

Jim Anderson and Dave Gustafson are connected with the University of Minnesota onsite wastewater treatment education program. Dave is extension onsite sewage treatment educator. Jim is former director of the university's Water Resources Center and is now an emeritus professor, as well as education program coordinator for the National Association of Wastewater Transporters. Readers are welcome to submit questions or article suggestions to Jim and Dave. Write to ander045@umn.edu.

Knowing Your Tanks

Installation professionals must understand the roles and function of four kinds of sewage tanks: holding, septic, trash and processing

By Jim Anderson, Ph.D., and David Gustafson, P.E.

In our series of articles walking through the installation sequence from start to finish, we now turn to installing tanks. During a recent workshop, we were discussing the operation and maintenance of aerobic treatment units (ATUs). As we talked about the trash tank, a participant asked, "What in the world is this trash tank?"

We often take for granted that people know what we are talking about — because everyone is familiar with the industry, right? This case reminds us that often we need

There are three types of tanks used to separate, store, and treat the solids in the waste stream. While their overall purposes are similar, their uses and the ways they fit into the onsite treatment system are somewhat different.

to take that step or two back toward the beginning so everyone is on the same page.

So here, when we refer to sewage tanks, we're talking about the different tanks with different functions that professionals are called upon to install. Before we discuss the specifics of installing concrete, plastic, or fiberglass tanks, let's look at the most common types of sewage tanks and their functions.

Holding tanks

The first common type is a holding tank, commonly used as a last resort where a complete treatment system cannot be installed, during system startup, or where complete installation has been halted because of weather or other circumstances.

The tank materials can be concrete, polyethylene or fiberglass. The tank itself functions as a watertight vessel that stores several days of sewage flow. Holding tanks are periodically pumped based on the daily flows — they act as collection and storage devices. It is important when pumping that all liquid and solids be removed. Some settling may occur, so mixing the tank contents while pumping is important.

Then there are three types of tanks used to separate, store, and treat the solids in the waste stream. These are septic, trash or processing tanks. While their overall purposes are the same, their uses and the ways they fit into the onsite treatment system are somewhat different.

Septic tanks

Septic tanks are watertight and can be made of concrete, plastic or fiberglass. They collect wastewater and provide primary treatment by separating solids from the water: heavier solids sink to the bottom, and the fats, oils, grease and soap scum float to the top.

Inlet baffles direct the flow to

allow for separation, and the outlet baffles hold the scum in the tank. The process creates a clear zone of liquid that passes through an effluent screen and out to the soil treatment area for final dispersal.

Tank size is based on the daily sewage flow and the detention time needed to separate the solids. The septic tank provides the only pretreatment before final dispersal.

Trash tanks

Trash tanks are similar to septic tanks in construction and the materials and also need to be watertight. They are used before some type of advanced pretreatment unit, such as an ATU. Their function is not so much to separate solids as to serve as a collection point for the larger solids and other materials that may enter the waste stream, such as plastic products.

This protects the ATU by keeping materials out that might interfere with system operation. For this reason, these tanks are often half the size of the septic tank used for a similar flow. The size is usually specified by the ATU manufacturer.

Remember that while these tanks may be anaerobic, they do not function like septic tanks. So if the advanced system is taken offline, additional tank capacity is needed to get a septic-tank-quality effluent.

Processing tanks

Finally, there are processing tanks.



Installation of a two-compartment septic tank. Tank size is based on the daily sewage flow and the detention time needed to separate the solids. The septic tank provides the only pretreatment before final dispersal.

Again the tank is watertight and is made of the same materials as the other types. These special-use anaerobic treatment tanks are designed to increase nitrogen removal. They combine the functions of septic tank, surge storage tank, pump tank and recirculating tank.

In operation, aerobic effluent from an ATU or media filter is returned to the processing tank, where the



Sewage holding tanks can be made of concrete, polyethylene (shown) or fiberglass.

septic or anaerobic conditions exist. The water containing nitrogen as ammonia is pumped to the ATU and aerated, so that the nitrogen is converted to nitrate form.

The aerated effluent is then sent back to the processing tank, which is anaerobic. There, the nitrate is converted to nitrogen gas, which is vented to the atmosphere. This process, called denitrification, reduces levels of nitrogen introduced to groundwater in sensitive areas.

If too much circulation occurs,

the processing tank can be aerobic, and therefore the nitrogen reduction does not occur. Or, if there is too little circulation, not enough of the nitrogen is converted, and BOD and solids removal may be reduced. This is why it is so important to calculate recirculation ratios accurately (a subject for a future column).

So that's a brief primer on sewage tanks. Next month we will begin to describe what makes a good tank installation. ■