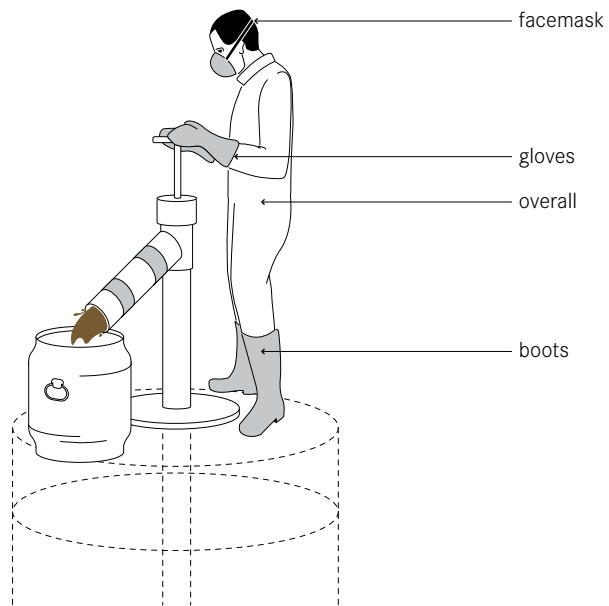
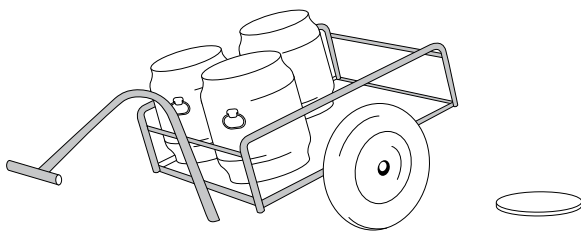


Application Level:	Management Level:	Inputs/Outputs:
★★ Household ★★ Neighbourhood □ City	★★ Household ★★ Shared ★★ Public	■ Sludge   ■ Dried Faeces ■ Compost   ■ Pit Humus



**Human-powered emptying and transport refers to the different ways by which people can manually empty and/or transport sludge and solid products generated in onsite sanitation facilities.**

Human-powered emptying of pits, vaults and tanks can be done in one of two ways:

- 1) using buckets and shovels, or
- 2) using a portable, manually operated pump specially designed for sludge (e.g., the Gulper, the Rammer, the MDHP or the MAPET).

Some sanitation technologies can only be emptied manually, for example, the Fossa Alterna (S.5) or Dehydration Vaults (S.7). These technologies must be emptied with a shovel because the material is solid and cannot be removed with a vacuum or a pump.

When sludge is viscous or watery it should be emptied with a hand pump or a vacuum truck, and not with buckets because of the high risk of collapsing pits, toxic fumes, and exposure to unsanitized sludge.

Manual sludge pumps are relatively new inventions and have shown promise as being low-cost, effective solutions for sludge emptying where, because of access, safety or economics, other emptying techniques are not possible.

**Design Considerations** Sludge hand pumps, such as the Gulper, work on the same concept as water hand pumps: the bottom of the pipe is lowered into the pit/tank while the operator remains at the surface. As the operator pushes and pulls the handle, the sludge is pumped up and is then discharged through the discharge spout. The sludge can be collected in barrels, bags or carts, and removed from the site with little danger to the operator. Hand pumps can be locally made with steel rods and valves in a PVC casing.

A MAPET (MAnual Pit Emptying Technology) consists of a manually operated pump connected to a vacuum tank mounted on a pushcart. A hose is connected to the tank and is used to suck sludge from the pit. When the wheel of the hand pump is turned, air is sucked out of the vacuum tank and sludge is sucked up into the tank. Depending on the consistency of the sludge, the MAPET can pump up to a height of 3 m.

**Appropriateness** Hand pumps can be used for liquid and, to a certain degree, viscous sludge. Domestic refuse in the pit makes emptying much more difficult. The pumping of sludge, which contains coarse solid wastes or grease, can lead to clogging of the device, and

chemical additives can corrode pipes, pumps and tanks. The hand pump is a significant improvement over the bucket method and could prove to be a sustainable business opportunity in some regions. Manually operated sludge pumps are appropriate for areas that are not served or not accessible by vacuum trucks, or where vacuum truck emptying is too costly. They are well suited to dense, urban and informal settlements, although the type and size of transport vehicle determines the feasible distance to the discharge point. Large vehicles may not be able to manoeuvre within narrow streets and alleys, while smaller vehicles may not be able to travel long distances. These technologies are more feasible when there is a Transfer Station (C.7) nearby.

**Health Aspects/Acceptance** Depending on cultural factors and political support, workers dealing with manual emptying may be viewed as providing an important service to the community. Government-run programmes should strive to legitimize the work of the labourers and create an enabling environment by providing permits and licences, as well as helping to legalize the practice of emptying latrines manually. The most important aspect of manual emptying is ensuring that workers are adequately protected with gloves, boots, overalls and facemasks. Regular medical exams and vaccinations should be required for everyone working with sludge.

**Operation & Maintenance** It is a common practice to add chemicals or oil during the pit emptying process to avoid odours. This is not recommended, however, because it causes difficulties in the subsequent treatment units, as well as additional health threats to the workers. If manual access to the contents of a pit requires demolishing the slab, it may be more cost-effective to use a manual sludge pump to empty the latrine. However, hand pumps cannot empty the entire pit and, therefore, emptying may be required more frequently (once a year). Manually operated sludge pumps require daily maintenance (cleaning, repairing and disinfection). Workers who manually empty latrines should clean and maintain their protective clothing and tools to prevent contact with the sludge.

### Pros & Cons

- + Potential for local job creation and income generation
- + Simple hand pumps can be built and repaired with locally available materials
- + Low capital costs; variable operating costs depending on transport distance
- + Provides services to areas/communities without sewers
- Spills can happen which could pose potential health risks and generate offensive smells
- Time consuming: emptying pits out can take several hours/days depending on their size
- Garbage in pits may block pipe
- Some devices may require specialized repair (welding)

### References & Further Reading

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