parts broken or worn out. The homeowner may hire a certified maintenance company to provide any services they are unwilling or unable to perform.

The Proper Care of Your Aerobic Tank System

General Precautions

An ATU system should not be treated as if it were a city sewer, where large amounts of water are allowed to go down the drain.

Water conservation helps prevent overloading in the disposal area. Such overloading could shorten the systems life and require expensive repairs. Leaky faucets and running commodes should be repaired quickly. Toilet tanks can be checked for leaks by adding several drops of food coloring to the tank water. If there is a leak, color will appear in the bowl without flushing.

Garbage disposals should be used sparingly or not at all to avoid rapid buildup of sludge or scum. This buildup may cause clogging of the soil which hampers absorption and creates a greater biological waste load that can threaten groundwater and surface waters.

Toilet paper substitutes should not be flushed into an ATU. Paper towels, newspaper, wrapping paper and rags do not decompose readily and are likely to lead to clogging of the plumbing and disposal system. Other items that should not be put into the ATU are disposable diapers, sanitary napkins and tampons, grease, coffee grounds and cigarette butts.

Keep in a convenient location a diagram plot plan, or map showing the

location of the ATU and disposal system. When these components are covered by grass or landscaping their actual locations may be forgotten over time. By having a convenient diagram you can prevent any structures being built or placed on top of your system or heavy equipment from parking or driving over it. In addition to keeping large items off your system you can prevent damaging your system during excavation projects. An accompanying chart should contain brief instructions about the required inspection and maintenance. Also, keep a copy of the receipt for the last tank cleaning as a convenient record.

Pumping Out ATUs

Trash tanks and ATUs should be pumped before a large volume of solids accumulates. If either the deposited solids or floating scum layers approaches the bottom of the outlet device or the intake to the clarifier, particles will be scoured into the soil absorption system or can clog dispersal holes in the disposal area piping. This could require replacement of the entire disposal area. In addition to causing harm to the disposal area, excessive accumulation of sludge or scum will decrease the ability of the ATU to treat the wastewater. Pumping is the recommended way to clean an ATU efficiently. Your maintenance provider should inform you of when the ATU needs to be pumped.

Chemicals

Chemicals should not be used for cleaning ATUs. Some products that claim to "clean" on-site sewage facilities contain sodium hydroxide or potassium hydroxide as the active agent, which act as caustic lye, or drain cleaner. Such compounds may result in sludge bulking and a large increase in alkalinity, and may interfere with aerobic digestion. The resulting effluent may severely damage soil structure and cause accelerated clogging, even though there may be some immediate temporary relief.

Some 1,200 products, many containing enzymes, have been placed on the market for use in septic tanks. However, in controlled tests, none have been proven beneficial. Frequently, the harmful effects of ordinary household chemicals are overemphasized. Small amounts of chlorine bleaches, soaps, detergents and drain cleaners as normally used in the

household will have no appreciable adverse effect on the system. These products however should never be disposed of down the drain. Remember that the ATU is a living environment and susceptible to mistreatment.

Disposal Area Care

Absorption and ET drainfields should be slightly mounded so that the center of the field is about four inches above the normal ground elevation. This will provide drainage away from the field. A small berm on the uphill side may be necessary to facilitate drainage away from the field. Providing rain gutters along the rooftop adjacent to the field can assist in redirecting large amounts of water. No disposal area should ever be paved or used for vehicular traffic or parking.

The field surfaces, especially ET and spray irrigation disposal areas, should be covered with perennial grasses to take advantage of transpiration. Evergreen bushes can be planted in the bed to assist in water uptake. If grasses that have dormant periods are planted, over seeding with winter grasses is advised. Vegetable gardens having plants that bear vegetables above ground are acceptable over absorption or ET disposal areas, though they should never be planted in a spray irrigation disposal area. Plants bearing vegetables below ground should not be planted in any disposal area.

Water-saving tips

Inside the home

1. Repair leaking faucets and commodes.
2. Use faucet aerators to reduce water consumption.
3. Keep a container of drinking water in the refrigerator instead of running the faucet until water turns cool.
4. Run dishwasher and washing machine with full loads.
5. Check all water line connections for leaks to avoid freezing pipes in the winter.
6. Insulate all hot-water pipes to avoid wasting water while you wait for the heated water.
7. Replace older appliances with new water-efficient appliances such

as low-flow shower heads (3 gallons per minute or less) and efficient commodes (1.6 gallons or less per flush).

8. Take shorter showers (for each minute you cut, you can save at least 2 gallons).
9. Turn off water when shaving or brushing teeth
10. Follow these additional tips to save more water:
    - Avoid flushing commode unnecessarily.
    - Don't pre-rinse dishes.
    - Reuse clean household water.
    - Install an instant water heater on your kitchen sink.
    - Program water softener to run the minimum amount of regenerations, and turn off softeners when on vacation.

Outside the Home

1. Check your sprinkler system for leaks and misdirected heads at least once every season.
2. Run sprinklers between dusk and dawn to reduce loss to evaporation.
3. Use soaker hoses with hose timers in shrub beds.
4. Be sure to have at least 4 to 6 inches of composted soil under turf and in planting beds.
5. Choose native and well-adapted plants.
6. Mow high and keep your mower blades sharp to reduce summer stress on turf.
7. Consider contouring your land to increase infiltration by rainwater.
8. Check your pool and pool pump equipment for leaks.
9. Sweep driveways and sidewalks rather than hosing them.
10. Use a spray nozzle and bucket when washing your car, and if possible wash your car in a location where rinse water can run onto the lawn or landscape.

Amounts of Water Used by Home Appliances

Automatic dishwasher _____ 15 gallons per load
Conventional commode _____ 3.5-6 gallons per flush
Washing machine _____ 32-59 gallons per load
Conventional shower heads _____ 5-10 gallons per min.
Outside garden hose _____ up to 200 gallons per hour

Amounts of Water Lost with Leaks

Slow Drip _____ 450 to 600 gallons per month
1/16" Faucet Leak _____ 3000 gallons per month

Examples of Water Saving Devices

Device	Water savings per person	Water savings per home**
1.6 gallon commode	8.0 gpd*	11,680 gallons/year
3 faucet aerators	.5 gpd	730 gallons/year
2 low-flow shower heads	10.0 gpd	14,600 gallons/year
**gallons per day*		
***family of four*		

About LCRA

LCRA is a conservation and reclamation district created by the Texas Legislature in 1934. LCRA provides energy, water and community services to the people of Texas. It cannot levy taxes, but funds its operations with income from the sale of electricity, water and other services.

LCRA generates electricity and sells it wholesale to city-owned utilities and cooperatives that serve more than 1.1 million people in Texas. LCRA also builds and operates transmission projects through a nonprofit corporation, manages and protects the lower Colorado River, provides water and wastewater utilities, owns and operates parks, and offers economic and community development assistance to communities.

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