The safe disposal of solid waste is critical for public health during an emergency. Not only will existing collection and disposal systems be disrupted, but there will be extra waste caused by the emergency itself. Initially, for new sites such as refugee camps, there will be no arrangements in place at all. If solid waste is not dealt with quickly, serious health risks will develop which will further demoralize the community already traumatized by the emergency. This technical note highlights the key issues to consider in managing solid waste during and shortly after a disaster.

What is solid waste?
In this technical note, the term ‘solid waste’ is used to include all non-liquid wastes generated by human activity and solid waste material resulting from the disaster, such as:

- general domestic garbage such as food waste, ash and packaging;
- emergency waste such as plastic water bottles and packaging from other emergency supplies;
- human faeces disposed of in garbage;
- rubble resulting from the disaster;
- mud and slurry deposited by natural disasters; and
- fallen trees and rocks obstructing transport and communications.

Other specialist wastes, such as medical waste from hospitals and toxic waste from industry, will also need to be dealt with urgently, but they are not covered by this technical note.

There could also be a large number of dead bodies to dispose of during and after an emergency (see Technical Note 8).

The objective of managing solid waste
People should be able to live in an environment that is uncontaminated by solid waste, including medical waste, and have the means to dispose of their domestic waste conveniently and effectively.

The SPHERE standards
In addition to this objective there is also the need to make the environment safe and provide access for people and services in the area.

Box 7.1. Health risks related to the inadequate management of solid waste
Flies, rats, dogs and other scavengers are attracted to garbage, particularly in hot climates. If food is scarce, people will be forced to scavenge as well which will lead to increased cases of dysentery and other diseases.

Heaps of garbage present a fire risk and smoke can also be a health hazard if the burning waste contains items such as plastics or chemicals. Breathing difficulties can arise from the fungi that develop on garbage tips. Sharp items such as needles, and broken glass present a further hazard to people walking through the area.

Garbage washed by rain can contaminate water supplies. Indiscriminate dumping of waste can block water courses causing flooding. Waste is unsightly and lowers the moral of communities.
Solid waste management in emergencies

Assessment
As with every emergency response, it is important to assess the issues and priorities before beginning work. Consider the following:

Waste streams
- What types and volumes of wastes are there and how much is being produced each day?
- How are wastes currently being disposed of (if at all)?
- Who (if anyone) is responsible for waste collection and disposal and what resources do they have?
- What is the quantity and what are the types of waste that have been produced by the disaster, and where are they situated?

Waste problems
- Are the current waste disposal systems coping with the volume of waste?
- Are there any hazardous wastes that require special attention?
- Can the organizations responsible for waste collection cope with the demand?
- Are steps being taken to deal with the wastes produced by the disaster? Are these sufficient?
- Are there suitable disposal facilities for all wastes being produced?

Disposal of waste caused by a disaster
Disasters such as floods, earthquakes and hurricanes (cyclones) can produce large quantities of rubble. This will be a danger to people, block access roads, conceal trapped persons and block drainage channels. It will also hinder the access of other emergency services (Figure 7.1).

Once all survivors have been released from the rubble (they can survive for up to seven days), its removal and the demolition of dangerous structures should be a priority. If there is no approved waste disposal site near by, the wastes can be piled, in the short term, on areas of waste land. Not all rubble is waste. Items such as such as zinc roofing sheets, furniture and bricks can be reused. If possible sort the rubble as it is being removed, storing reusable materials separately from the rest of the waste. Waste piles can be a serious fire risk so provide a security fence to keep out the public and ban the use of all naked flames, including cigarettes.

Work with the community
People affected by major disasters are badly traumatized. Giving them something to do can help them. Employ neighbourhood groups to clean up their areas. This will bring money into the communities and strengthen their links with their areas. Introduce a rotation system so that all families in the community can benefit.

Protect the workforce
The workforce should be protected from physical injury by the provision of masks, overalls, gloves and boots (Figure 7.2). They should be vaccinated against common diseases such as tetanus.

Domestic waste
A major disaster will not stop people producing garbage but the content may change. If people have stayed close to their homes it is best to support the use of traditional practices. In rural areas this is likely to be burial, either within the family compound or in shared neighbourhood pits.

Most urban areas will have had some form of communal collection system but you may have to set one up and support it financially, by supplying vehicles and by employing personnel. If you need to recruit more people, hire from the local community.

Collection and transport
In the early stages of an emergency, you should provide communal storage bins (Figure 7.3). As the situation stabilizes, the number of bins can be gradually increased to the density there was before the disaster. Immediately after a disaster, a 100 litre container will serve 200 people. This drops to 50 people per container in the long-term.

The type of transport used for moving the garbage from bins to its final point of disposal depends on the quantity of waste there is, the distance it has to be transported and available local resources. Box 7.2 illustrates some of the common vehicles used.

Consult local health services for advice on vaccination.
Solid waste management in emergencies

Disposal
Existing urban areas will almost certainly have established waste disposal sites. Use these if possible. If they cannot be used, set up temporary disposal sites such as communal pits similar to the type shown in Figure 7.4.

Figure 7.3. Provide communal storage bins for domestic waste in the early stages of an emergency

Earth mound to keep surface water out of the pit
Fence around the pit
Waste layers
0.1m layer of soil/ash to cover each layer of waste
Once full, backfill the pit with at least 0.5m of soil cover
Wire mesh covering pit contents

Refugee camps
For low-density refugee camps, the best waste disposal option is the family solid waste pit similar to those used in rural communities. If the plot size is too small for family pits, treat the camp like an urban area by using communal pits or larger disposal sites away from the camp.

Box 7. Solid waste collection and transportation
When selecting a suitable vehicle for transportation of waste, the waste generation rates and densities need to be considered along with the areas they need to access, such as narrow alleys or uneven paths, and the distance between collection and disposal points.
Other important factors

Community issues
It is useful and important to consult potential users of a waste management system before and during its design, construction and use. This is particularly true for a displaced community as some people may not be accustomed to using a communal system.

Recycling
Recycling should be encouraged and managed properly as it provides a local source of income and reduces the amount of waste for disposal.

Further information

Other disposal methods
Disposal systems such as composting, incineration and sanitary landfill can be considered once the situation has stabilized. They are unlikely to be a first phase emergency response activity.

Management
The key to effective solid waste collection and disposal is good management. It is often necessary to support local institutions with funds and professional staff to enable them to meet their responsibilities.