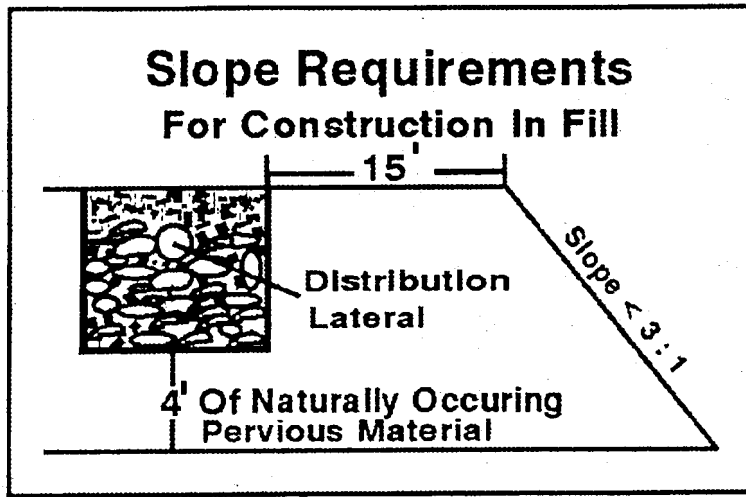


Figure 3-12

Where fill is required to replace unsuitable or impermeable soils (not including the 4 feet of naturally occurring pervious material) the excavation of the unsuitable material must extend a minimum of five feet laterally in all directions beyond the outer limit of the soil absorption system to the depth of naturally occurring pervious material. Replacement fill must meet the specifications provided in section 15.255(3). For mounded systems the side slopes cannot be steeper than 3:1 (horizontal:vertical) and a minimum horizontal separation distance of 15 feet must be provided between the soil absorption system and the adjacent side slope, as measured from the edge of the top of the two inch layer of 1/8 to 1/2 inch stone aggregate. In addition, the toe of the slope must be at least five feet from any adjacent property line or a swale or other drainage system provided to prevent runoff from migrating to the adjacent property. Adjustments to the side slope criteria may be allowed if a suitable impervious barrier, such as a vertical concrete retaining wall is provided that meets the specifications provided in section 15.255(2).



**Figure 3-13: Slope Requirements
for Construction in Fill**

A **tight tank** is a large tank used for storage of sewage. It has an inlet but no outlet. Tight tanks cannot be approved for new construction or for increased flow to existing systems except in extreme situations that require prior Department approval. Tight tanks may be used, only with DEP prior approval, to eliminate a failed on-site system when no other feasible alternative to upgrade the system exists. Tight tanks approved by DEP must be sized at a minimum of 500 % (5 days storage) of the sewage system design but in no case less than 2000 gallons. Tanks also must be equipped with audio and visual alarms set to activate at 3/5 of the tank capacity. Applications to the Department must indicate the method and frequency of removal of the contents as well as the specific location and method of disposal.

The Department may also consider the use of a modified tight tank in conjunction with a soil absorption system in specific situations where the limiting factor is a percolation rate slower than 60 minutes per inch. In these cases, application for a variance must be made to the local approving authority. Additional specifications for the use of tight tanks in special areas are provided in section 15.261. Figure 3-14 provides a cross sectional view of a typical tight tank configuration.

Checklists have been provided in appendix 11 to assist local Boards of Health in their review of many of the system components previously discussed in this chapter.

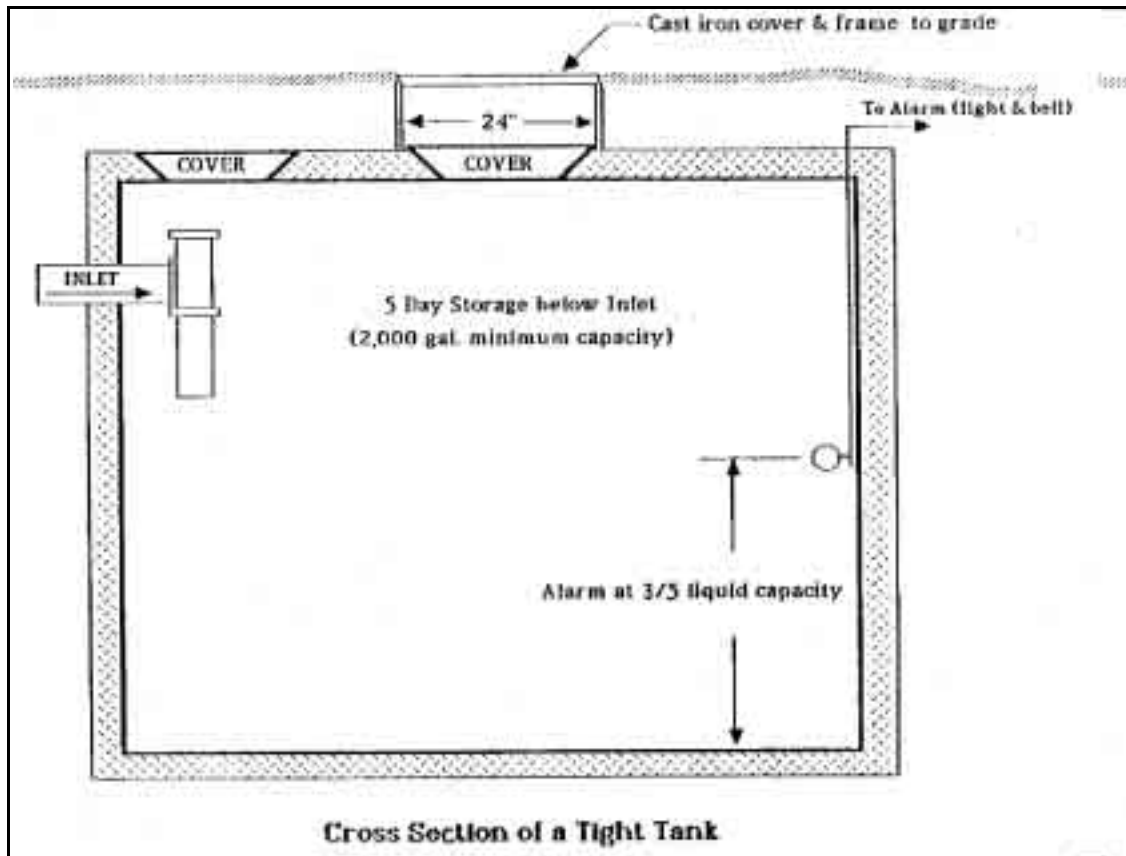


Figure 3-14

Innovative and Alternative (I/A) There are a number of innovative systems that may provide substitutes for, or alternatives to, one or more of the components of a conventional system, but provide equal or better environmental and public health protection. These alternatives are becoming more widely proposed as cost-effective upgrades of older, failing systems on sites that cannot accommodate conventional systems due to poor soil conditions, setback requirements or other constraints. I/A technologies can also provide enhanced wastewater treatment solutions for new construction located in environmentally sensitive areas and at sites where conventional systems simply are not effective.

Approval Process: Title 5 establishes a three-tiered process for DEP review of I/A systems leading to their approval for general use. That process consists of pilot test approval for the

technology, followed by provisional approval, and finally approval for general use throughout the Commonwealth. In addition, DEP may issue site-specific approvals for remedial use of technologies that are likely to improve existing conditions. The use of an I/A technology can be authorized without a variance provided it still must receive DEP prior approval.

In order for technologies to be approved for pilot testing the applicant must provide technical data from independent testing organizations or field evaluations conducted in other states that demonstrate the technology will provide a level of environmental protection at least equal to that of a system designed and built in accordance with Title 5. Additional information obtained during the pilot testing will reveal whether or not the technology has the potential to function effectively in the Commonwealth. DEP may approve no more than 15 facilities to pilot test for each technology. Each facility must have a specific approval from DEP. Pilot approval applications require the submittal and implementation of an 18 month monitoring plan, an operation and maintenance contract and notice to the local approving authority. Upon completion of testing, DEP may grant a provisional approval, require additional testing, or disapprove of its use. Pilot testing is considered successful when at least 75% of piloted systems have performed at the relevant level for at least 12 months.

In order to receive provisional approval for a technology, evidence must be provided that it has been successfully pilot tested for two years or approved for general use in one or more other states. Provisional approval clears the way for broader testing under actual field conditions in Massachusetts. Testing must be conducted for at least a 3 year period on at least the first 50 systems installed. Provisional approvals, which must be noticed in the Environmental Monitor, require less intensive oversight than at the piloting stage. DEP and/or the local Board of Health may establish special conditions in this approval. After receipt of the performance evaluation, DEP may certify the technology for general use, request additional information, or disapprove its use.

A technology may be approved for general use if it has been proven to be equivalent or superior to a Title 5 system in 90 % or more cases in which it has been approved for provisional use. Supporting data can be from Massachusetts or other states with comparable geography and weather. An innovative or alternative technology that is approved for general use will be allowed anywhere in the Commonwealth when site and soil conditions warrant and if designed, operated and maintained in accordance with the conditions of approval. DEP may impose special conditions for the protection of public health, safety, welfare, or the environment and the local Boards of Health may impose additional conditions under local regulations. Notice of all pending systems, provisional systems, and piloting must be provided by DEP annually in the Environmental Monitor.

Under the regulations, DEP can also approve an I/A technology for remedial use to improve conditions at existing sites served by failed conventional systems, systems that are in the process of failing, or systems that are simply sub-standard. An approval for remedial use is considered a stopgap measure and is not intended to be used for demonstrating that the technology is acceptable for general or provisional use. The reader is referred to sections 15.281-15.289 for additional information on alternative system approvals.

Approved Technologies: There are presently two alternative technologies approved for use in Title 5. Recirculating sand filters (RSF's) are approved for general use, and humus/composting toilets for remedial use. Each of these is discussed in more detail below.

Recirculating sand filters also referred to as RSFs, are approved for general use and must be used where the system design flow is greater than 2000 gallons per day and the system is

located in a nitrogen sensitive area. RSF's may also be used for systems with design flows below 2000 gallons per day to obtain a design flow credit for the system's nutrient removal capability. Nitrogen sensitive areas include interim wellhead protection areas; Zone 2s (zone of contribution) of public water supply systems; and nitrogen sensitive embayments (these areas have not yet been designated). RSF's are particularly well suited to these areas due to their ability to reduce the total nitrogen concentration from influent to effluent by up to 60%. In order to be approved for use recirculating sand filter systems must meet several performance standards that are delineated in section 15.202(4). RSF systems must also contain all the components of a conventional system and be capable of functioning in that manner. Figure 3-15 presents the typical components of an RSF system.

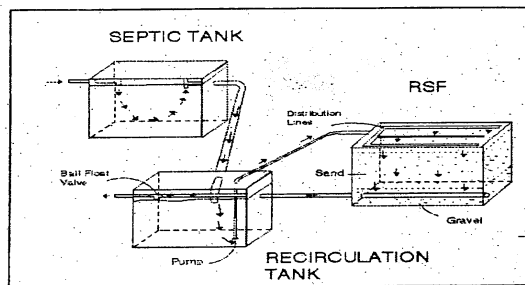


Figure 3-15: Typical Recirculating Sand

Humus/Composting toilets are defined in the code as self-contained systems consisting of a composter with a separate toilet fixture from which no liquid or solid waste materials are discharged to the surface or subsurface environment and from which a humus/compost end product is produced. Figure 3-16 illustrates a typical composting toilet.

These systems are certified for remedial use subject to several conditions. First, any liquid by-product that is not recycled back through the toilet must be removed by a licensed septage hauler and properly disposed. Discharge through a greywater facility is only allowed if that facility also contains a septic tank and leaching system. Second, the humus/compost toilet must be designed to store compostable and composted solids for a period of at least two years in order to provide sufficient time for biological treatment to occur. The composted residuals from that process can then be disposed of either by burying the material at least six inches deep on-site or in another manner and location approved by the local Board of Health. The last condition of approval is that separate greywater systems (greywater includes wastewater discharged from washing machines, sinks, dishwashers, etc. but not from toilet facilities) or discharge from a drain with a garbage grinder must include a septic tank and a leaching facility designed in accordance with the new code. The leaching facility however may be designed to accommodate 60% of the facilities design flow because of the decreased load. A filter system specifically approved by the Department for that purpose may be used in place of a septic tank provided that there is no discharge of garbage grinder waste or liquid by-product from the composting toilet to the greywater system. Existing cesspools may serve as a leaching facility for these purposes provided it meets the additional requirements outlined in section 15.289(3)(a)(2) of the revised code.

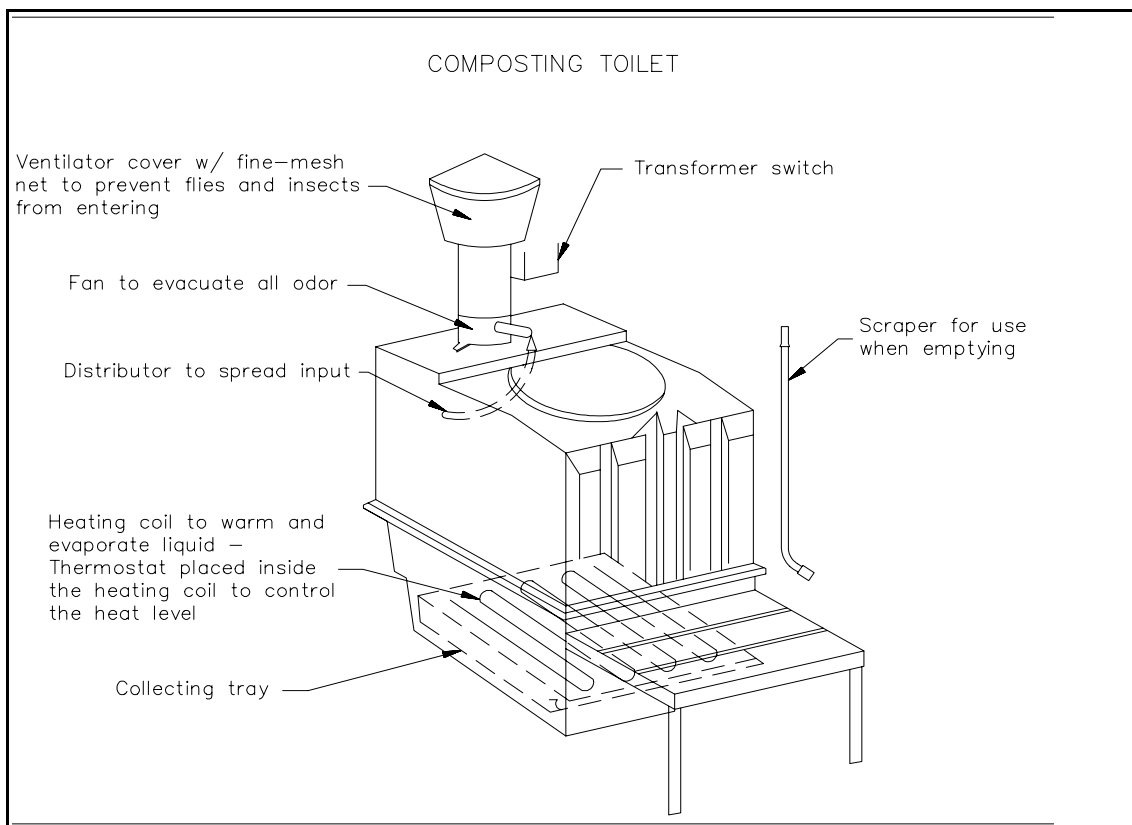


Figure 3-16

Composting toilets may be approved for new construction only where a system in full compliance with Title 5 could otherwise be installed on the site.

There are several advantages for using this technology over conventional toilets including:

Water Conservation

Flexible on-site wastewater treatment solution for existing systems unable to upgrade to a Title 5 system.

- Leaching area reduction
- Elimination of septage

The main disadvantage to the use of a composting toilet is the additional requirements directly associated with the maintenance and removal of the compost piles.

SHARED SYSTEMS

The code also allows for the use of shared systems as an alternative to address wastewater treatment and disposal needs. Shared systems are systems that are sited and designed in accordance with the code requirements (i.e. they contain all the necessary components of a subsurface sewage disposal system) but serve more than one facility or more than one dwelling in a single facility. Shared systems may be approved for existing system upgrades; new construction; or an increased flow to an existing system. DEP approval is required of all proposed systems to be shared however the local approval authority may impose additional conditions for the protection of public health and the environment. Shared systems can be approved for any upgrade to an existing system without a variance under certain conditions outlined in 15.291. All other uses of shared systems require a variance.

All applications for a shared system must include plans and specifications; a description of how the proposed system compares to single systems in compliance with the new code in terms of capacity to protect public health, safety, welfare, and the environment; operation and maintenance plans, and a description of ownership form. In addition, since shared systems by definition serve more than one facility a critical component of the application package is the inclusion of a copy of the Title 5 covenant and easement, a sample of which is provided as an appendix to the code, and a description of the financial assurance mechanism to be used to ensure on-going system monitoring and maintenance.

Once reviewed at the local level, the local approving authority must provide notice to the Department for their review. Prior to construction the applicant must submit to DEP a copy of the written approval from the local approving authority and a copy of the complete application package. The application is deemed approved by DEP after 60 days if the Department fails to approve or disapprove of the system in writing or request additional information. The Department has an additional 60 days to review supplemental submissions.