Delivering safe water by tanker

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. However, tankering operations are expensive and time-consuming to administer. This technical note considers key issues relating to the efficient and effective 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 12.1 and 12.2).

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 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 resulting from empty, discarded water bottles.

Logistics

The number of tankers needed to supply the required quantity of water during an emergency will depend on a variety of factors. Box 12.1 gives an example calculation for the number of tankers required.

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 a good 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.

Tanker management

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

Consider the following, especially if contracting out:

- Contracts should be based on the quantity and quality of water delivered not working time.
- Agree a method for measuring how well the contractor is performing.
- 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.
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**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 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 No. 3.

**Box 12.1. 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 service takes about 120 minutes.
- A three-weekly service takes a day.
- Each tanker can work 14 hours per day using two drivers.

**Activity times**

<table>
<thead>
<tr>
<th>Activity</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filling the tanker:</td>
<td>20 min</td>
</tr>
<tr>
<td>Travel time from borehole to community:</td>
<td>30 min</td>
</tr>
<tr>
<td>Offloading time for tanker:</td>
<td>20 min</td>
</tr>
<tr>
<td>Return travel time:</td>
<td>30 min</td>
</tr>
<tr>
<td>Net turnaround time:</td>
<td>100 min</td>
</tr>
<tr>
<td>Add 30% for unforeseen activities:</td>
<td>30 min</td>
</tr>
<tr>
<td>Gross turnaround time:</td>
<td>130 min</td>
</tr>
</tbody>
</table>

**Calculations**

- The number of trips each tanker can make a day is: 
  \[14 \times 60/130 = 6.5\] (say 6)
- The total volume of water carried by each tanker a day is: 
  \[5,000 \times 6 = 30,000\] 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.

**Box 12.2. 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.

**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 Technical Note No.11 for more details.

Chlorine levels should also be checked before the water is discharged. If chlorine levels have dropped below 2 mg/l, extra chlorine should be added.

**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 12.2 lists the types of information that should be recorded.
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Figure 12.3. Water tanker filling station

Figure 12.4. Road damage caused by water tankers
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 12.3). Lots of water will be split during the filling process so provide good drainage.

Access roads
Water tankers are heavy vehicles and can quickly damage poorly constructed roads (see Figure 12.4 on the previous page). Make an assessment of the roads before starting to use them and strengthen 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 12.5). A storage tank connected to communal tap stands is a common method to use.

Further information


Figure 12.5. Simple storage and distribution point supplied by water tanker.