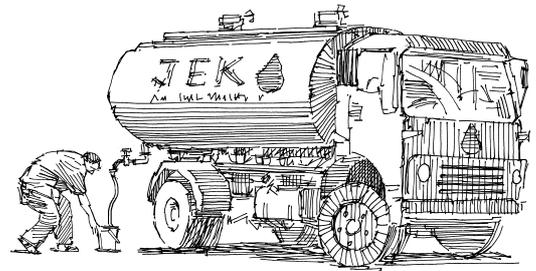


# Delivering safe water by tanker



**World Health Organization**



## When to use tankers

Moving water by tankers should be avoided if possible. It is expensive and difficult to organize. It should be seen as a temporary measure to allow for the development of a more sustainable solution. Tankering, however, is a common method for delivering water immediately after an emergency has happened while more long term measures are being put in place; where the emergency is thought to be temporary and the situation will return to normal soon; and where security and political problems make it difficult to change to a more sustainable approach. In the last case, tankering may continue for long periods – sometimes for years.

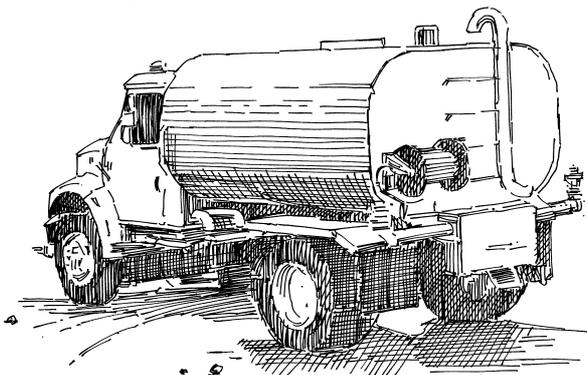
Tankering is a major logistical operation. It requires a fleet of vehicles that require frequent maintenance and proper management. Tankers full of water are heavy vehicles and the operation may require regular attention to the access routes if they are to remain open.

The key to a successful tankering operation is good management, and proper financing.

## Types of tanker

Water can be carried in a variety of different containers, some specifically designed for the task and others fabricated to meet an urgent need. Figure 1 shows a selection of different vehicles for carrying water.

If possible, try to use specially designed water tankers. They will be safer and more reliable. Temporary tankers



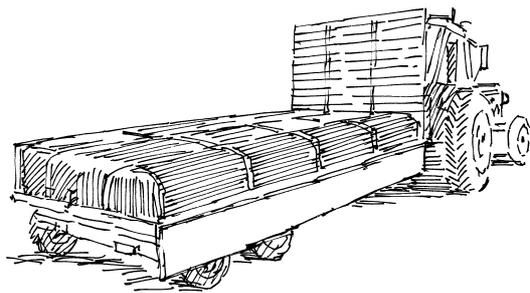
made from flat bed trucks with portable storage tanks attached can be very dangerous if the tank is not securely fastened. The delivery of bottled water may be a short term option but it is expensive and inefficient. It also produces a major solid waste problem from all the discarded empty water bottles.

## Tanker management

Consider the following points when organizing a tankering programme:

- Good management is the key to successful tankering. Identify reliable and capable supervisors. Closely monitor tanker performance, fuel consumption and spare parts use.
- Get clearance from local authorities and owners before using a water source. Check the water's quality and reliability before committing to its use.
- Tankers may have been used for carrying other liquids before the emergency. Always insist on all tankers being properly cleaned and disinfected before being used to carry water (see Note 3).
- Establish detailed contracts with private tankering contractors. Payment should be based on the quantity and quality of water delivered not the working time. Establish a monitoring system at the delivery point to check the quantities delivered.
- Make sure the routes to be taken by the tankers are capable of carrying the wheel loads. You may have to reinforce bridges and resurface sections of road.
- Choose the right tanker for the job. Some sites may be inaccessible and unsuitable for large tankers. Others may require water to be transported over long distances that would be unsuitable for small tractor drawn bowsers.
- Arrange an adequate supply of fuel. If the area has been hit by an emergency, supplies of fuel may be disrupted and there will be a high demand from other emergency services. It may be necessary to set up a temporary fuel storage depot to ensure a reliable supply.

# Delivering safe water by tanker



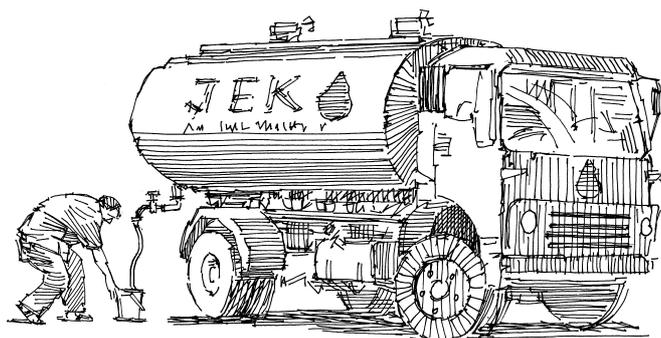
**A temporary tanker**

(Temporary tankers made from flat bed trucks with portable storage tanks attached can be very dangerous if the tank is not securely fastened.)

- A well managed tankering programme is heavily dependent on staff relations. Drivers are particularly important. Make sure they are properly paid, have adequate rest periods and have the proper equipment. Make clear the divisions of responsibility for the different tasks such as loading, chlorination and pump operation. Don't forget to consider the security of the vehicle and its driver and make appropriate arrangements.
- If the driver is to look after other machinery (such as water pumps), make sure they are properly trained in their use and day to day maintenance.
- Tankers are machines and need regular maintenance. Build a regular maintenance schedule into the programme to keep the delivery reliable and ensure a good supply of spare parts and mechanics to fit them.

## Water distribution and collection

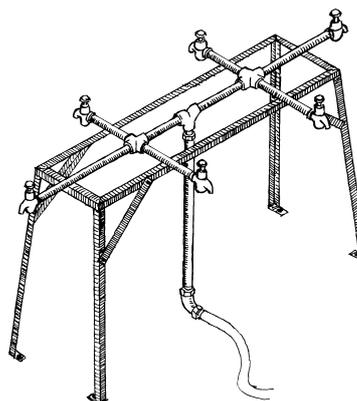
The simplest method of distributing water from tankers is to allow the public to collect it directly from the vehicle. This method is slow and reduces the number of trips the vehicle can do each day. Efficiency can be improved slightly by fitting a tap bar on the back of the tanker but the best method is to transfer the water from the tanker to a storage tank.



The provision of storage tanks increases the efficiency of the tankering system and extends the time over which users can collect water. It also improves the quality of the water as it provides additional storage time before use.

There are many different designs for storage tank, some specifically developed for emergency situations and others adapting existing equipment and ideas. Always raise tanks off the ground so that users can get their containers under the outlet tap. Tankering efficiency can be further increased by fitting the tanker with a water pump so that the water can be pumped into the storage tanks rather than allowing it to flow by gravity.

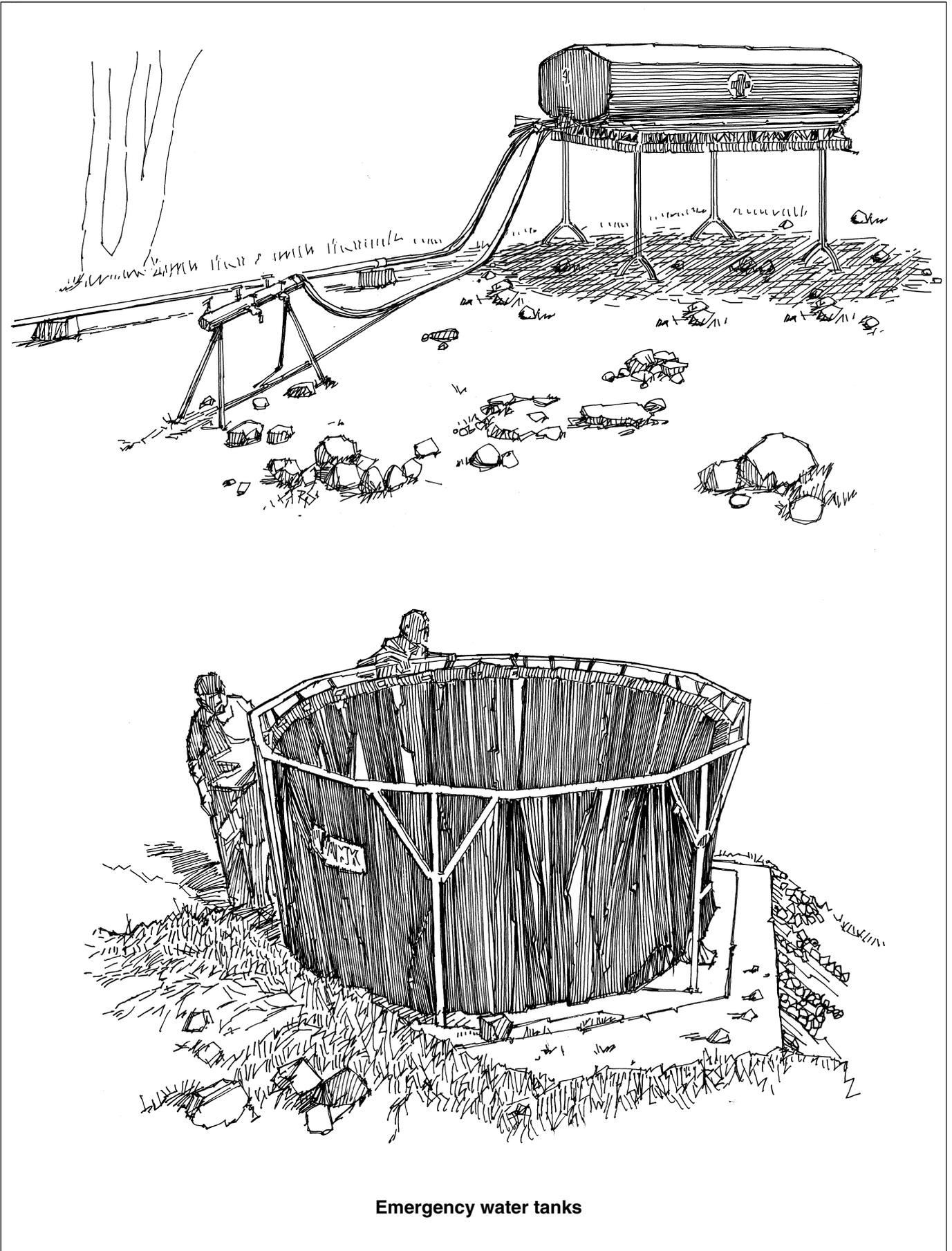
Access is improved if the storage tank is connected to a tap stand. This moves the users away from the storage tank that reduces the problems associated with wasted water and vandalism and allows more people to collect water at the same time.



Providing water in an emergency is only successful if the users also have suitable containers to collect and store it. Domestic containers come in a wide variety of designs. One of the most popular is the jerry can. Provided it is fitted with a lid, the jerry can is easily carried in the hand or on the head. The problem with jerry cans is that they are difficult to fill, causing a high proportion of water to be wasted, and they are almost impossible to clean on the inside. If used for extended periods they can become a serious health hazard.



The other common design of container is the bucket. These are cheap to buy, easy to fill but hard to carry when full. Water is easily spilt during carriage and the large open water surface can easily lead to contamination. These problems can be reduced by fitting the bucket with a tight fitting lid that can be removed for filling and cleaning.



Emergency water tanks

# Delivering safe water by tanker

## Calculating tankering requirements

A community affected by an earthquake requires 200,000 litres of water a day to be tankered in. The water is to be collected from a borehole 10km from the community. Estimate the number of tankers that will be required to deliver the quantity of water required.

The following activities are assessed to take these times:

Filling the tanker	20 min
Travel time from borehole to community	30 min
Offloading time for tanker	10 min
Return travel time	30 min
Net turnaround time	90 min
Add 30% for unforeseen activities	30 min
<b>Gross turnaround time</b>	<b>120 min</b>

Assume each tanker can work 14 hours per day using two drivers then the number of trips each tanker can make a day is:

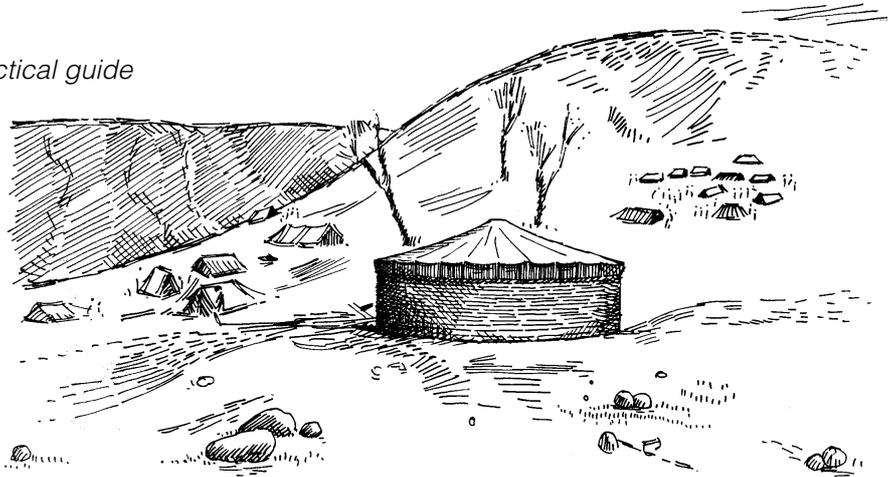
$$14 \times 60 / 120 = 7$$

If each tanker can carry 5,000 litres per trip then one tanker can transport  $5,000 \times 7$   
= 35,000 litres per day

Therefore the number of tankers required to deliver sufficient water is  $200,000 / 35,000$   
= 5.7 say 6 tankers

## Further information

Davis, J. and Lambert, R. (2002)  
*Engineering in Emergencies – A practical guide for relief workers*, 2<sup>nd</sup> edition,  
ITDG Publishing, UK.



## World Health Organization

WHO Headquarters  
Avenue Appia 20  
1211 Geneva 27  
Switzerland

Telephone: (+ 41 22) 791 21 11  
Facsimile: (+ 41 22) 791 31 11  
Telex: 415 416  
Telegraph: UNISANTE GENEVA



This information has been prepared by WEDC

**Author and Series Editor:** Bob Reed **Design:** Glenda McMahon **Illustrations:** Rod Shaw **Graphics:** Ken Chatterton  
Water, Engineering and Development Centre, Loughborough University, Leicestershire, UK.  
Phone: +44 1509 222885 Fax: +44 1509 211079 E-mail: WEDC@lboro.ac.uk Website: www.lboro.ac.uk/wedc