

## **LESSON ASSIGNMENT**

### **LESSON 6**

Waste Disposal in the Field.

### **LESSON ASSIGNMENT**

Paragraphs 6-1 through 6-5.

### **LESSON OBJECTIVES**

After completing this lesson, you should be able to:

- 6-1. Identify the three categories of waste disposal in the field.
- 6-2. Select the best latrine for your unit's situation.
- 6-3. Select the best liquid waste disposal method for your unit's situation.
- 6-4. Select the best garbage and rubbish disposal method for your unit's situation.
- 6-5. Select the best hazardous waste disposal procedure for your unit's situation.

## LESSON 6

### WASTE DISPOSAL IN THE FIELD

#### 6-1. WASTE DISPOSAL IN THE FIELD

When we talk about waste disposal we need to look at three categories. Any of these, when not properly disposed of can become a breeding ground for disease-carrying insects and animals.

- a. Human waste – feces and urine.
- b. Liquid waste – liquid kitchen and bath waste.
- c. Rubbish – combustible and non-combustible solids.

#### 6-2. HUMAN WASTE DISPOSAL

Human waste disposal facilities are a must when talking about proper disposal of human waste in the field. There are two categories of human waste disposal facilities: latrines and urinals. The type of human waste disposal facility selected for use is dependent upon how long the unit will remain in one place. Usually, the longer the stay, the more sophisticated the facility. However, there are other considerations too, such as the tactical situation, weather and ground conditions, and local environmental laws.

**WARNING:** Army units **MUST** follow all local, state, federal, and international environmental standards during operations. The waste disposal devices described in this lesson **MUST** be reviewed and authorized by Preventive Medicine personnel prior to their use. This information is presented so units can develop their own waste disposal capabilities in **EMERGENCY** situations.

a. Latrines. Whatever type of latrine is used, the unit is responsible for its construction, maintenance, and closure. You, as the FST member, need to know the type of latrine best suited for the unit's location and operational status.

(1) Planning considerations. Regardless of the type of latrine you are going to use, you can't just build them anywhere. These planning factors must be taken into consideration.

(a) Location. The latrine should be located at least 100 yards downwind from the unit's field food service facility, 100 feet away from any unit ground water source, and at least 30 yards from the edge of the unit area.

(b) Privacy. A canvas or brush screen should be placed around each latrine, or a tent may be placed over it. The screen should have a drainage ditch dug around its edges to prevent rainwater from flowing into the latrine.

NOTE: In cold climates, you may consider heating the enclosure.

(c) Hand-washing devices. Hands contaminated with fecal matter are the most common means of disease transmission. Because of this, hand-washing devices are absolutely necessary. A simple hand-washing device should be installed outside of each latrine enclosure. It should be easy to operate and must be kept constantly supplied with soap and water.

(d) Cleanliness. Keep the latrines clean. Latrines should be policed daily to ensure they are being properly maintained. They should also be cleaned and sanitized every day to reduce germs and odor.

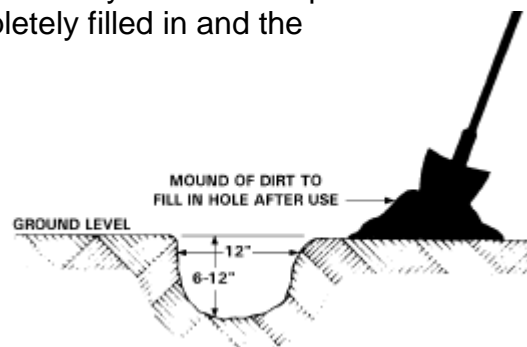
(e) Quantity. You must construct enough latrines to handle the unit population. You should have enough latrines to accommodate four percent of the unit's male soldiers and six percent of the unit's female soldiers at any one time.

(f) Closure. Even if you build a sufficient number of latrines, you will probably have some that fill up. Even if they are not completely full, all latrines must be properly closed. When a latrine pit is filled to within one foot of the top, or when it is to be abandoned, remove the latrine box and spray the contents of the pit, the side walls and the ground within two feet with an approved insecticide. Fill the pit to ground level, packing the dirt after every three inches of dirt added. Then mound the latrine with twelve inches of soil to prevent flies from entering or exiting the pit. Finally, place a sign on the pit that states the type of latrine, the date it was closed, and the unit designation.

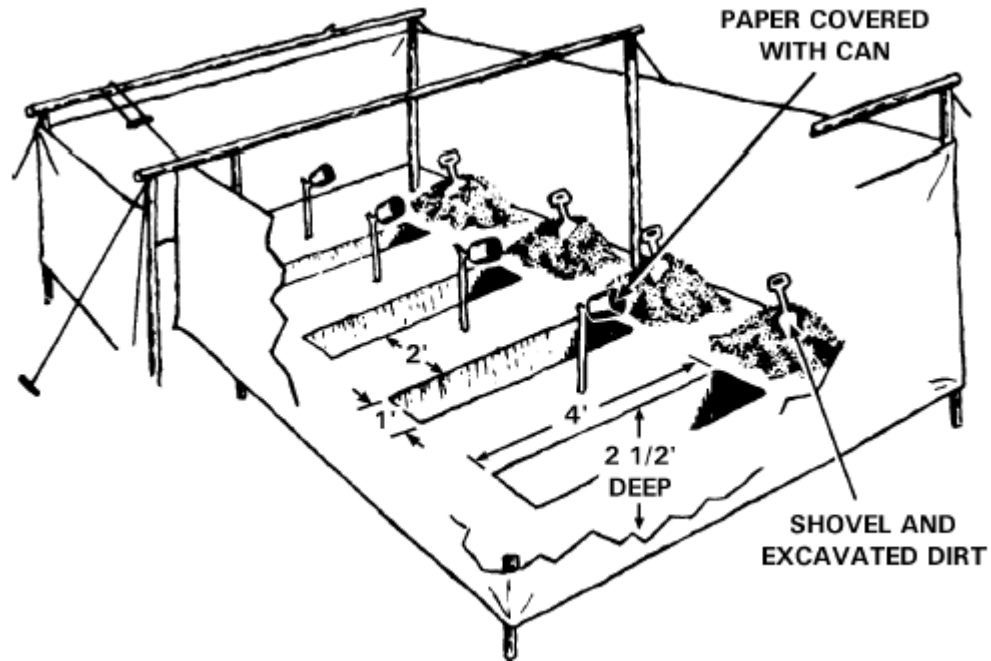
NOTE: Unit designations should only be included on the closure sign in non-operational areas.

(2) Types of latrines. Remember that the decision on the type of latrine to be used is based upon the unit situation and other things like ground or soil conditions.

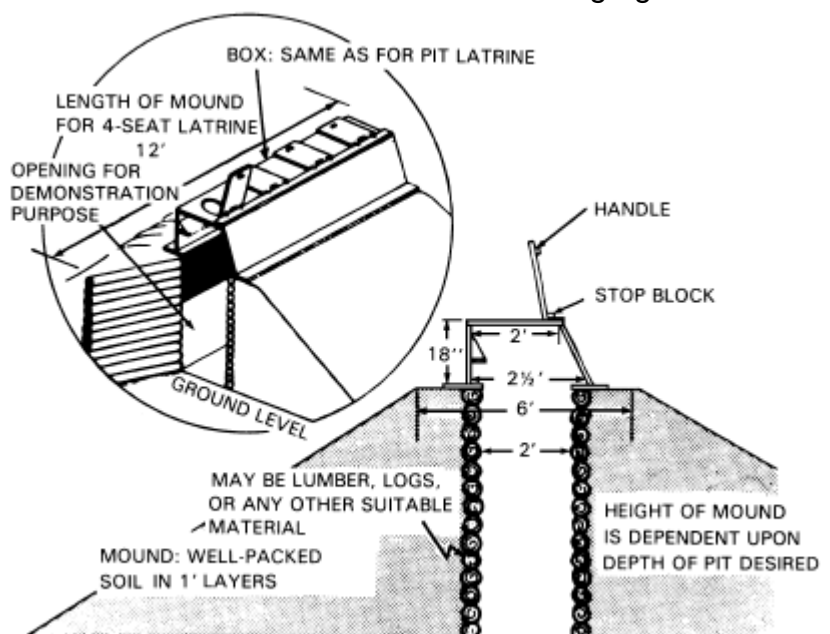
(a) Cat-hole latrine. The cat-hole latrine is used when the unit is on the move. The cat-hole latrine is simply a hole approximately one foot deep and one foot in diameter. After using a cat-hole it must be completely filled in and the dirt packed down.



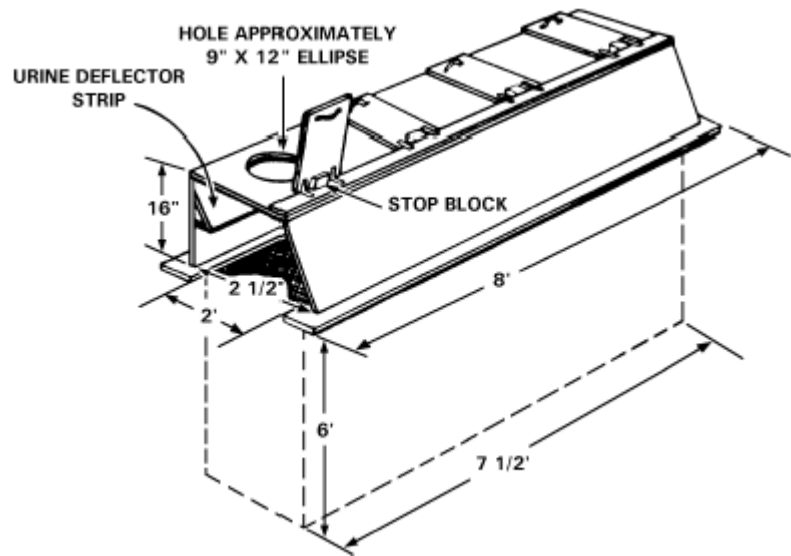
(b) Straddle trench latrine. Use the straddle trench latrine if the unit is remaining in one place for up to three days. Each trench is dug one foot wide, two and one half feet deep, and at least four feet long. Multiple trenches should be dug at least two feet apart. Each four-foot trench will accommodate two soldiers. Separate facilities should be constructed for male and female soldiers. Placing boards along both sides of the trench can provide better footing. Place toilet paper on broken sticks or branches and cover the rolls with a can to protect the paper in bad weather. Pile the excavated dirt at one end of the latrine and provide a shovel for the soldier to cover the excrement and toilet paper after each use. Close the latrine when the trench is filled to within one foot of the top.



(c) Mound Latrines. Mound Latrines are utilized when a high ground water level or a rock formation near the ground surface prevents digging a deep pit. A mound of earth with a top at least 6-feet wide and 12-feet long is formed and a four-seat latrine box is placed on top. The mound is formed in 1-foot layers and allows 1 foot from the base of the pit to ground level. The pit is dug into the mound when the mound has reached its desired level.



(d) Deep pit latrines. If the unit is going on an extended stay, longer than three days, then deep pit latrines are usually built. This latrine uses a two-seat or four-seat box either issued to, or built by, the unit using. The two-seat box is four feet long, two and one half feet wide at the base, and sixteen inches high. The four-seat box is eight feet long. To minimize flies entering the latrine, pack the dirt tightly around the base of the box. Lids that are fly-proof and self-closing should cover the seat holes. A metal urine deflector strip is placed inside the front of the box to prevent urine from soaking into the wood. The pit for the latrine is dug two feet wide and either three and one half or seven and one half feet long. The depth of the pit should equal one foot for each week the latrine will be used, plus one foot for the dirt cover when the latrine is closed.



(e) Burnout latrines. Burnout latrines are particularly suited to jungle areas with high water tables, but can also be used when the ground is hard or rocky and digging is difficult or impossible. Do not use it in areas in which the air pollution regulations prohibit open fires. Furthermore, be aware that in combat areas, burnout latrines make great targets as the smoke and fire are easily seen.

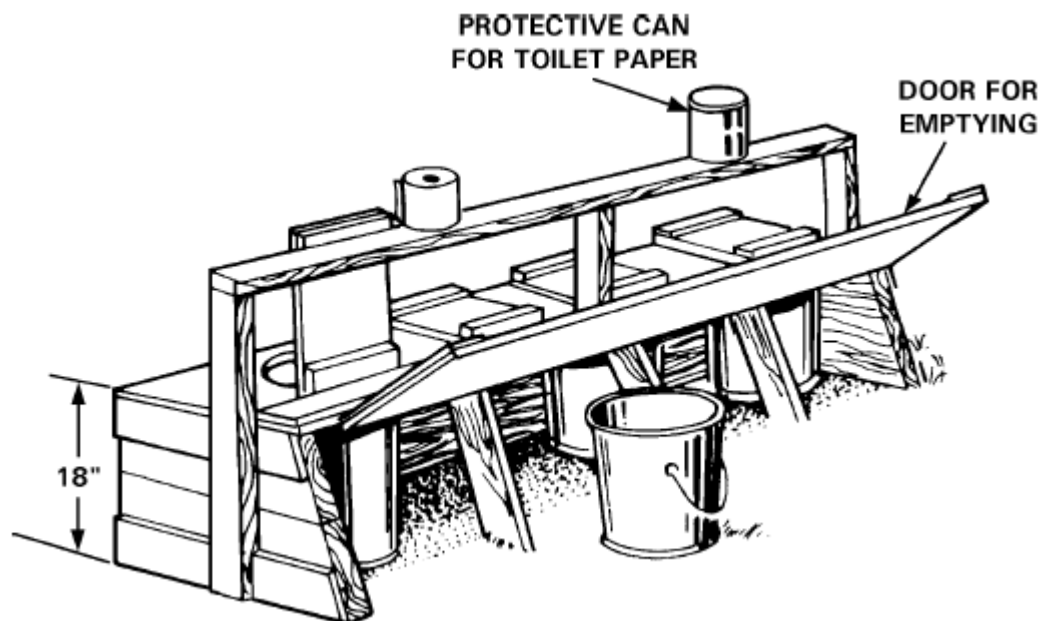
1 To construct a burnout latrine, a 55-gallon drum is cut in half, and handles are welded to the sides of the half drum for easy carrying. A wooden seat with a fly proof, self-closing lid is placed on top of the drum. To prevent dilution of the waste, build urinals for men and create separate urinal barrels for women.

2 The latrine is burned out daily by adding sufficient fuel to incinerate the fecal matter. A mixture of 1 quart (1 liter) of gasoline (Mogas) to 4 quarts (4 liters) of diesel (JP8) oil is effective, but must be used with caution. For safety precautions, never add additional fuel while barrel is actively burning. Ensure fire-fighting capabilities at burn locations are on hand: fire extinguishers (operational), piles of dirt (with shovels), and water cans (with water). If possible, have two sets of drums, one set for use while the other set is being burned clean. If the contents are not rendered dry and odorless by one burning, they should be burned again. Any remaining ash should be buried.

NOTE: Due to a possible lack of supplies during deployments, Mogas may be hard to acquire. In that event a 100% JP8 solution may be used, but it will take much longer to

burn the human waste. **NEVER USE 100% MOGAS FOR THIS TYPE OF OPERATION.**

(f) Pail latrines. Use the pail latrine where the water table is too close to the surface of the ground for digging a deep pit latrine. The same seat boxes constructed for a deep pit latrine can be modified for use as a pail latrine by placing hinged doors on the rear of the box, adding a floor and placing a pail under each seat. If the pail latrine is located in a building, the box should be placed to form part of an outer wall. The box should be placed on a floor of impervious material, such as concrete, that slopes toward the rear. The slope allows wash water to drain rapidly. If possible, line the pails with plastic to reduce the risk of accidental spillage. Dispose of the contents by burial, burning, or other sanitary measures.



(g) Chemical toilets. Chemical toilets are usually obtained where environmental laws prohibit the construction of latrines. They are seen quite frequently these days during training exercises. Chemical latrines are self-contained, having a holding tank with chemical additives to aid in waste decomposition and to control odor. These latrines must be cleaned daily, but the contents are emptied based on usage.

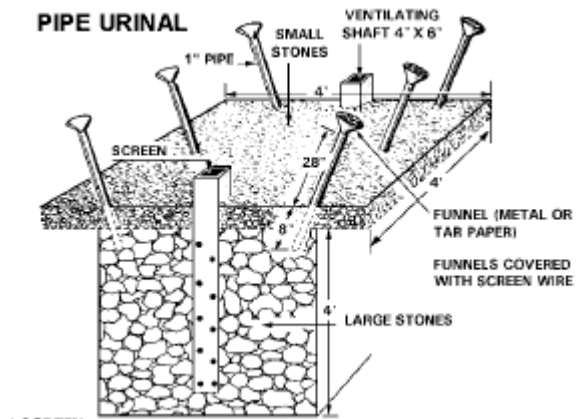
b. Urinals. Proper disposal of urine is just as important as the disposal of any other type of waste. Urine disposal devices are always used in conjunction with a urine soakage pit.

(1) General guidelines for the urine soakage pit. First, inform soldiers that they should not urinate on the surface of the pit; it defeats the sanitary purpose. Second, food service personnel should not use the pit for liquid waste disposal as grease and oils from kitchen waste will clog the pit. Finally, closed or abandoned pits should be sprayed with a residual insecticide and covered with a two-foot mound of compacted dirt. Use a sign to mark the closed pit.

NOTE: If the latrine is located some distance from the sleeping area, a large can or pail may be placed at a convenient spot to be used as a urinal during the night. In the morning, empty the can into the urine disposal facility and wash it with soap and water before re-using it.

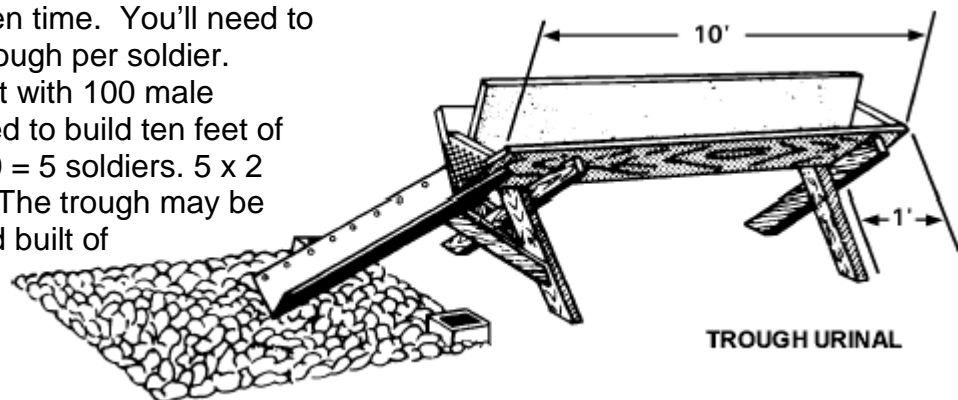
(2) Urine soakage pit construction. The urine soakage pit is a four by four foot hole, dug four feet deep then filled with rocks, flattened cans, broken bottles or other similar non-porous rubble. Ventilation shafts can be inserted in the pit extending from within six inches of the bottom to about seven inches above the surface. Be sure to top the ventilation shafts with screens to prevent flies from entering the pit.

(3) Pipe urinals. Pipe urinals are simply pipes, at least one inch in diameter, placed at an angle at each corner of the soakage pit. If needed, additional pipes can be placed on the sides, halfway between the corners to accommodate up to eight soldiers at a time. You'll need to have enough pipes available to accommodate five percent of the male soldiers in your unit at any given time. (In other words, five pipes are required for a unit with one hundred male soldiers.) The pipes should extend at least eight inches into the pit and about twenty-eight inches above the surface. Place a funnel made of tarpaper or sheet metal at the top of each pipe and cover it with a screen.



(4) Urine troughs. Urine troughs are used when the unit is going to be in one area for a long period of time and when more permanent facilities are desired. As with the other waste disposal facilities, you will need to accommodate five percent of the soldiers at any given time. You'll need to build two feet of trough per soldier.

Therefore, in a unit with 100 male soldiers, you'll need to build ten feet of trough. (5% of 100 = 5 soldiers. 5 x 2 ft/soldier = 10 ft.) The trough may be U or V shaped and built of sheet metal or wood. Wooden troughs should be lined with



heavy tarpaper. The legs on one end of the trough should be slightly shorter. A pipe is then connected to this end to carry the urine to the urine soakage pit.

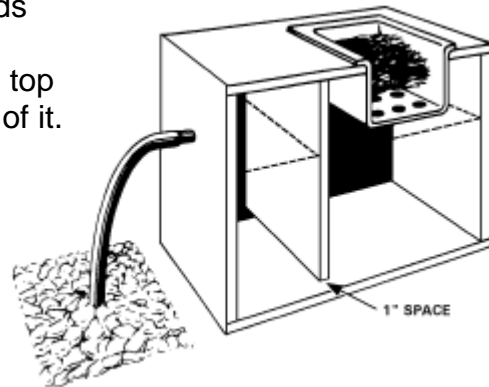
### 6-3. LIQUID WASTE DISPOSAL

In the field, liquid waste refers to wash, bath, and liquid kitchen waste. Liquid waste from food service operations contains particles of food, grease, and soap. This type of liquid waste requires treatment before it can be disposed of. Liquid kitchen waste accumulates at the rate of one to five gallons per soldier per day. There are three basic devices used to dispose of liquid waste in the field. They are the soakage pit, the soakage trench, and the evaporation bed. All three devices have one element in common; the grease trap. All liquids from food service operations must have the food, grease, and soap removed to avoid clogging the disposal device.

a. There are two main types of grease traps commonly used in the field. They are the baffle grease trap and the barrel filter grease trap.

(1) Baffle grease trap. The baffle grease trap is the most effective way to remove grease from kitchen waste. It is constructed from a barrel or a watertight box.

(a) Inside the barrel or box is a wooden baffle that divides it into two chambers. The entrance chamber is given two-thirds the space, while the exit chamber is afforded the remaining one third. The baffle should run from the top of the barrel or box to within one inch of the bottom of it. Above the entrance chamber, insert a strainer into the lid. The strainer can be made from a small-perforated box filled with straw, hay or burlap. On the side of the exit chamber, closest to the pit, insert one end of a pipe about three to six inches below the top of the barrel or box. This is the outlet, which will allow the liquid waste to pass into the pit or trench. Once the grease trap is in place, the other end of the pipe should be inserted into the center of the pit or trench at least one foot deep. When the baffle grease trap is properly positioned and the pipe is inserted into the pit, it is ready for use.

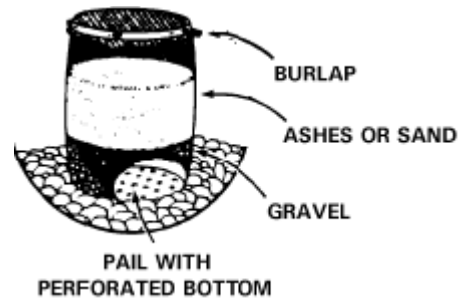


(b) To begin, both chambers must be filled with cool water. Then pour the waste liquid through the strainer. The strainer will catch the solids. When the warm wastewater comes in contact with the cool water in the entrance chamber, the grease will solidify. The coagulated grease sits on top of the water in the entrance chamber while the remaining liquid passes under the baffle and into the exit chamber. Eventually, the displaced liquid reaches the pipe that goes to the soakage pit. However, the congealed grease remains on the water's surface in the entrance chamber until it is removed. To maintain the baffle grease trap, skim off the grease daily, or more often if required. Burn or bury the grease. Empty and scrub the entire trap with hot, soapy water as often as the mission allows.

(2) Barrel filter grease trap. The barrel filter is the other type of grease trap you're likely to encounter. This trap is constructed using a thirty to fifty gallon barrel or drum. Start by removing the top of the drum and boring several holes into the bottom.



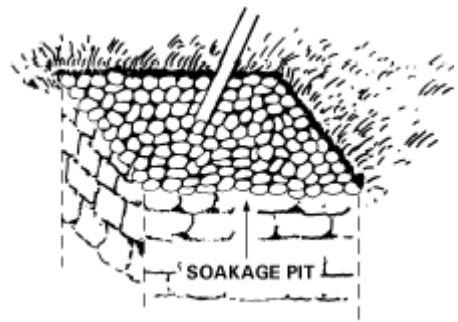
Put eight inches of gravel or small stones in the bottom of the barrel. Then cover these with twelve to eighteen inches of wood ashes or sand. Finally, fasten a piece of burlap over the top of the barrel to serve as a coarse strainer.



(a) The barrel filter grease trap must be positioned in one of two ways for it to be effective. One is to place trap directly over the soakage pit. The other is to place the barrel on a platform with a trough that leads to the pit.

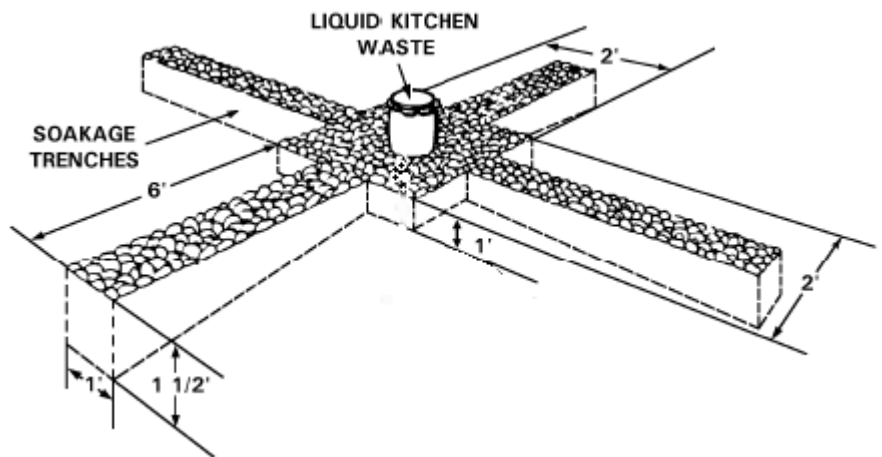
(b) Like all of our field sanitation devices, the barrel filter grease trap requires some maintenance to operate efficiently. Every two days empty and wash the trap. Then refill it with fresh ashes or sand. Wash or replace the burlap strainer daily. Burn or bury the ash or sand to prevent infestations from pest or insects.

b. Soakage pits. A soakage pit should be four square feet and four feet deep. The bottom of the pit should be covered with non-porous rubble, such as rocks, broken bottles or cans. One soakage pit is adequate for smaller units located in an area for a brief period. For units with 200 or more soldiers it is recommended that you have two soakage pits. Having two would allow them to alternate days and give each pit a chance to rest. In camps of long duration, each pit should be given a rest period of one week every month. The rest period prevents the pit from clogging. To close a soakage pit you should first mound it over with one foot of compacted soil. The compacted soil will keep insects and vermin from entering and exiting the pit. Then post a sign on the mound that states the type of pit and the date it was closed.



c. Soakage trenches. Should your unit sit up in an area where digging may be difficult due to rocky terrain, or the water table is high you may decide to use the soakage trench to dispose of liquid waste.

(1) To construct a soakage trench dig a pit two feet square and one foot deep. One-foot wide trenches are then dug, radiating outward from the pit in each direction. These trenches vary in depth from one foot at the pit to one and a half feet at the outer edges.



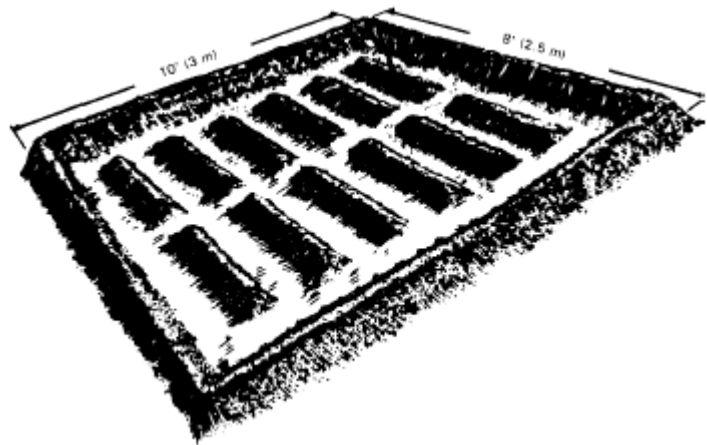
Line the bottom with the same non-porous material as the soakage pit.

(2) Remember that you will need two soakage trenches for every two hundred persons and each one would require a grease trap. When using two trenches alternate their use to provide each a period of rest. To close the trenches use the same method used for the soakage pit.

d. Evaporation beds. In hot, dry climates where the soil is heavy clay, evaporation beds are used. This is due, in part, to the fact that the heavy clay prevents the use of soakage pits and trenches since it is basically non-absorbent. Evaporation beds are built in eight foot by ten-foot rectangles. You should allow three square feet per soldier per day for kitchen waste, and two square feet per soldier per day for wash and bath waste. While evaporation beds are seldom used, it is important that you are familiar with their construction in case the necessity arises that one needs to be built.

(1) To begin, scrape the topsoil from the area and mound it around to form the outside edges of the bed. Then, with a spade, turn the dirt over within the bed to a depth of between 10 and fifteen inches. With a rake, mound the loosened dirt into a series of horizontal or vertical ridges that are approximately six inches high. These ridges will help to distribute the water evenly within the bed.

(2) Evaporation beds actually operate on a process of evaporation, percolation and oxidation. To operate the bed, simply flood the bed with liquid waste until the wastewater is close to the top of the ridges within the bed. In other words, flood the bed to a depth of approximately six inches. The liquid should be allowed too sufficiently dry to permit re-spading and reforming on the mounds. While this is happening, other beds are flooded on successive days and the same sequence of events is followed. It is important to give special attention to the proper rotation, maintenance, and usage of these beds. If these beds are used properly, they create no insect hazard and only a slight odor.



#### **6-4. GARBAGE AND RUBBISH DISPOSAL**

The third type of waste disposal you'll need to concern yourself with is the disposal of garbage and rubbish.

a. Garbage refers to the food waste that occurs during food preparation, cooking and serving. Garbage is classified as either dry or wet. Rubbish is the non-food waste that usually comes from kitchens.

b. Rubbish is classified as either combustible or non-combustible.

c. Garbage and rubbish are disposed of in one of two ways: burial or incineration. The tactical situation will dictate which method is most appropriate. For example, in some situations, it may be necessary to conceal excavated soil. In other situations, smoke and flame may be intolerable.

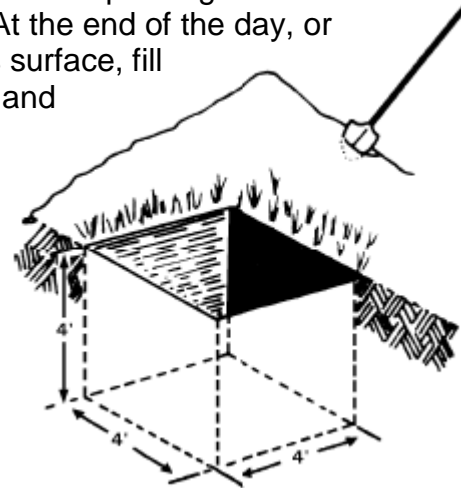
(1) Burial method. There are two techniques used to bury garbage and rubbish. Again, knowing the tactical situation will assist you in selecting the most appropriate technique. The length of the mission is usually the primary factor in deciding whether to use a pit or a trench.

**NOTE:** When using either method, be sure to compact the rubbish before disposing of it. Doing so will help to prevent infestation by insects and rodents.

(a) Burial pits. Burial pits are preferred for overnight halts. A pit is four feet by four feet and four feet deep. A pit of this size is suitable for one day for one hundred soldiers.

1 Operational considerations. After depositing rubbish and garbage in the pit, cover it to keep pests away. At the end of the day, or when the pit is filled to within one foot of the ground's surface, fill it in with earth. Once it is filled in, mound it over with and additional one foot of compacted earth. Then mark the pit.

**NOTE:** Compacting the earth is very important. Doing so prevents flies and rodents from entering or exiting the pit.



2 Placement of the pit.

Proximity to the food service area and the water supply are important. Locate the pit a minimum of thirty feet and a maximum of thirty yards from the food service area. The pit should also be located at least one hundred yards downstream from any source of water that is in use, for either cooking or drinking.

(b) Continuous trenches. For stays of two days or more a continuous trench two feet wide and four feet deep should be used. The overall length of the trench will vary depending upon the length of time the trench will be in use.

1 Operational considerations. To operate the trench, remove dirt to extend the length of the trench. Use the dirt you remove to cover the garbage that has been added during the day.

2 Placement of the trench. The same considerations for pit placement should be made when locating the continuous trench. Locate the trench a minimum of thirty feet and a maximum of thirty yards from the food service area. The trench should also be located at least one hundred yards downstream from any source of water that is in use, for either cooking or drinking.

(2) Incineration method. There are several types of incinerators. Your tactical situation must be taken into account in order to choose the incinerator that is best fitted to the needs of your unit. The incinerator should be located at least 50 yards downwind from camp. The further, the better. This prevents it from being an odor problem.

**NOTE:** Although a significant amount of time is spent discussing incineration and the various types of incinerators, students should be aware that burial is almost always the best method for disposing of garbage and rubbish. Therefore, burial should be used whenever possible.

(a) Remove non-combustible rubbish. Since incinerators will not handle either non-combustible rubbish or wet garbage, these items must be removed from the mix. First, remove all non-combustibles, such as cans.

(b) Remove wet garbage. Remember that wet garbage is actually semi-solid. Therefore, it is necessary to separate the liquid from the solid portion. To do this, strain the garbage with a course strainer.

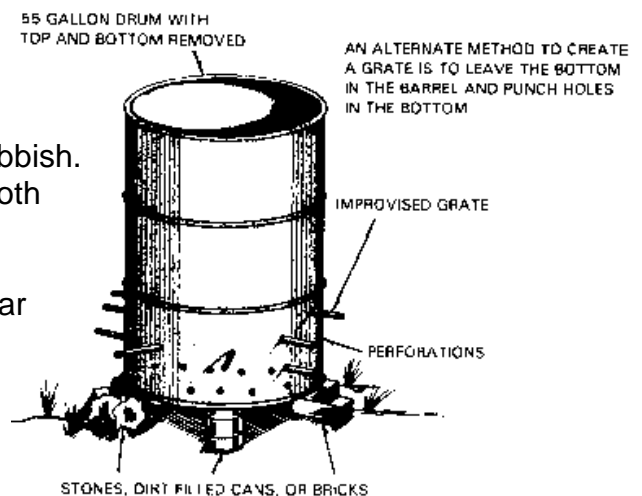
1 Pour the liquids through a grease trap and into the soakage pit.

2 Incinerate the solids remaining in the strainer.

(c) Barrel incinerator. This incinerator is used to dispose of combustible rubbish. It is made from an empty 55-gallon drum with both ends removed.

1 Punch several holes near the bottom of the barrel and insert grates inside the barrel, several inches above the holes.

2 Support the barrel above the ground using stones, bricks, or dirt-filled cans. Be sure to leave enough space underneath it to allow a fire to be built.



3 Put the combustible rubbish on the top grate and ignite it.

(d) Cross trench and stack incinerator. This type of incinerator will effectively take care of the waste produced by a company-sized unit. This is an excellent dry trash device. Wet materials tend to disrupt airflow and keep the garbage from burning properly.

1 Construct two trenches that cross at right angles. Each trench should be ten feet long. The depth of each trench should slope from the surface of the ground to eighteen inches at the intersection.

2 Build a grate from scrap iron and lay it over the intersection of the trenches.

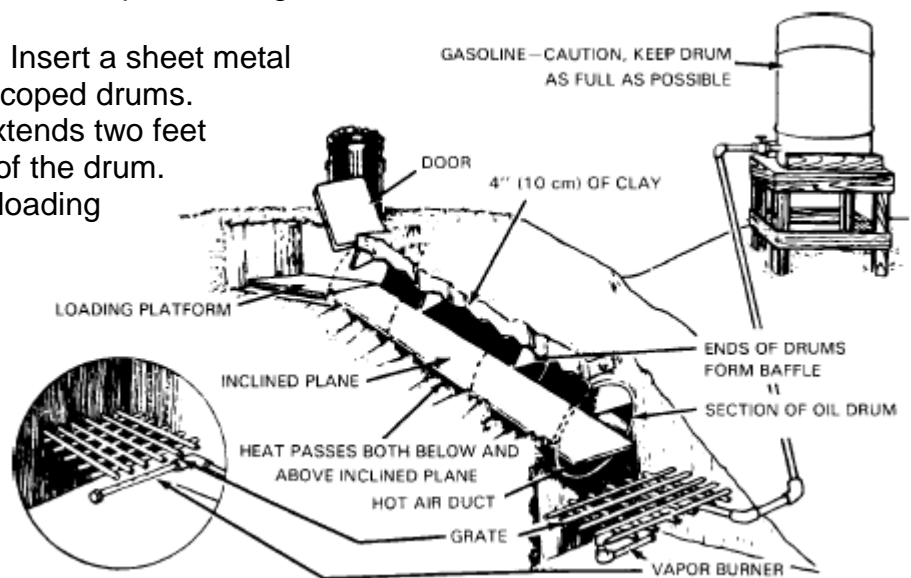
3 Create a stack from an old drum with both ends removed OR with one end removed and holes drilled liberally in the other end to emit air.

4 Build a fire on top of the grate. Place the stack on top of the fire. Add waste to the stack, one shovel-full at a time.

(e) Inclined plane incinerator. This device is capable of disposing of the garbage for an entire battalion, combat support hospital, or other unit of similar size. Its effectiveness in combustion, as well as the fact that wind or rain does not hamper its operation, makes it an excellent device. However, skill and time are required to construct it.

1 Telescope two 55-gallon drums with both ends removed.

2 Insert a sheet metal plane through the telescoped drums. Make sure the plane extends two feet beyond the upper end of the drum. This will serve as your loading platform.



3 Position the drums, with the plane in place, on an inclined surface.

4 Put a grate at the lower end of the drums. The fire should be started under the grate. Either a wood or fuel oil fire is okay.

5 When the incinerator is hot, place the garbage on the loading platform. As the garbage becomes dry, push it through the drums in small amounts. Final burning takes place on the grate.

#### **6-5. HAZARDOUS WASTE**

Hazardous waste should normally be disposed of through the unit S4 section. Commanders should check with the supporting PVNTMED personnel for information concerning the turn-in of hazardous materials and hazardous waste materials.