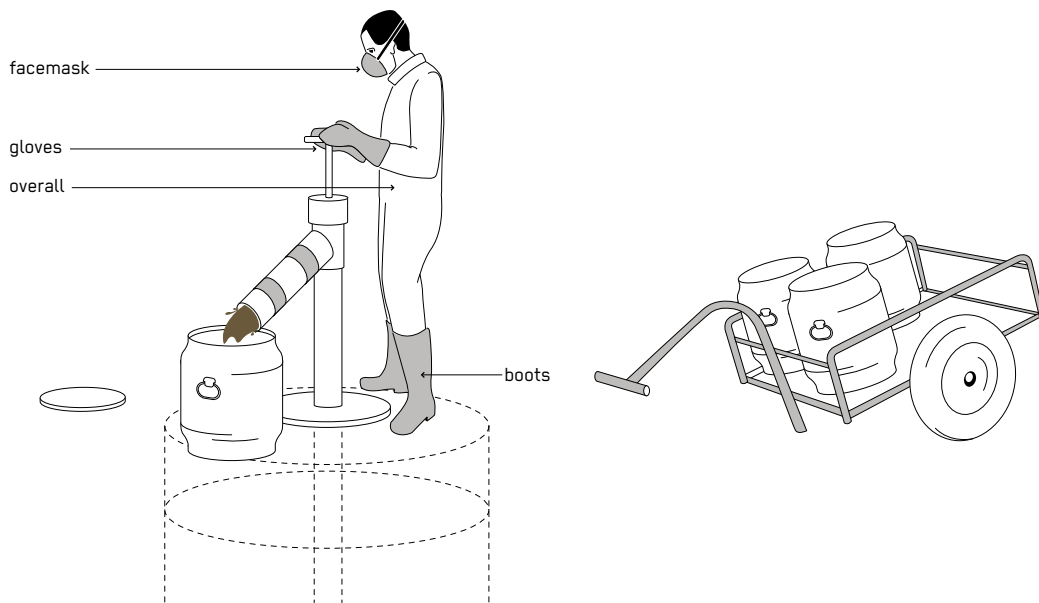


Manual Emptying and Transport

Phase of Emergency	Application Level / Scale	Management Level	Objectives / Key Features
<ul style="list-style-type: none"> ★★ Acute Response ★★ Stabilisation ★★ Recovery 	<ul style="list-style-type: none"> ★★ Household ★★ Neighbourhood City 	<ul style="list-style-type: none"> ★ Household ★★ Shared ★★ Public 	Emptying and transport where access is an issue
Space Required	Technical Complexity	Inputs / Outputs	
<ul style="list-style-type: none"> ★ Little 	<ul style="list-style-type: none"> ★ Low 	<ul style="list-style-type: none"> ● Sludge, ● Blackwater, ● Effluent, ● Urine, ● Stored Urine 	



Manual Emptying and Transport refers to the different ways in which sludge and solid products generated at on-site collection and storage/treatment facilities can be manually removed and transported to treatment or disposal sites.

In some situations, collection and storage/treatment facilities can only be emptied manually. The manual emptying of latrine pits, vaults and tanks can be done in one of two ways: (1) using buckets and shovels, or (2) using a portable, manually operated hand pump specially designed for sludge (e.g. Gulper, Rammer, Manual Desludging Hand Pump or Manual Pit Emptying Technology (MAPET)). If the material is solid and cannot be removed through pumping, emptying must be carried out using a shovel and bucket. If the sludge is viscous or watery it should be emptied with a hand pump or a vacuum truck, and not buckets, due to the high risk of collapsing pits, toxic fumes, and exposure to unsanitised sludge.

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. Alternatively, a MAPET consists of a manually operated pump connected to a vacuum tank mounted on a push-cart for transportation. 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 depth of 3m.

Materials: In principle, hand pumps and hand carts can often be constructed using locally available material such as steel and PVC pipes. Prefabrication is also possible. For some pumps, additional piping is needed. Other tools such as buckets and shovels should be available locally.

Applicability: Manual Emptying and Transport is viable in all phases of emergencies and appropriate for areas that are either not accessible by motorised vacuum trucks, or where vacuum truck emptying is too costly. The method is suitable for dense, urban and informal settlements, although the type and size of transport vehicle determines the feasible distance to the discharge point. In some cases, sludge may be too thick to pump and it may have to be fluidised with water so that it flows more easily. However, this increases the volume to be transported and may be inefficient and costly. Solid waste and sand that enters the pit or vault will make emptying more difficult and may clog pipes or pumps. The hand pump is a significant improvement over emptying with a bucket and shovel (e.g. time efficiency and reduced risk of exposure) and could prove to be a sustainable business opportunity in some regions. The technology is more feasible where a Transfer Station (C.6) is nearby. One difficulty is that pumps are often not readily available on the market, so local technicians must be trained in their manufacture before any units are available.

Operation and Maintenance: Chemicals or oil are commonly added during pit emptying to reduce odours. This is not recommended. It can cause difficulties in the subsequent treatment, additional health threats to the workers, environmental pollution and corrosion to the pumps and holding tanks. Hand pumps are unlikely to suffice to empty an entire pit and therefore, emptying may be required more frequently depending on the collection and storage technology used. Hand pumps and hand carts require daily maintenance (cleaning, repairing and disinfection). The pumps can be built and repaired with locally available material. If well maintained and constructed, they are usable for many years.

Health and Safety: The most important aspect of manual emptying is ensuring that workers are equipped with personal protective equipment like gloves, boots, overalls and facemasks. Regular medical exams and vaccinations should be required for everyone working with sludge.

Costs: The capital costs for Manual Emptying and Transport are low. Operational costs are variable and depend on the fee for the workers. Additional costs need to be considered for daily cleaning and maintenance of equipment.

Social Considerations: Manual Emptying might not be a socially acceptable form of employment within the community. Additionally, spillage and odour may further hinder acceptance. This can be overcome if the service is properly formalised, with adequate training and equipment. If putting solid waste in the pits is a common practice it should be addressed as part of hygiene promotion or other awareness raising activities (X.12).

Strengths and Weaknesses:

- ⊕ Provides services to communities without sewers and where access is difficult
- ⊕ Low capital costs; variable operating costs depending on transport distance
- ⊕ Simple hand pumps can be built and repaired with locally available materials
- ⊕ Potential for local job creation and income generation
- ⊖ Manual Emptying exposes workers to serious health risks
- ⊖ Emptying pits can take several hours or days depending on pit size
- ⊖ Solid waste in pits may block pipes and damage pumps
- ⊖ Some devices may require specialised repair (welding)

→ **References and further reading material for this technology can be found on page 192**