

## Technical Brief No.54: Emptying latrine pits

### What to do with a full latrine pit

**WARNING!** When a single pit is full to within half a metre of the top, either:

● stop using the latrine

or

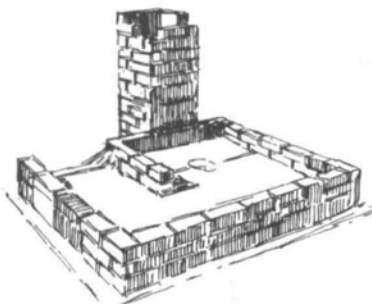
● empty the full pit



- Back-fill the top of the pit with soil.



- Dig another pit and build a new latrine.



#### by hand

- Dig out the contents using a spade and a bucket.
- Remember that if the latrine was used very recently, the excreta will be fresh and dangerous because it contains lots of pathogens (germs).
- By digging, you can become infected with worms and diarrhoea.
- Flies attracted to excavated material often carry infection to people nearby.



#### or by machine

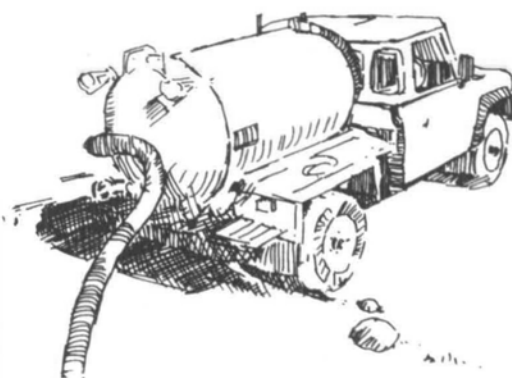
- Use a big tanker with a powerful vacuum pump...

##### Advantages

- Your pit will be empty after only one or two tanker visits
- The vacuum is strong enough to lift sludge from a depth of 2 to 3 metres

##### Disadvantages

- Large vehicles cannot negotiate narrow, twisting roads and alleys.
- Vehicles with powerful pumps are very expensive, and it is often very difficult to get spares.



- ... or use a tanker with a less powerful pump which may be mounted on a Land Rover or similar vehicle ...
- ...or fill 200-litre drums with hand-operated pumps. Small teams of individuals may provide a private service to householders.

If a pit is to be emptied, it is usually 'lined' with walls of stones, bricks or concrete. If the pit is not lined, there is a danger of collapse when solids are removed.

If the sludge is too firm, jet on water and agitate the mixture of sludge and water with the end of the suction hose.

*In Zimbabwe, for example, many unlined pits have collapsed when emptied.*

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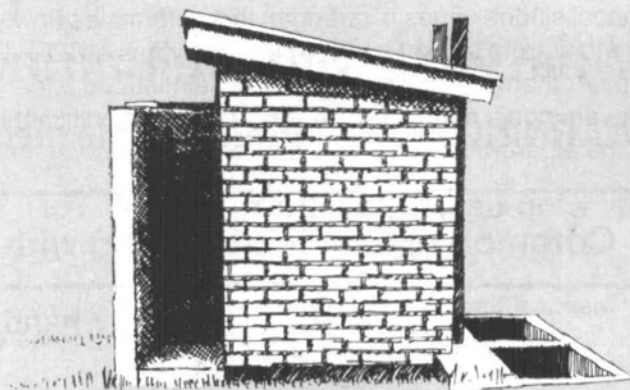
## Full twin-pit latrines

Make your single pit as big as possible,

- then it can be used for many years before filling up;
- you will have fewer problems with flies and smells; and
- the further down the excreta, the smaller the risk of disease.

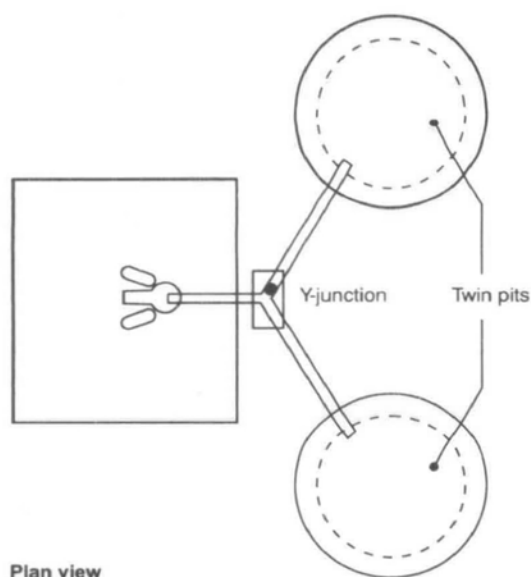
*Many latrine pits in East Africa are more than 10m deep. Sometimes, pits 15 or 20m deep are dug in firm soil.*

But twin-pit latrines can be fairly shallow — typically 1.5 m deep. Each pit will take only two to three years to fill up, so use one pit until almost full — then use the other pit for the next two to three years.



### Design and operation features of twin-pit latrines

1. Use completely separate twin-pit latrines alternately with pour-flush latrines.
2. Pour-flush latrines are built where people use water for anal cleaning. They take one or two litres of water to the latrine; a little is used for anal cleaning and the remainder is poured into the pan to flush faeces into the pit.
3. Excreta is flushed from the pan to a Y-junction and then to one of the twin pits.

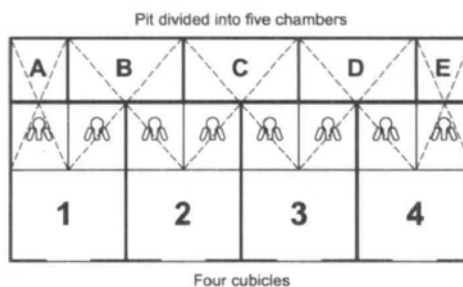


4. When the second pit is full, the first pit is emptied. Because the content of the first pit has been maturing while the second pit fills, the excreta has become innocuous — it has lost any unpleasant smell and all pathogens have become inactive. As the pit is small and the sludge is no longer unpleasant or a health risk, the contents can be dug out by the family and neighbours.

5. When solid material such as leaves, grass or paper is used for anal cleaning, double or divided pits are suitable.
6. Walls extending for the full depth divide the pit into two or more sections. Each section is a separate chamber and is used for two or three years in the same way as one of the twin-pits.



7. For public or communal latrines, for example in schools, a long pit can be divided into several chambers. These chambers are used alternately for two or three years. Each chamber (except those at both ends) receives excreta from two cubicles.



# What to do with sludge from latrine pits and septic-tanks

Faecal sludge varies in strength; this determines how you should treat it. High-strength sludge from unsewered public toilets or from bucket latrines commonly has a COD (Chemical Oxygen Demand) exceeding 20 000 mg/l, total solids greater than 3.5 mg/l, up to 60 000 helminth eggs per litre, and  $\text{NH}_4\text{-N}$  ammonia concentration exceeding 2000 mg/l. The ammonia concentration is particularly significant because liquid with a high ammonia content is likely to be toxic to the algae which are necessary for the operation of waste-stabilization ponds.

## Common methods of dealing with sludge include:

### Disposal into water

Sludge is regularly and indiscriminately dumped into rivers, ponds, lakes and the sea. ***This is bad for the environment and a real health risk.***

### Disposal onto land

***Indiscriminate dumping onto land is as common and as undesirable as disposal into water.*** Untreated sludge can be used as a fertilizer *provided great care is taken to avoid contamination of crops.*

### Composting

Mix sludge with two or three times its volume of vegetable waste. To keep it aerobic, turn it several times in the first few weeks. Then pile it into windrows (long heaps, often about 2m wide at the top, 2m high, with sides sloping at about 45°) for several weeks. You can then use it as a land-conditioner and fertilizer.

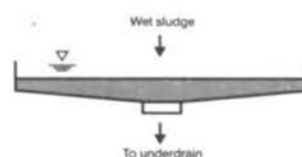


### Household biogas units

Add latrine or septic-tank sludge to biogas units, whose main input is animal waste (e.g. cows in India or pigs in China).

### Drying beds

Sludge flows onto a shallow tank to a depth of about 300mm. The base of the tank slopes to allow drainage and is covered with a layer of sand which forms a 'bed'. The time it takes for the solids content to increase until the sludge can be lifted by hand or mechanical shovel depends on temperature, humidity, and rainfall. In favourable conditions, this should be about a week.



## If you have a wastewater treatment system you can also use:

### Solids-liquid separation

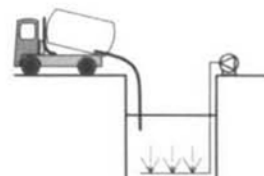
A preliminary treatment. Dewater, dry or treat the separated solids by anaerobic digestion (as described below). Treat the liquid in waste-stabilization ponds, or mix it with municipal wastewater for conventional treatment.

### Anaerobic digestion

Add sludge from pit latrines, aqua-prives and septic tanks to wastewater sludge separated by sedimentation at wastewater-treatment plants.

### Extended aeration of septic-tank sludge (septage)

This method is good as less land is required for separation and dewatering. The capital and operating costs of aeration are high, but the smaller area involved should enable you to use local treatment units, and save money on haulage.



### To sewerage systems

Sludge is often illegally dropped down manholes, increasing the likelihood of downstream blockage. Discharge stations can be specially constructed to receive and retain sludge from tankers, then discharge it to the sewer when the flow is appropriate.

### Waste-stabilization pond systems

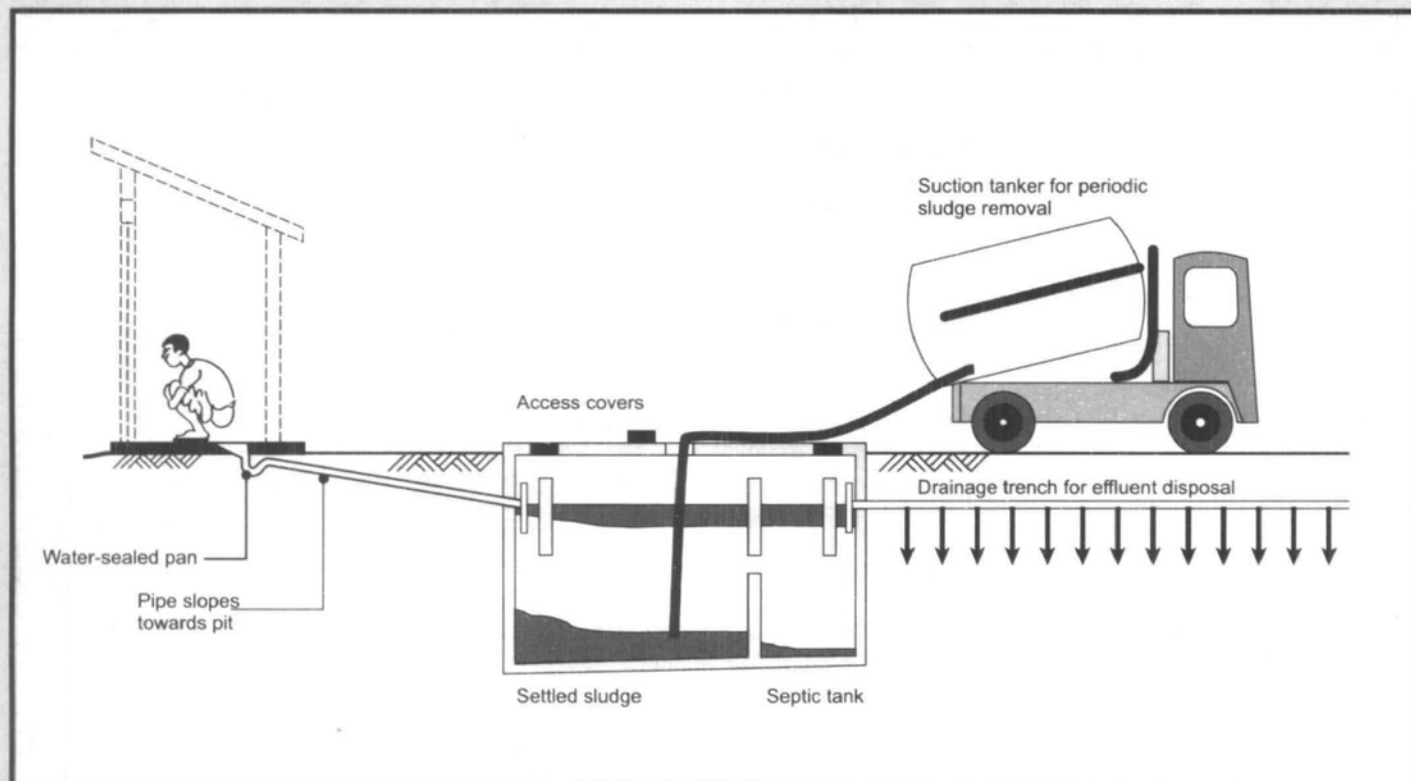
Faecal sludge may be treated in facultative waste-stabilization ponds together with municipal wastewater, or separately. The facultative ponds may be preceded by settling, thickening, and anaerobic ponds, and may be followed by maturation ponds.



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## Sludge from septic-tanks

As sewage passes through a septic tank, heavy solids fall to the bottom, where a layer of sludge builds up. Light solids, like grease, rise to the surface and form a layer of scum.



Sludge accumulates at the bottom of the tank. While lying there, it slowly decomposes by anaerobic digestion.

In tropical climates, decomposition may be rapid, and the net increase of sludge (accumulation less decomposition) slower.

After a certain time, the sludge must be removed — the tank is 'desludged'.

In temperate, industrialized countries, desludging is often carried out at regular intervals, for example, every six months.

In hot climates, you can leave the sludge for several years. A simple rule is to desludge the tank when the sludge occupies two-thirds of the tank volume.

Vacuum tankers are commonly employed for desludging septic tanks.

In general, septic-tank sludge is much less dense than solids removed from pit latrines. Consequently, a medium-powered vacuum pump is strong enough to lift septic-tank sludge.

### Further reading

Franceys, R., Pickford, J. and Reed, R., *A Guide to the Development of On-site Sanitation*, WHO, Geneva, 1992.  
Pickford, John., *Low-cost Sanitation: A survey of practical experience*, IT Publications, London, 1995.



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