

# Water for the World



## Operating and Maintaining Septic Tanks

Technical Note No. SAN. 2.0.3

A septic tank is a self-operating unit for sewage treatment. The tank receives raw sewage from a building, allows solids to settle out, and discharges effluent to an underground (subsurface) absorption system for final disposal. Maintaining a septic tank involves periodically measuring scum and sludge depth and cleaning the tank. It is important to maintain the septic tank on a routine basis in order to ensure continued operation, prevent tank failure, and extend the life of the subsurface absorption system (see "Constructing, Operating and Maintaining Subsurface Absorption Systems," SAN.2.C.1). A properly constructed and maintained septic tank can last for 20 years or more.

This technical note describes how to (1) measure scum and sludge depths to determine if the tank needs to be cleaned, (2) clean the tank, and (3) check for signs of tank failure.

Read the entire technical note before beginning maintenance activities.

### Useful Definitions

**GROUNDWATER LEVEL** - The level to which subsurface water rises during any given time of year.

**SCUM** - Oily, greasy, and sometimes crusty material that floats on or near the liquid surface in a septic tank.

**SEPTAGE** - The combined contents of the septic tank; that is, all of the scum, sludge, and effluent.

**SLUDGE** - Settled solids at the bottom of the septic tank.

## Inspecting the Septic Tank

Inspect the septic tank at least once a year to determine if it needs cleaning. The tank needs to be cleaned if either (a) the depth of the sludge is equal to or greater than one-third the liquid depth, or (b) the bottom of the scum layer is within 75mm of the bottom of the outlet pipe's "T" fitting. If the tank is allowed to become too full of scum or sludge, it will begin discharging solids to the subsurface absorption system. When this happens, the system will rapidly become clogged and a new system will have to be built.

## Locating and Opening the Tank

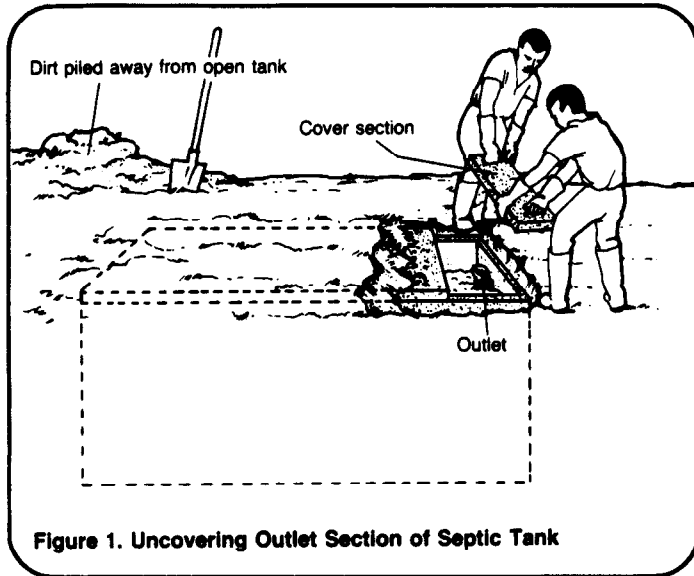
If the top of the tank is level with or above ground level, finding it should not be a problem.

If the top of the tank is covered with dirt, locate the tank site by one or more of the following methods: (1) locate the metal stake, wooden post, or other identifying marker placed there when the tank was built, (2) locate the mound of dirt over the tank, (3) make field measurements using a measuring tape and the location map used to site the tank for construction, (4) make a rough guess based on memory or the knowledge of persons using the septic tank system.

When the site has been identified, dig small test holes until the tank is found. The top of the tank should be no more than about 0.3m below the surface of the ground. Find the outlet end of the tank (this is the end farthest from the building and nearest the absorption field).

If the tank top is made in sections, uncover the end section, which is the one over the outlet end of the tank. Remove dirt and pile it far enough away from the tank so that when the section is removed, dirt will not fall into the tank. If the tank top is one piece equipped with manholes, uncover the manhole over the outlet end.

Remove the end top section or manhole and set it aside as shown in Figure 1.



### Determining If the Tank Needs to be Cleaned

There are two ways to find out if the tank needs cleaning: measure the depth of the sludge and measure the depth of the scum.

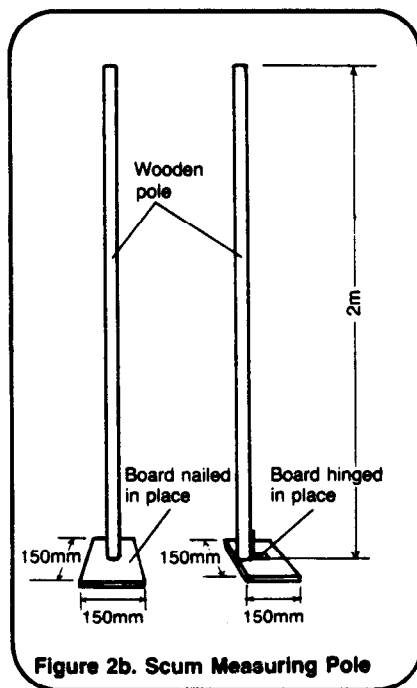
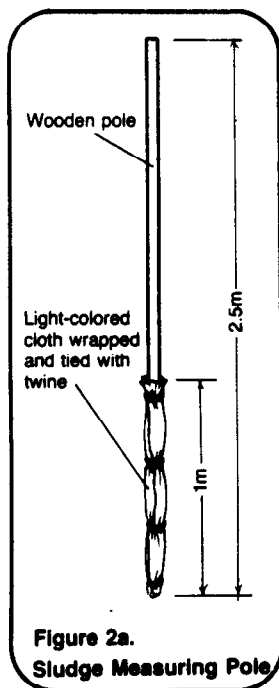
To measure the depth of the sludge:

1. Wrap a light-colored cloth around one end of a 2.5m pole and fasten it with string or twine as shown in Figure 2a.

2. To avoid the scum, lower the measuring pole through the "T" fitting to the bottom of the tank as shown in Figure 3.

3. After a few minutes, slowly and carefully remove the pole. The depth of the sludge can be distinguished from the effluent by dark particles clinging to the cloth.

4. With a measuring tape, measure the depth of sludge on the pole. If the depth of the sludge is equal to or greater than one-third the liquid depth of the tank, the tank needs to be cleaned. If the depth of the sludge is less than one-third the liquid depth, go ahead and measure the scum depth.



SLUDGE DEPTH CHART	
Clean the septic tank if:	
the liquid depth is	and the sludge depth is equal to or greater than
0.9m	0.30m
1.1m	0.37m
1.2m	0.40m
1.5m	0.50m
1.8m	0.60m
divided by 3 equals	

NOTES: 1. Liquid depth is the distance from the design flow line to the bottom of the tank (see Figure 4).

2. If the liquid depth of the tank does not appear on this chart, write it in the space provided in the liquid depth column, divide by 3, and write the answer in the space provided in the sludge depth column.

To measure the depth of the scum:

1. Fasten a 150mm square board to one end of a 2m pole with nails or a hinge. The hinge makes it much easier to push the board and pole down through the scum as shown in Figure 2b. (NOTE: If the 2.5m pole is used for this purpose, remove the cloth and twine.)

2. Push the board and pole down through the scum layer.

3. Raise the pole slowly as shown in Figure 4, until you can feel the bottom of the scum layer. It will offer more resistance than the liquid.

4. Mark the pole with a pencil to show the depth of the scum.

5. Using the same procedure, locate the bottom of the outlet pipe's "T" fitting and mark the pole.

6. The distance between the two marks is the same as the distance from the bottom of the scum to the bottom of the "T". Measure the distance with the measuring tape. If it is 75mm or less, the tank must be cleaned. If the distance is more than 75mm the tank need not be cleaned at this time.

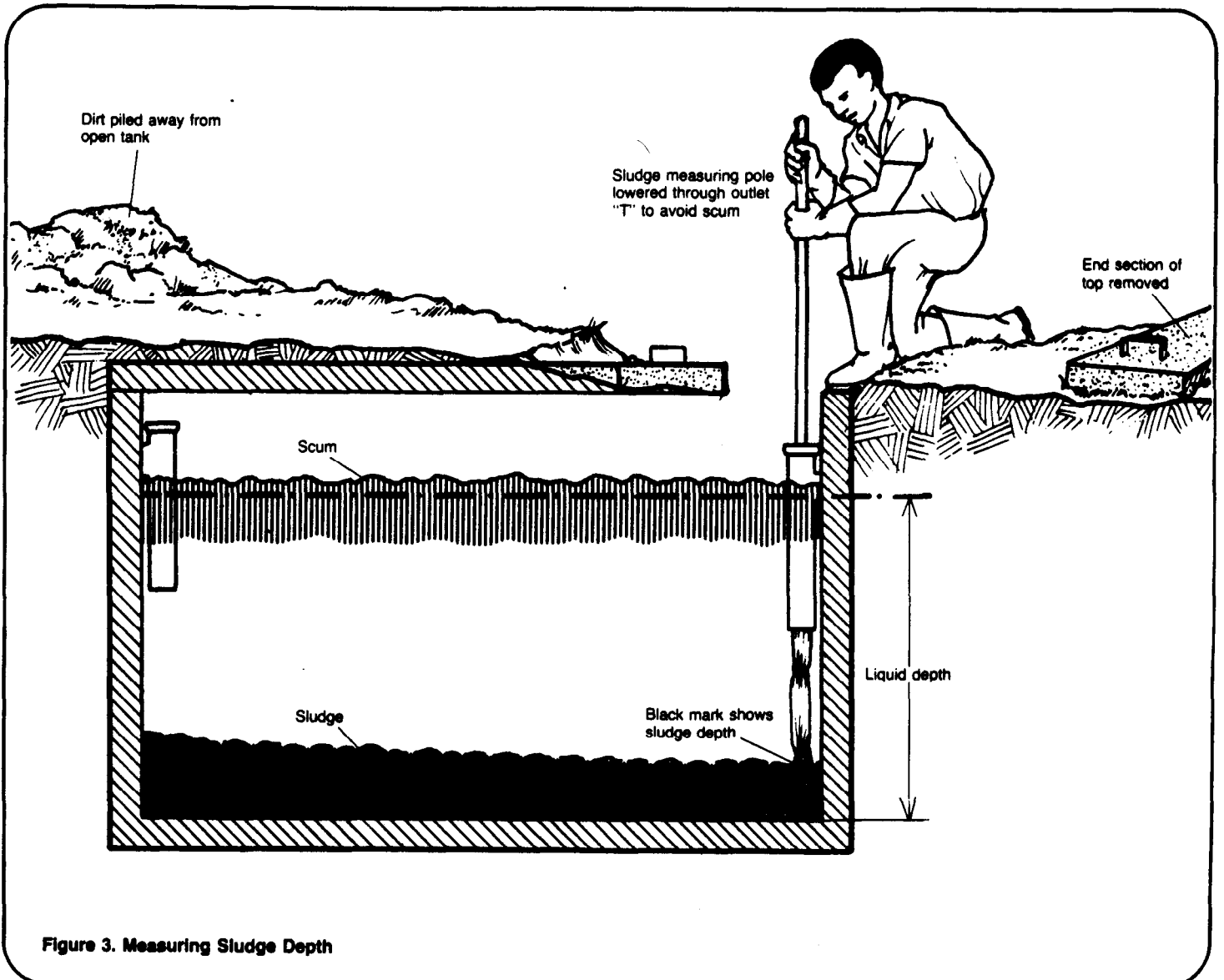


Figure 3. Measuring Sludge Depth

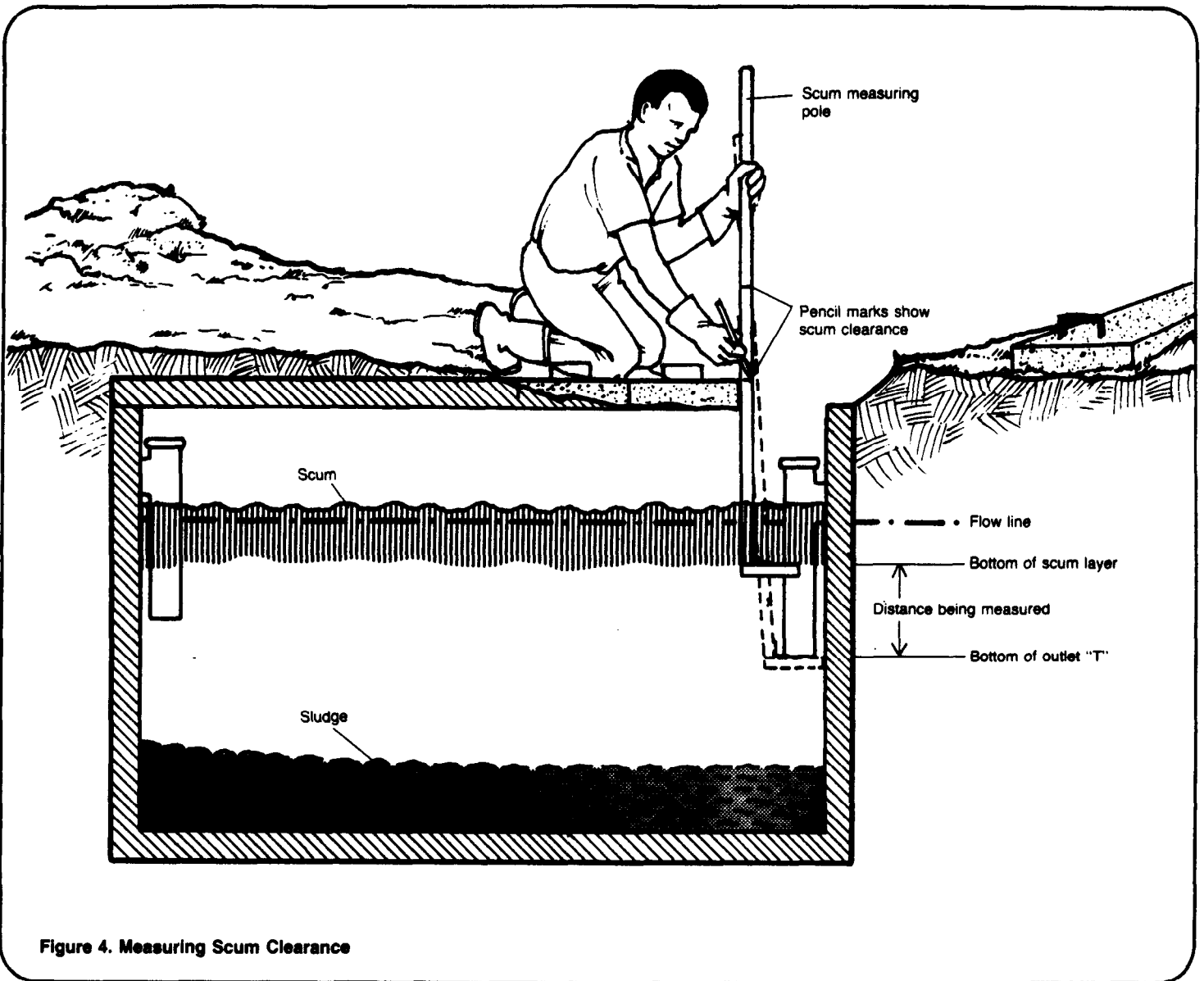


Figure 4. Measuring Scum Clearance

### Resealing the Tank

If the tank does not require cleaning, replace the top section or manhole and thoroughly waterproof around the edges with tar or other waterproofing material. Replace the dirt, if applicable, and mound. Set a metal stake, wooden post, or other object to identify the outlet end of the tank so it can be easily located when it is time for the next tank inspection.

### Cleaning the Septic Tank

If the sludge or scum depths indicate the tank needs cleaning, begin the cleaning process immediately. Delay risks damaging the subsurface absorption field. The tank can be cleaned mechanically or by hand.

To clean the tank mechanically:

These steps will depend in part on the type of equipment being used. Generally, the sewage pump, hoses, and container are all mounted on a truck.

1. Park the truck near, but not over, the septic tank.
2. Start the sewage pump and let it run for a few minutes.
3. Lower the hose into the tank and begin pumping out the septage. If the scum layer is especially heavy and crusty, have a worker break it up with a shovel while the septage is being pumped.
4. When the tank is empty, retrieve the hose and shut off the pump. (NOTE: Small amounts of septage may be left in the tank to act as a starter when the tank is put back into operation.)
5. Replace the top section or manhole cover and waterproof.
6. Drive the truck to the septage disposal site.

To clean the tank by hand:

1. Remove dirt from at least half and preferably all of the top of the tank if it is underground. Pile the dirt far enough away so that when the sections are removed, dirt will not fall in.
2. Remove at least half and preferably all of the top sections.
3. Have all workers put on gloves and boots.
4. Begin dipping out the septage with a bucket tied to a rope and emptying the septage into the containers as shown in Figure 5. Have a worker break up the scum layer and continually stir the septage with a shovel or pole. This will bring sludge off the bottom and leave less to be shoveled out later.

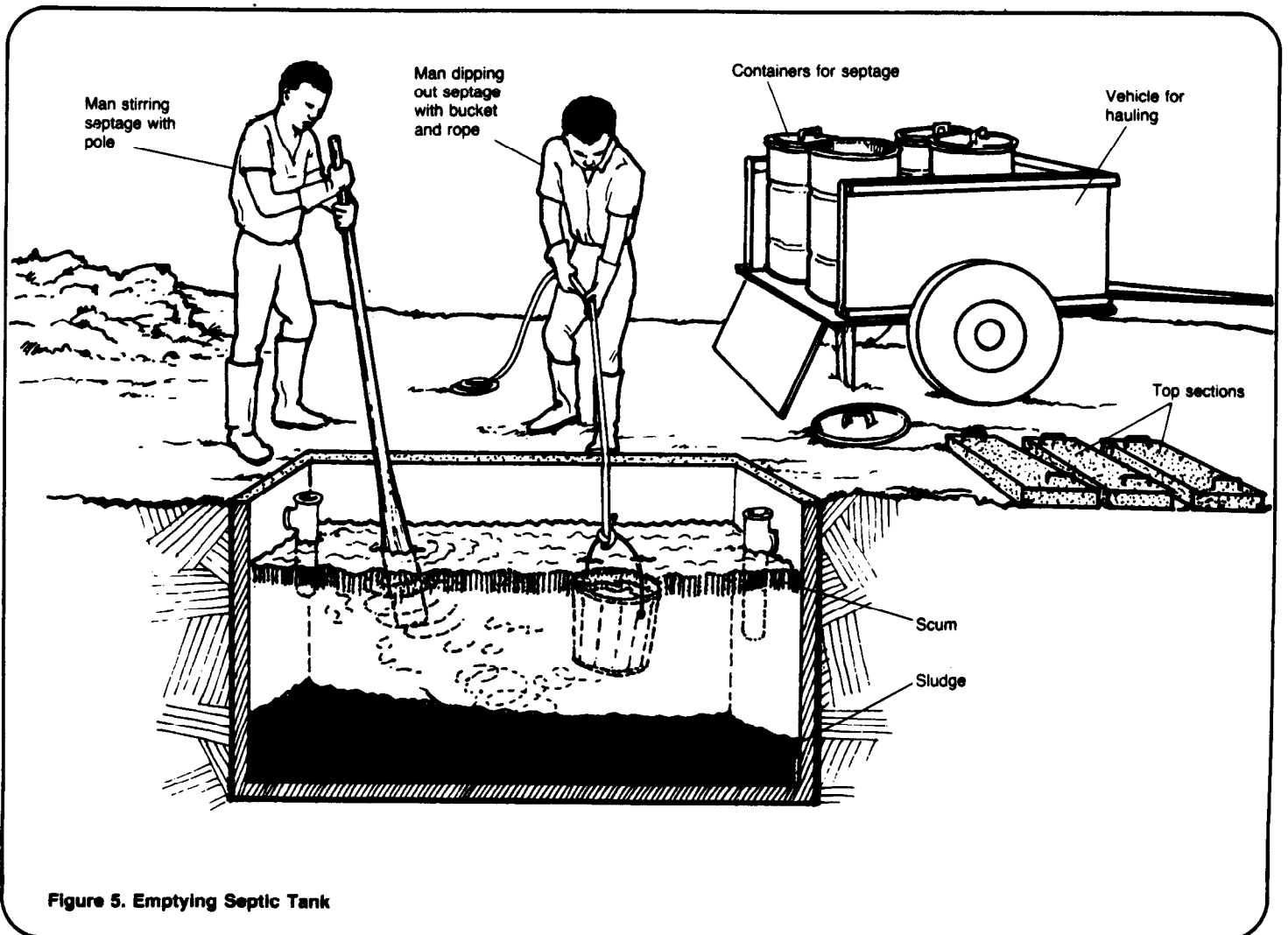


Figure 5. Emptying Septic Tank

5. When no more septage can be dipped out with the bucket, it is necessary to enter the tank. Wear a safety rope held by an assistant standing outside the tank or tied to a section of the top that has been removed. Using a scoop shovel, remove sludge from the bottom of the tank as shown in Figure 6. It may be convenient to empty sludge into a bucket tied to a rope, and have a worker raise the bucket out to the tank and empty it into a container.

6. Do not wash the walls or floor of the septic tank. The small amount of septage left will act as a starter when the tank is put back into use.

7. Thoroughly examine the inside of the tank for any damage. Look for cracks in the walls and floor. Examine the inlet and outlet fittings for damage. Minor damage can be corrected by patching or waterproofing with

cement mortar (see "Constructing Septic Tanks," SAN.2.C.3). If there appears to be major structural damage, the project designer or the worker who supervised construction should be consulted before repairs are attempted and before the tank is put back into use.

8. If the tank is not damaged, or after it has been repaired, replace the top sections and waterproof.

9. Haul the septage to the disposal site.

(NOTES: If more than one day is required to empty the tank, replace the top sections before stopping work at the end of the day. DO NOT leave the tank open overnight. An open tank is a dangerous hazard.

Septage is hazardous material. Thoroughly wash hands with soap after inspecting or cleaning a septic tank or disposing of septage, and especially before eating.)

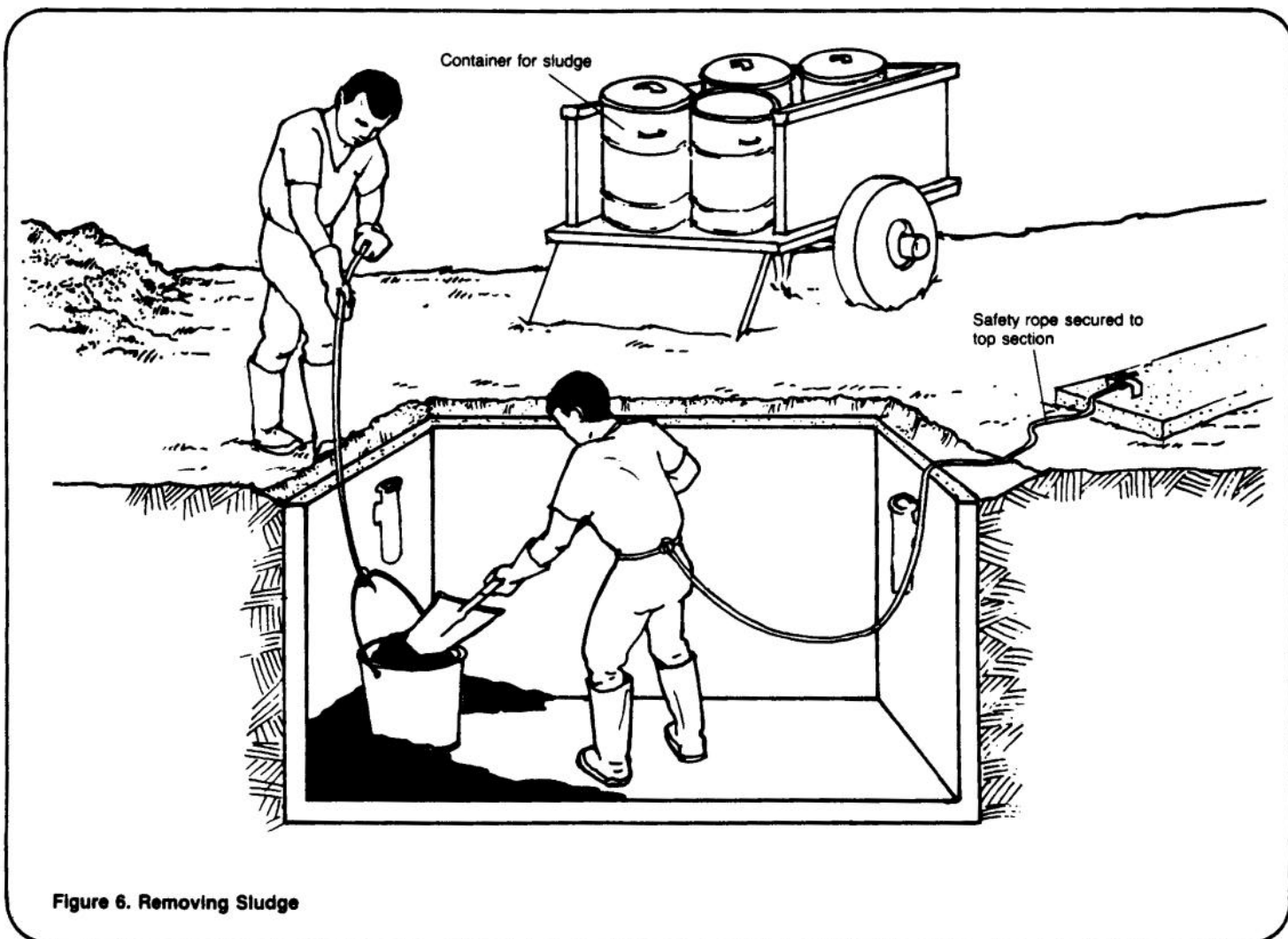


Figure 6. Removing Sludge

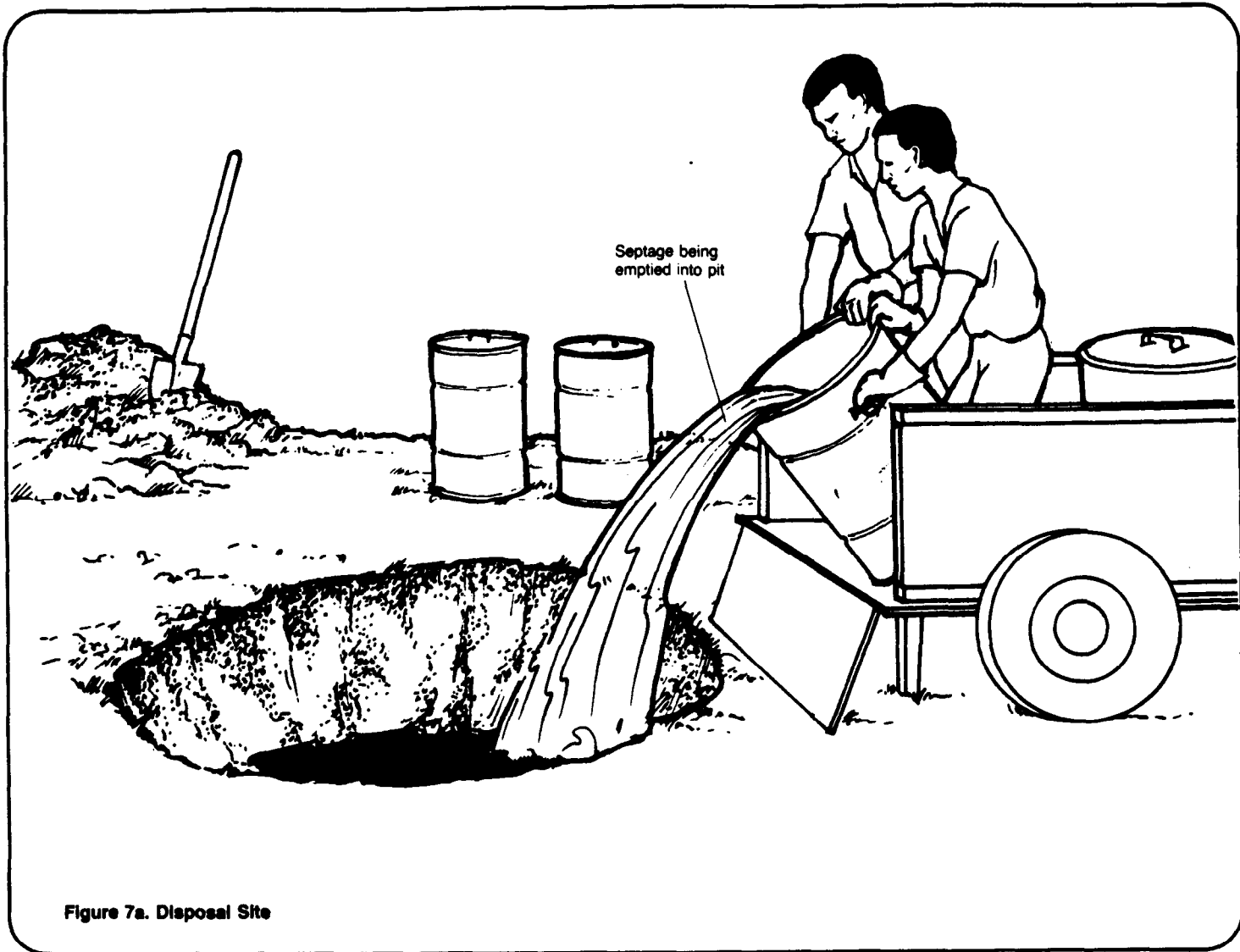


Figure 7a. Disposal Site

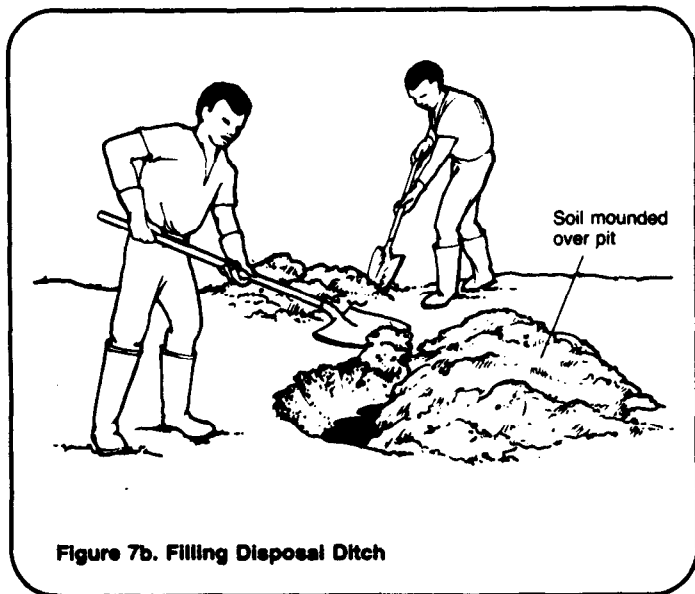


Figure 7b. Filling Disposal Ditch

### Disposing of Septage

Select a disposal site downhill and at least 60m from any water supply or dwelling. The site should be outside the village, in a remote or little-used area.

Dig a shallow pit or trench and dump in the septage as shown in Figure 7a. After the liquid has soaked into the ground, cover the pit with 0.5-0.6m of dirt as shown in Figure 7b.

Septage is hazardous and should be handled carefully. Be careful to avoid spillage when traveling from the septic tank to the disposal site.

## Caution!

1. Never leave an open septic tank unattended. When a tank is opened during cleaning, it becomes a dangerous hazard, especially for children. Unauthorized persons should be kept away from the tank.

2. Remove at least half of the top sections of the septic tank, when it becomes necessary to enter it for cleaning. If the tank top is one piece remove the entire top. This will allow the tank to air out. When entering the tank, wear a safety rope held by one or two assistants standing outside the tank or tied to a section of the top that has been removed.

3. Handle the septage (scum, sludge, and effluent) carefully; it is as hazardous to your health as raw sewage.

4. Do not use chemicals to clean or disinfect the septic tank; harmful fumes may be released.

5. Do not permit the earth around the septic tank to sink or cave-in.

6. Keep dogs and burrowing animals away from the septic tank site.

## Materials Needed

### For Inspecting Tank:

(1) drawing of the tank showing the actual liquid depth; (2) shovel; (3) poles: one 2.5m long, other 2m long; (4) light-colored cloth or towel, about 0.3m x 1m; (5) string or twine, about 1m; (6) board, about 150m square and 25mm thick; (7) hinge (optional); (8) nails; (9) hammer; (10) measuring tape or ruler; (11) pencil or piece of charcoal.

### For Cleaning Tank by Hand:

(1) shovel; (2) scoop shovel; (3) two sturdy ropes, each 5 to 6.5m long and suitable for lifting a worker from the tank; (4) bucket with handle, 11 to 15 liters; (5) several barrels, drums, or other containers larger than the bucket; (6) vehicle to haul containers; (7) pair of gloves for each worker; (8) pair of boots for each worker; (9) flashlight or lantern (optional) for inspecting emptied tank.

### For Cleaning Tank Mechanically:

(1) shovel; (2) sewage pump with hoses long enough to reach from bottom of tank to the containers; (3) containers to hold septage, usually mounted on a truck; (4) vehicle to haul containers, usually a truck.

### For Repairing Tank:

(1) cement; (2) sand; (3) container for mixing concrete mortar; (4) trowel; (5) several lengths of sewer pipe, 100mm in diameter; (6) shovel.

Other: (1) tar or other waterproofing material; (2) maintenance record book.

(NOTE: Some or all of these materials may be left over from construction of the tank.)

## Cleaning Up

When all inspecting, cleaning, and disposing activities are completed, wash tools, equipment, containers, and clothing and store them in a proper place.

Mark your activities on a maintenance record similar to that shown in Table 1. This one is filled in to show examples of how yours will look when you have completed each maintenance activity.

## Inspecting Tank Site

Inspect the site of the septic tank and the subsurface absorption system (see "Constructing, Operating and Maintaining Subsurface Absorption Systems," SAN.2.C.1) every month or so. If any problems are evident, find the causes and correct them at once. Use Table 2 as an aid. Note all problems and repairs on a maintenance record similar to that shown in Table 1.

## Emptying Septic Tanks

It is possible for an empty septic tank to float up out of the hole, causing serious damage. This can happen when the seasonal groundwater level is higher than the bottom of the tank. If this is likely to be a problem in your area, do not empty the tank until a drier season, when the groundwater level is lower.



**Table 1. Sample Maintenance Record**

Inspect Septic Tank Sludge and Scum Levels At Least Once per Year

Inspect Site of Tank and Absorption System Every Few Months

Date	Location	Liquid Depth	Task
4 May '81	Mendoza house	1.2 m	Uncovered tank. Measured sludge (0.2 m) and scum space (150 mm). No cleaning necessary. Resealed and recharged tanks. Set post.
5 May '81	al Hofan house		Inspected tank site and leach field. No problems.
5 May '81	N'Kuma house		Inspected tank site. Found erosion around tank. Filled in with dirt. Inspected leach field - no problems.
1 June '81	School	1.5 m	No problem with tank site and field. Opened tank and measured sludge (0.6 m). Must clean. Resealed tanks. Contacted Juan and Hassan to help me tomorrow.
2 June '81	School		Juan, Hassan and I emptied tank (9 hours). Inspected inside of tanks. No problems. Resealed tanks. Hauled septage to vacant field - buried in trench.
8 August '81			Inspected tank site and leach field. No problems.
8 August '81			Inspected tank site and leach field. No problems.
8 August '81		1.2 m	Inspected tank site and leach field. No problems. Opened tank and measured sludge (0.3 m). Measured scum space (50 mm). N'Kuma and I emptied. I inspected tank. No problems. Resealed tank. Hauled septage to field south of town, dug shallow pit and buried septage.

**Table 2. Problem/Solution Chart**

Problem	Possible Cause	Solution
Lush growth, wet spots, or continual odors near site, or frequent cave-ins at or around site	Tank needs cleaning or repair	Clean tank; inspect for damage (cracked sewer pipe; leaks in walls or floor)
	Outlet clogged	Clean outlet
	Absorption system not operating properly	Inspect system (see SAN.2.C.1)
	Improperly designed tank	Correct design flaw or build new tank
	Tank too small	Reduce sewage flow or build new tank
Erosion at tank site	Surface water flowing over site	Fill and mound with dirt, or build small dams or trenches to divert water
Small holes or excavations near tank site	Dogs or burrowing animals	Keep animals away (erect a fence, set traps, etc.)