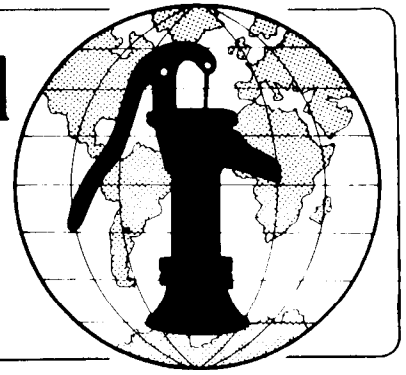


# Water for the World



## Simple Methods of Excreta Disposal Technical Note No. SAN. 1.M.1

Simple methods of excreta disposal use a pit, vault, or bucket to hold the excreta. This reduces the chance of contaminating water supplies and of spreading diseases caused by poor sanitation (see "Means of Disease Transmission," DIS.1.M.1). These methods also help control the spread of disease by keeping animals and insects away from excreta. Simple methods of excreta disposal are easy to build, inexpensive, and can be made from locally available materials.

This technical note describes five simple methods of excreta disposal: pit privy, pit privy with improvements, aqua privy, compost toilet, and bucket latrine.

### Useful Definitions

**COMPOST** - A dark, fairly dry, crumbly, odorless material that is produced by sealing excreta, ashes, woodchips, straw, and vegetable waste for 6-12 months; compost can be used to fertilize crops.

**CONTAMINATE** - To make unclean by introducing an infectious (disease-causing) impurity such as bacteria from excreta.

**EXCRETA** - Human body wastes.

**PERMEABLE** - Allowing liquid to soak in.

**SLUDGE** - Solids settled from water-carried wastes.

### Pit Privy

Pit privies are probably the cheapest and easiest excreta disposal method to build and the simplest to maintain. The four main features of a pit privy are the shelter, pit, slab with hole or seat, and lid. See Figure 1.

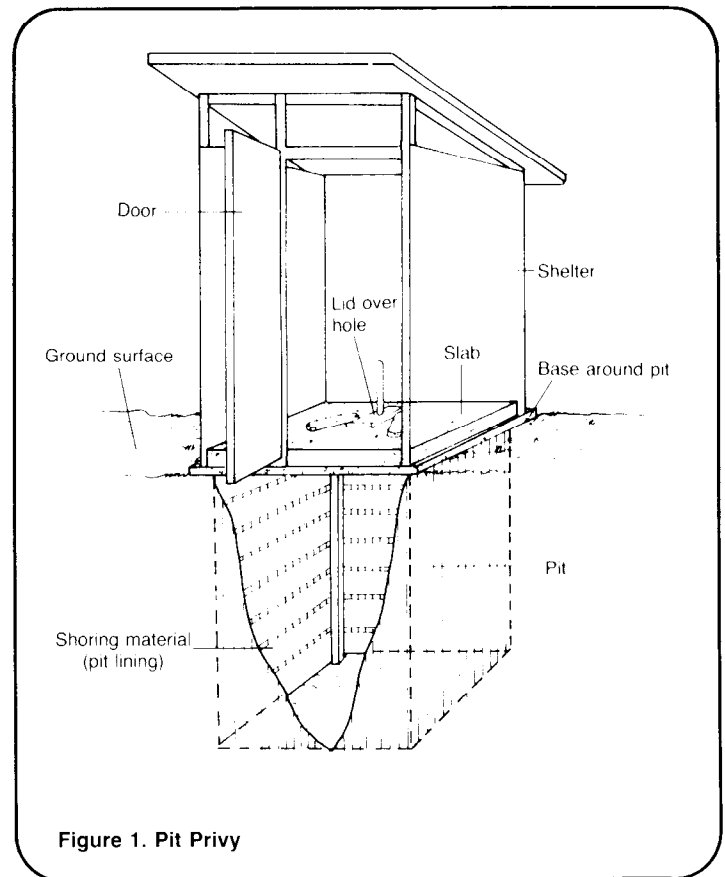


Figure 1. Pit Privy

The shelter gives the user privacy and, depending on the design, may protect the user and the privy from the weather. It should be made from local materials such as palm thatch, bamboo, wood, or bricks. It can have a screening wall or door, depending on local preference.

The pit is dug in permeable soil and holds the excreta. The bottom of the pit must be at least 1m above groundwater levels. The size of the pit will vary, depending on the number of users, the type of anal-cleaning material used, and the desired lifetime of the pit. For example, a pit that is 1m square and 1.5m deep can be used by a family of five for about six years.

The pit has a base for the slab and sometimes a lining, as well, depending on the type of soil in which it is dug. The lining shores up the sides of the pit. It is made from bamboo, boards, brick, or select field stones. The base encircles the top of the pit and supports the slab. It is made of logs, bricks, or concrete.

The slab covers the pit and has a hole near the center through which to defecate. It can have either a squatting hole or a seat and pedestal, depending on local preference. The slab can be made from bamboo, wood, or concrete.

The lid covers the hole in the slab when the privy is not in use. It is made of local material, and it should fit tightly over the hole to keep flies and other insects out of the pit.

The pit will eventually fill with excreta. When it is filled to within 0.5m below the slab, the slab and shelter are moved to a new pit and the old pit is filled with dirt.

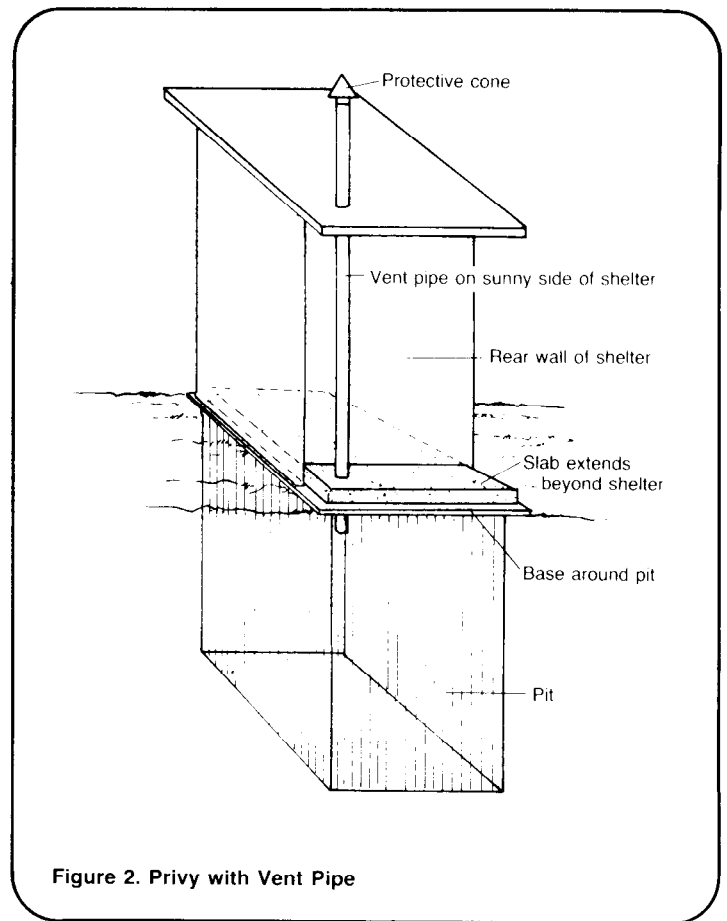


Figure 2. Privy with Vent Pipe

### Privies with Improvements

Improved privies have all the features of a pit privy plus either a vent pipe, pour-flush bowl, off-set pit, or some combination of the three. Like pit privies, improved privies must be no deeper than 1m above groundwater levels, and they will eventually fill with excreta. These privies cost about one-and-a-half times as much as a pit privy.

A vent pipe is 75-150mm in diameter, usually metal painted black, and topped with a fly-proof screen and cone-shaped cover to keep out rain. See Figure 2. The purpose of the vent pipe is to remove odors from the privy. The vent pipe is installed outside the shelter, on its sunny side. The pipe's bottom end is mortared to a hole in the slab and the top end is attached to the roof of the shelter. The sun heats the pipe causing an updraft. As a result, air moves down through the squatting hole or seat, through the pit, and up the vent. The screen on the top end of the vent pipe traps flies that may get into the pit.

A pour-flush bowl is a bowl with a U-shaped pipe attached below the squatting slab or the seat and pedestal, as shown in Figure 3. After each use, 1-3 liters of water are poured into the bowl. Part of the water flushes excreta into the pit, and part forms a water seal in the bowl to prevent odors from rising from the pit into the shelter.

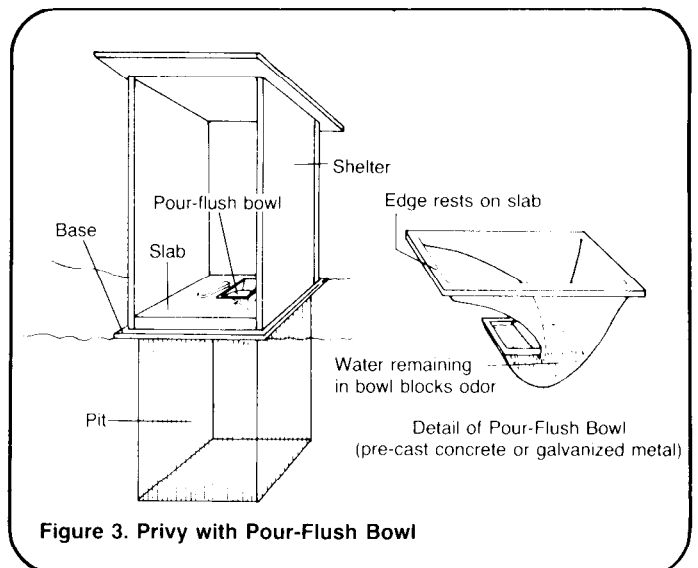


Figure 3. Privy with Pour-Flush Bowl

A pour-flush bowl requires a water source, such as a standpipe, near the privy. Washwater can also be used to operate a pour-flush bowl. Bulky anal-cleansing materials should not be used because they will clog the pipe.

An off-set pit is not directly under the slab and shelter and can be larger than a standard pit, as shown in Figure 4. Off-set pits are at least 1m wide, 1.5m long, and 3.0m deep. Because of their size, they last longer than standard pits. Another feature, which may be considered an advantage, is that the excreta in the pit cannot be seen.

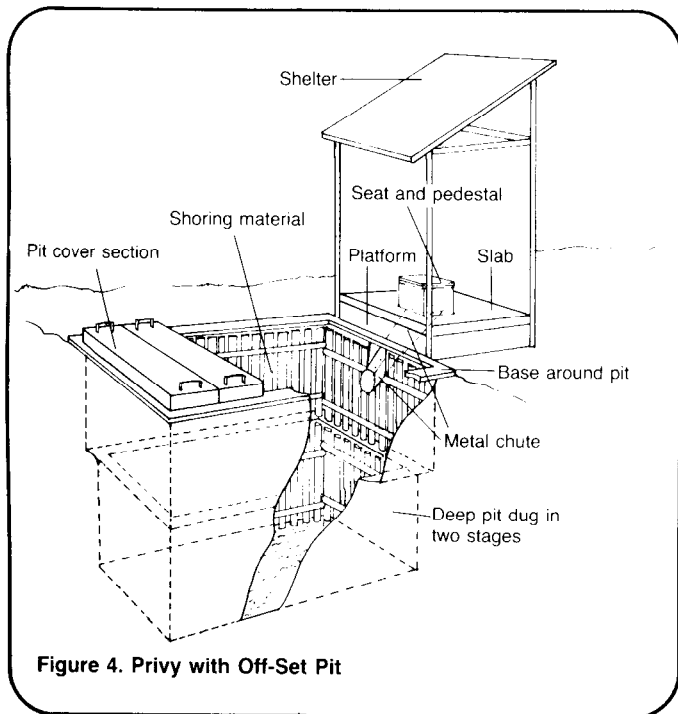


Figure 4. Privy with Off-Set Pit

An off-set pit can be fitted with a pour-flush bowl or a chute and cover. The chute, usually made of galvanized metal, carries excreta downward from the squatting hole or seat to the pit. The cover is generally made of concrete.

### Aqua Privy

An aqua privy costs about twice as much as a pit privy. Its four main features are a water-tight vault, slab, shelter, and soakaway as shown in Figure 5.

The vault is about 1m square and 1-2m deep. It is made of reinforced concrete or brick and mortar, and is

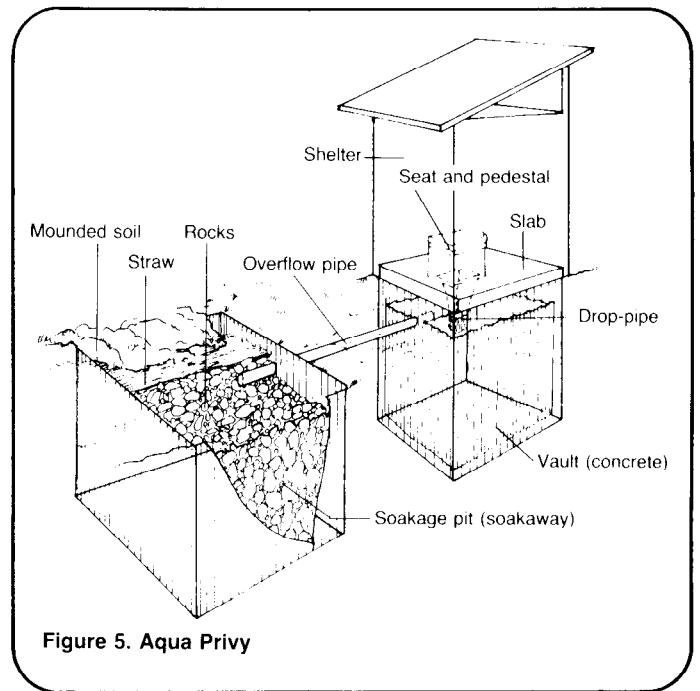


Figure 5. Aqua Privy

installed underground and filled with water. Excreta passes from a drop-pipe in the slab into the vault. The bacteria in the vault breaks down the excreta, and the solids settle to the bottom. The excess liquid flows through an overflow pipe from the vault to a soakaway.

The slab covers the vault and has a metal drop-pipe that extends from the squatting hole or seat down into the water in the vault. The water in the drop-pipe forms a seal, much like a pour-flush bowl, and prevents odors from rising into the shelter.

The shelter is the same as the shelter for a pit privy or improved privy.

The soakaway can be a soakage pit or trench (see "Simple Methods of Wash-water Disposal," SAN.1.M.2). It receives excess liquid run-off from the vault through an overflow pipe.

The water level in the vault and the water seal in the drop-pipe must be maintained or there will be severe problems with odors, flies, and mosquitoes. Enough water, possibly wash-water, must be added to the vault to replace any water that evaporates. This will vary from 1-10 liters per day.

The vault will gradually fill with sludge. The sludge must be cleaned out and buried when the vault is about two-thirds full and the vault must be re-filled with water. This will occur every two to six years.

## Compost Toilet

The compost toilet described here is the double-vault type. It costs about twice as much as a pit privy. The five main features of a compost toilet are two water-tight vaults, two slabs, and a shelter, as shown in Figure 6.

The shelter is larger than a shelter for a pit privy, because it must enclose two slabs.

The slabs are the same as for a pit privy, and may have squatting holes or seats and pedestals.

The vaults, which may really be one large vault divided in half, are made of reinforced concrete or brick and mortar. They rest above ground on a concrete or brick base and are each about 1m square and 1m high.

Only one vault is used at a time. It holds the excreta, to which is added ashes, sawdust, woodchips, or vegetable wastes. When the vault becomes two-thirds full, which takes six to 12 months, it is filled with dirt and sealed. The second vault is then used until it becomes two-thirds full. At that time, it is filled with dirt and sealed, and the first vault is opened. The contents of the first vault will have changed into compost material. The compost is removed from the first vault through the door at the back and used to fertilize crops. The first vault is now ready to use again.

## Bucket Latrine

The construction cost of a bucket latrine is about the same as a pit privy. However, operating costs can make a bucket latrine the most expensive excreta disposal method described in this technical note. The four main features of a bucket latrine are a platform, slab, shelter, and bucket, as shown in Figure 7.

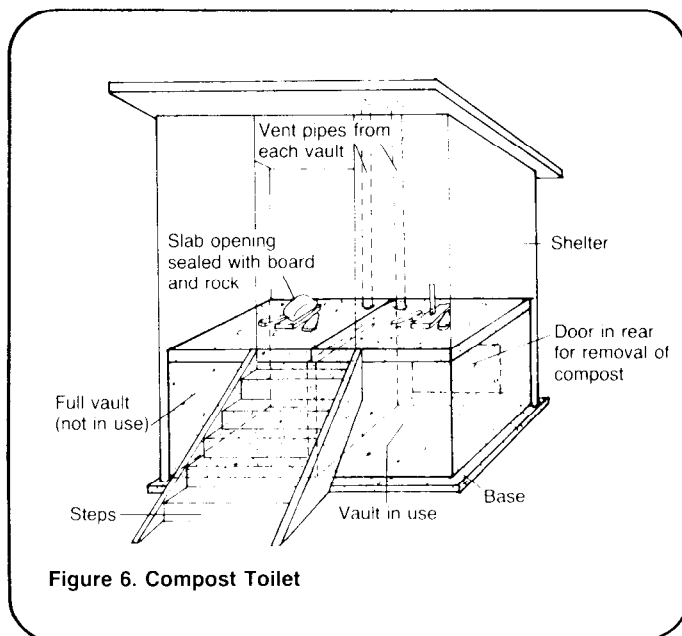


Figure 6. Compost Toilet

The platform can be made of wood, concrete, or brick and mortar. It elevates the slab and encloses the bucket.

The slab is the same as for a pit privy, and may have a squatting hole or a seat and pedestal.

The shelter is the same as for a pit privy, with the addition of a fly-proof door in the rear wall for removal of the bucket.

The bucket is made of rubber, enamel, galvanized metal, or lacquered wood. It is placed under the slab, in the compartment created by the platform.

The bucket holds excreta and must be emptied every one to three days, preferably every day. A laborer replaces the bucket with a clean one, empties the excreta into a larger container, and takes it to a trenching ground where the excreta is buried. Water must be available at the trenching ground so the laborer can wash the containers and buckets. It is also possible to compost the excreta.

This method of excreta disposal can be unpleasant and unsanitary. There is a risk of spreading disease because the excreta and excreta containers must be handled continually. This method also can be quite expensive because

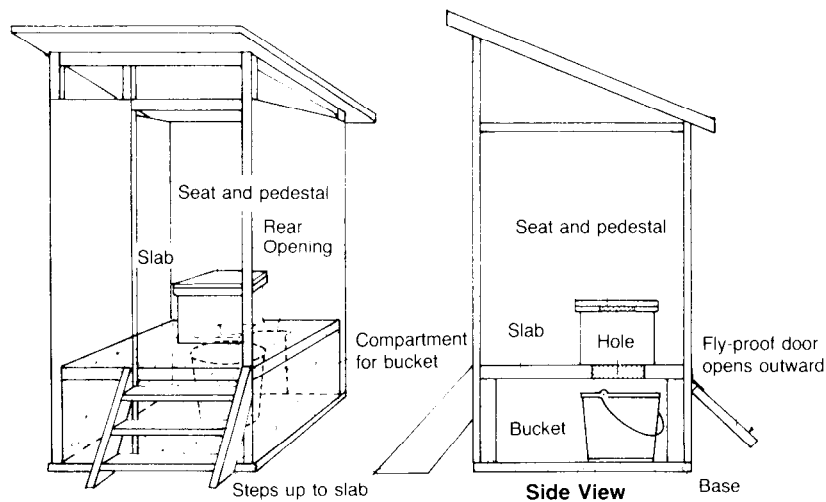


Figure 7. Bucket Latrine

workers must be paid to empty the buckets and bury the excreta. In some regions, however, the excreta is composted successfully with no odor, flies or disease. It is then used to fertilize crops. In most circumstances bucket latrines should probably only be used where there is a dense population on rocky ground or as a temporary solution to an emergency situation. Existing bucket latrines should be replaced with other, more sanitary means of excreta disposal as soon as possible.

### Comparison of Methods

Table 1 summarizes each of the five simple methods of excreta disposal. The methods are listed across the top of the chart, and the factors to be compared are listed down the left side. The table can be used as an aid in selecting a method (see "Planning Simple Systems of Excreta and Washwater Disposal," SAN.1.P).

Table 1. Comparison of Simple Methods of Excreta Disposal

Factor	Disposal Method				
	Pit Privy	Pit Privy with Improvements	Aqua Privy	Compost Toilet	Bucket Latrine
Cost	None	1½ times pit privy	2 times pit privy	2 times pit privy	No construction cost but operation may be costly depending on community
Design Features	Pit; slab (squat or seat); lid; shelter	Same as pit privy plus either pour-flush bowl, vent pipe, off-set pit, or combination	Vault; slab (squat or seat); shelter; soakaway	Double vault; two slabs (squat or seat); shelter	Platform; slab (squat or seat); bucket; shelter; large containers' cart
Construction Skills	Minimal	Minimal	Some masonry	Some masonry	Minimal
Slab Material	Bamboo, wood, or concrete	Bamboo, wood, concrete, ceramic, or plastic	Concrete	Concrete	Bamboo, wood, or concrete
Water Requirement	No	No, except for pour-flush	Yes	No	No for operation, but yes for washing at trenching ground
Handling of Wastes	None	None	Every 2-6 years as sludge	Every 6-12 months as compost	Every 1-3 days as excreta
Maintenance	Clean slab weekly; dig new pit and move slab and shelter every 4-6 years	Same as pit privy; if off-set pit, clean chute weekly and dig new pit every 10 or more years	Maintain water level in vault; clean slab weekly; remove sludge and refill with water every 2-6 years	Clean slab weekly; alternate use of vaults every 6-12 months by removing compost, cleaning one vault, sealing the other	Clean slab weekly; remove excreta every 1-3 days; clean buckets every 1-3 days; cart excreta to trenching ground and bury it or to composting area