WEDC

MOBILE NOTE 42

Delivering safe water by tanker

TECHNICAL NOTES ON DRINKING-WATER, SANITATION & HYGIENE IN EMERGENCIES

Originally designed for print, this is one of the series of highly illustrated notes prepared by WEDC for WHO to assist those working immediately or shortly after an emergency to plan appropriate responses to the urgent and medium-term water, sanitation and hygiene needs of affected populations.

TN 12

World Health Organization

Loughborough University

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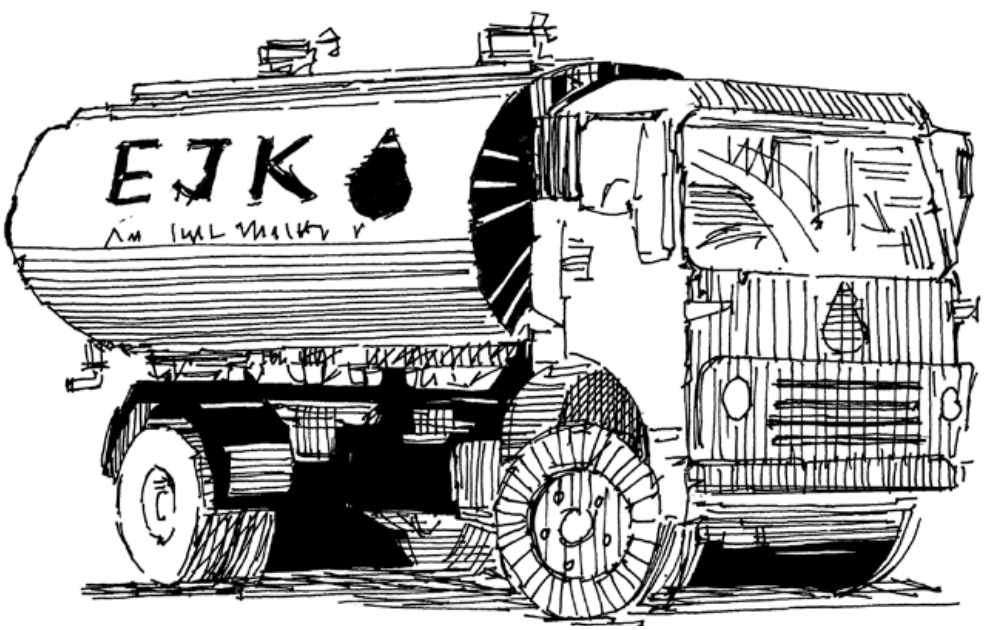

Introduction

Water tankering (also known as water trucking) can be a rapid means of transporting water to areas in need during the initial phase of an emergency. Tankering operations, however, are expensive and relatively time-consuming to administer. This technical note considers key issues relating to the effective and efficient use of tankers during an emergency.

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 (see Figures 1 and 2).

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 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 resulting from empty, discarded water bottles.

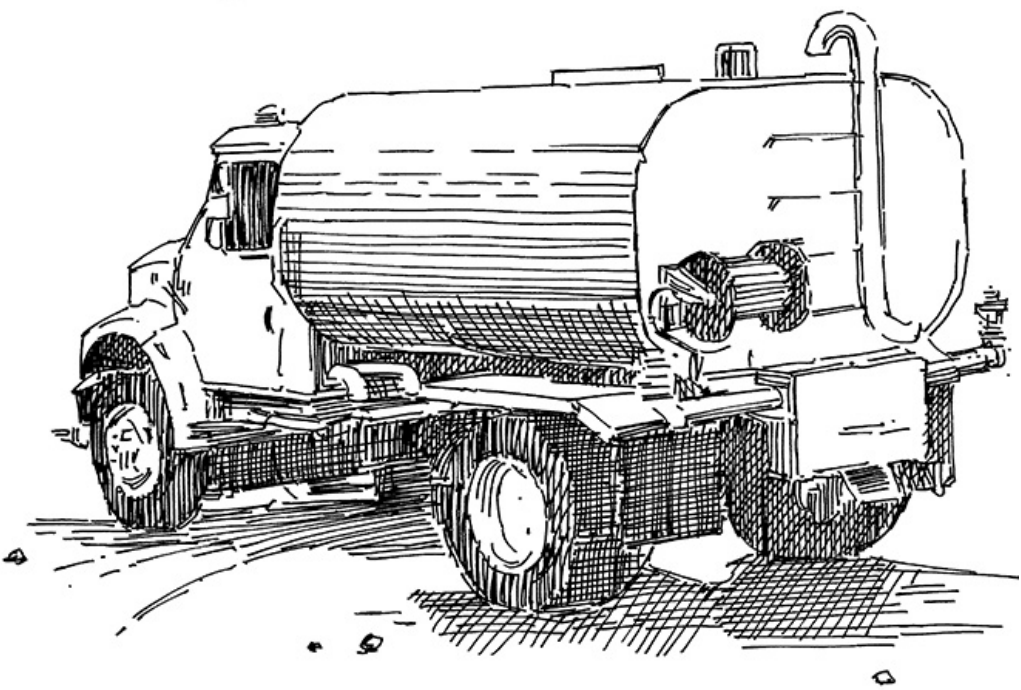

Figure 1. A purpose-built tanker

Logistics

The number of tankers needed to supply the required quantity of water during an emergency will depend on a variety of factors. In Box 1 an example calculation

for the number of tankers required is presented.

Other logistical factors to consider include:

- **Fuel**. Regular supplies are essential. Consider setting up a storage tank if supplies are unreliable.
- **Drivers**. Vehicles are likely to be more reliable if operated by an experienced driver. Always test driving skills before employing drivers and consider providing advanced driving training if necessary.
- **Spare parts**. All vehicles need maintenance and in emergencies this is even more important. Consider purchasing spares in bulk.
- **Maintenance staff**. In remote areas, it may be difficult to find skilled vehicle maintenance staff. You may have to bring them in from elsewhere.

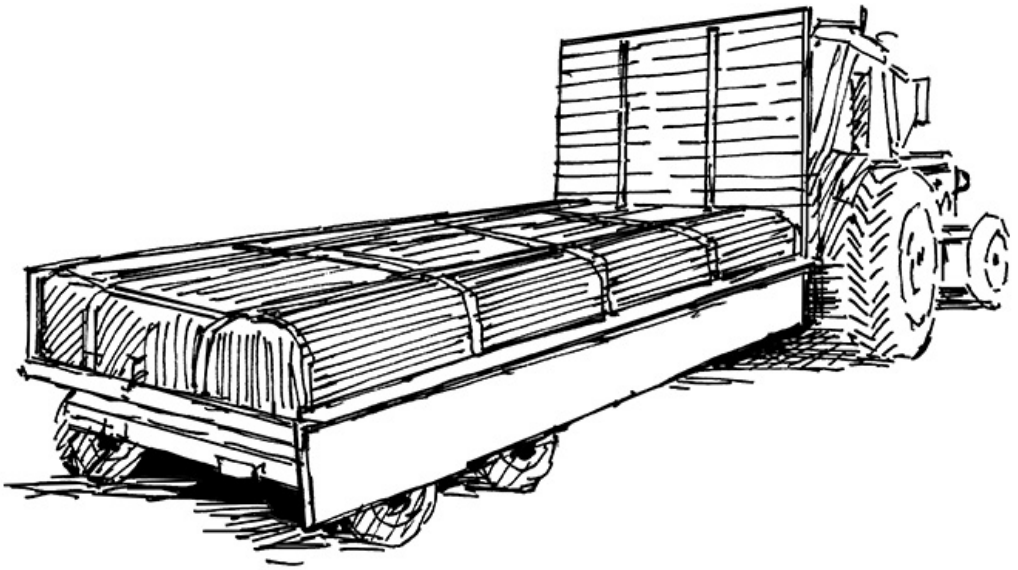

Figure 2. An improvised tanker

Tanker management

Tankering operations can be managed in-house or contracted out. In either case, good planning and supervision will help operations run smoothly.

When contracting out, consider the following:

- Base contract fees on the quantity and quality of water delivered not on operating time.
- Agree on a method for appraising contractor performance.

- Clarify responsibility for consumables such as the provision of fuel, insurance, maintenance, the wages of drivers, etc.

Where tankering operations are run in-house, attention should be given to basic fleet management including vehicle maintenance, fuel supply and the availability of standby vehicles.

Driver management can be a particularly difficult task. Drivers may be unreliable and untrustworthy. Always monitor their driving skills and regularly check their record book and compare it with records from fuel suppliers and delivery records. Frequent spot checks are useful, particularly at the start of a tankering programme.

Operation

Equipment

Water tanks should be made of stainless steel or other material suitable for the

storage of drinking water. The tank should have an access port preferably large enough for a person to enter for cleaning purposes. The access must be covered with a dust-proof lockable cover. There should also be an air-vent with an outlet that is screened to prevent dust, insects, birds and other vermin entering the tank.

Most tankers are fitted with water pumps to speed up loading and unloading. They should be regularly checked as part of the general vehicle maintenance programme to see if they are operating efficiently. The vehicle may need a safe storage container for fuel for the water pump.

Hoses and related couplings should be stored in a sealed container to protect them from contamination. Vehicles should be equipped with a chlorine testing kit and the driver trained in how to use it.

Cleaning

Water tanks, and when applicable, pumps must be cleaned before they are used, after major maintenance and at least every three months. Details of cleaning methods are given in Technical Note 3 (Mobile Note 33).

Chlorination

Water in a tanker should be chlorinated to prevent the build-up of organic matter in the tank and to ensure the water delivered is safe to drink. Chlorination usually takes place as the tank is filled with water.

The amount of chlorine to be added will depend on the quality of the water, but sufficient should be added to leave a residual amount of 0.5 mg/l. See Mobile Notes 41 and 17 for more details.

Chlorine levels should also be checked before the water is discharged. If chlorine levels have dropped below 0.2 mg/l, extra chlorine should be added.

Box 1. Calculating tankering requirements

A community affected by an earthquake requires 200,000 litres of water a day to be tankered. 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.

Assumptions

- The capacity of each tanker is 5,000 litres.
- Poor road conditions and old equipment means most vehicles will need to be checked every week and require maintenance about every three weeks.
- A weekly vehicle service takes about 120 minutes.
- A three-weekly vehicle service takes a day.
- Each tanker can work 14 hours per day using two drivers.

Activity times

Filling the tanker:	20 minutes
Travel time from borehole to community:	30 minutes
Offloading time for tanker:	20 minutes
Return travel time:	30 minutes
Net turnaround time:	100 minutes
Add 30% for unforeseen activities:	30 minutes
Gross turnaround time:	130 minutes

Calculations

The number of trips each tanker can make a day is:

$$14 \times 60/130 = 6.5 \text{ (say 6)}$$

The total volume of water carried by each tanker a day is:

$$5{,}000 \times 6 = 30{,}000 \text{ litres}$$

Therefore the number of tankers required to deliver sufficient water is:

200,000/30,000 = 6.7 (say 7 tankers)

Assume the weekly service can be fitted in with normal working and has no large-scale effect on water delivery.

The three-weekly service requires the truck to be off the road for at least a day. Allow an extra truck to replace the one being serviced.

So the total number of trucks required is 8.

Record-keeping

Each tanker should be provided with a book to record its operation. This will help with the future planning of tankering operations and for checking the efficiency of the vehicle and its drivers.

Box 2 lists the types of information that should be recorded.

Box 2. Tanker record book

The book should record:

- Date
- Driver's name
- Start and finish time
- Start mileage
- Location, time and mileage at point of filling
- Location, time and mileage at point of emptying
- Quantity of water delivered
- Rest periods
- Fuel quantity, date added and mileage
- Maintenance dates
- Signature of customer receiving the water
- Signature of person supplying the water

Other considerations

Filling points

Try to use filling points close to the delivery point. Check that the source has sufficient quantity for your needs and the water quality is acceptable.

If the tankering process is expected to last some time, set up a dedicated water filling point (Figure 3). Lots of water will be spilt during the filling process so provide good drainage.

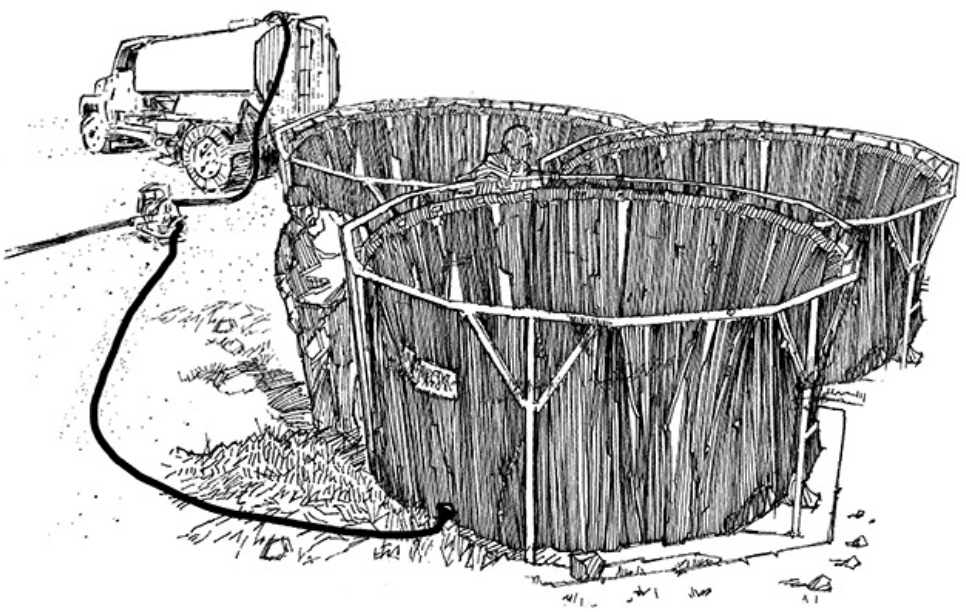

Figure 3. Water tanker filling station

Access roads

Water tankers are heavy vehicles and can quickly damage poorly constructed roads (see Figure 4). Make an assessment of the roads before starting to use them and reinforce them if necessary.

Delivery points

Tankering is much more efficient if water can be off-loaded to storage tanks rather than allowing people to collect their water directly from the tanker (Figure 5). A storage tank connected to communal tap stands is a common method to use.

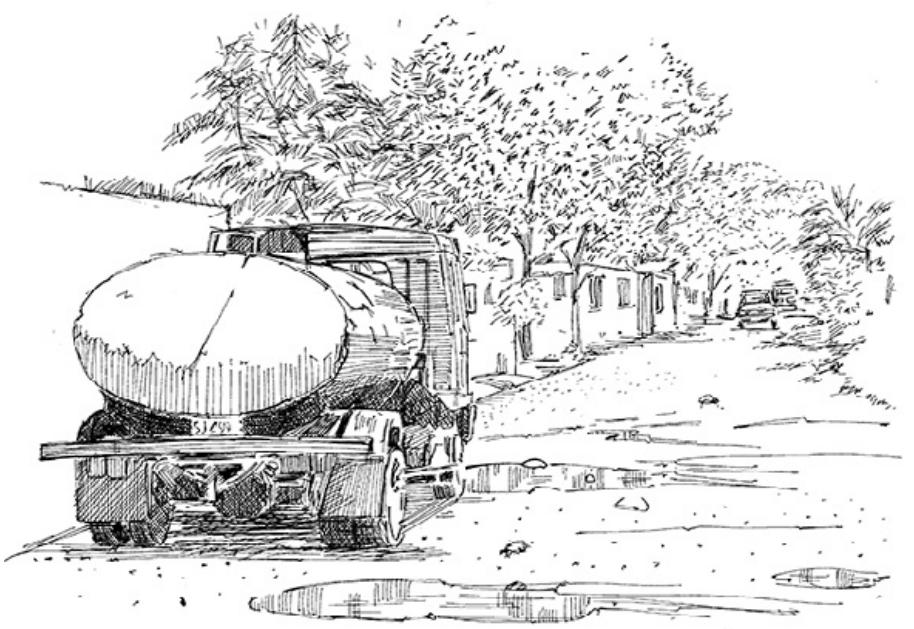

Figure 4. Road damage caused by water tankers

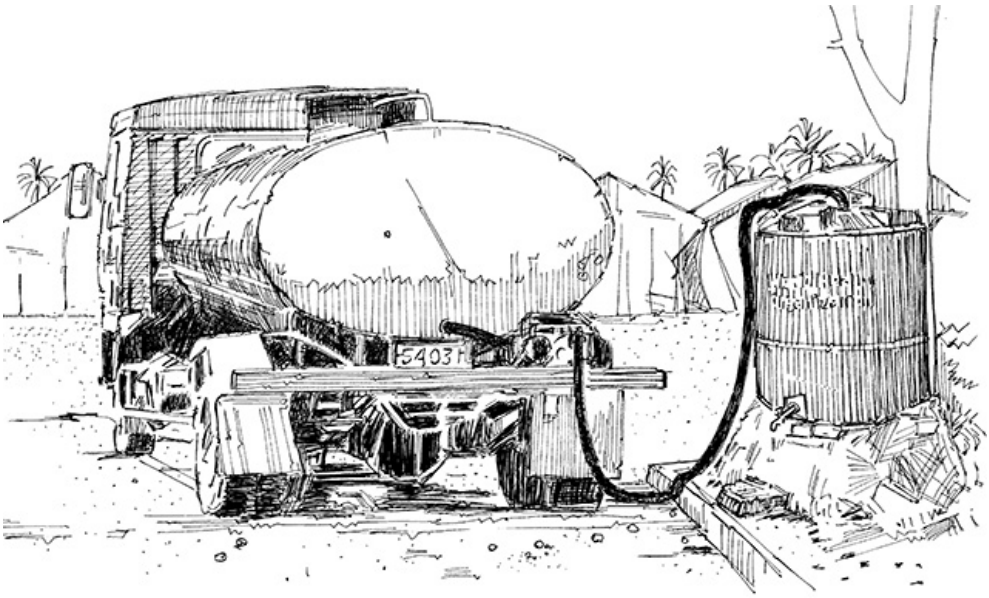

Figure 5. Simple storage and distribution point supplied by water tanker.

Further information

DAVIS, J. and LAMBERT, R., 2002. *Engineering in Emergencies: A practical guide for relief workers*. 2nd edn. Rugby, UK: ITDG Publishing, UK.

Potable Water Hauler Guidelines
http://wedc.lu/potable-water-hauler-guidelines

About this note

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