

Hazardous Wastes

This Technical Brief looks the handling and storage of Hazardous wastes such as hospital waste, industrial wastes, chemical, asbestos, batteries, gas canisters and other such waste. Oxfam staff would generally be unlikely to be involved in final disposal of hazardous wastes.

What are Hazardous wastes?

Hazardous wastes are likely to include asbestos, batteries, gas canisters, hospital wastes, industrial wastes, oils, chemical wastes, pesticides, fungicides, etc. Hazardous wastes from all sources can cause serious health risks through uncontrolled containment and handling.

Often emergency clean-up work is undertaken by volunteers and local residents who are unaware of the hazards associated with different wastes and may be unable to identify hazardous materials. It's important that where Oxfam staff and volunteers are involved in emergency clean-up that they are made aware of the hazards associated with various wastes and are able to identify hazardous wastes and know how to appropriately handle and storage of such wastes.

Hazardous wastes should be separated, handled and disposed of separately from normal municipal solid waste.

Generally speaking Oxfam is unlikely to deal with most hazardous wastes, other than those contained within general waste on a routine basis, but it is possible from time to time the Oxfam public health staff will need to deal with such materials.

Medical wastes

Medical wastes typically constitute only 10 to 25% of health care generated waste. The remaining non-clinical waste includes office and kitchen waste. The medical waste presents the greatest risk to health. Medical waste can be further divided into the following:

- Infectious waste (lab cultures, wastes from isolation wards, tissues, used dressings)
- Pathological waste (body parts, human foetuses, placentas, blood and other body fluids)
- Pharmaceutical waste (unwanted drugs, expired drugs)
- Chemical waste (chemicals from diagnostic work, cleaning materials)
- Sharps (needles, blades and broken glass)
- Radioactive waste (radioactive substances from radiotherapy and lab work)
- Pressurised waste (gas cylinders, cartridges and aerosol cans)

- High heavy metal content (batteries, broken thermometers, blood pressure gauges)

In most emergency situations the predominant types of medical waste are infectious waste, pathological waste and sharps.

Medical/clinical waste poses significant risks to health, the most obvious the transmission of diseases through contact with infected waste items such as needles, discarded dressings, human tissues or fluids. Additional risks include disease transmission through vector and pollution of the surrounding environment, including water pollution. There are also risks associated with handling radioactive or toxic wastes.

Asbestos wastes

Asbestos is a naturally occurring mineral that has excellent tensile strength properties, a poor conductor of heat, is relatively resistant to chemical attack and is non-biodegradable. As a result of these properties asbestos is widely used throughout the world, particularly in building and as an insulating material. However, damage to asbestos containing materials can result in the release of small asbestos fibres, which can cause serious lung disease. There is no minimum threshold or safe level of exposure to asbestos fibre.

There main types of asbestos are white, blue and brown asbestos. White asbestos is the most commonly used form of asbestos.

Asbestos can be found in many common building and insulation materials including:

- Boiler and heating vessels and insulation
- Cement pipes
- Clutch, brake and transmission components
- Conduits for electrical wires
- Pipe covering and insulation covering
- Roof sheets and roofing products
- Duct and home insulation
- Fire protection panels
- Furnace insulating pads
- Sheet vinyl and floor tiles and underlay
- Partition walling and plasters.

Separation of Hazardous Wastes

Where hazardous wastes are identified it is important that they are kept separate from normal municipal waste and stored in appropriate labelled sealed containers until they can be properly disposed of. For example, hospital waste should be separated into sealed containers for sharps, swabs and other blood-contaminated materials and for medicine, which required disposal. These containers should appropriately labelled, including a suitable hazard warning label and if possible these containers should be different colours depending upon what they are storing.

Labelling of hazardous wastes should include the contents, e.g. hospital sharps, and the date the container was filled and sealed. It should also include an appropriate hazard-warning label.

Hazardous wastes should be handled with great care. Advice should be sought from those familiar and experienced in handling such wastes wherever possible. Where this is not possible and the waste needs to be moved extreme care should be taken. **Hazardous wastes should only be moved if there is an immediate threat to human health.**

Where existing containers are leaking and no longer deemed to be safe, waste should not be transferred out of one container into another as this could create greater health and environmental risk than leaving the wastes in the poor quality containers. Instead the waste together with its existing container should wherever possible contained within a bund.

Appropriately contained and labelled hazardous waste should be stock-piled/stored in flat areas protected by bund walls and tarpaulin. Effort should be made to ensure that the storage area is protected from rainwater. The storage area should be secured to prevent animals, children, etc entering and accessing the area.

Photo: Examples of Storage of Hazardous Wastes
(Note: containers are labelled and stored under cover. The storage area would also benefit from a concrete slab and cut off drainage)



Risks

Hazardous wastes cause direct risk to health and the environment through contact directly or through indirect contact resulting from release into the environment affecting soil, groundwater and air.

Hazardous waste should not be mixed with other waste, should not be burnt and should not be piled up in an uncontrolled manner.

Hazardous waste should be separated from each other and from general municipal waste.

All hazardous wastes should be handled with great care. Different hazardous wastes will require specific measures to be taken to reduce the risk to those handling them. For example, when handling asbestos particular care should be taken to ensure that it is not broken or fractured to prevent spreading of fibres.

Greatest risk from hazardous waste will be to those creating the wastes, those handling the wastes and those disposing the waste. Oxfam staff are only likely to be involved with the handling and storing of hazardous wastes and on very rare occasions disposing these wastes (such as with some medical wastes).

Others who are at risk from hazardous wastes are waste pickers who are involved with the collection and separation of general waste where hazardous wastes may be contained within.

How to Minimise Risk from Handling Hazardous Wastes

The location of hazardous materials should be identified and a **risk assessment** carried out to establish the particular risks associated with the particular wastes identified.

It is important that the people involved with waste clean-ups are adequately informed of the risks and methods of best practice in handling wastes. They should be made aware of the particular risks associated with hazardous wastes and how to identify them.

It is important the disturbance of all types of hazardous wastes is kept to a minimum. This will reduce the risk of the release of hazardous material into the broader environment, by preventing dust, providing containment for leaks, etc.

Minimise the extent to which people have contact with the hazardous wastes is also very important. Hazard wastes should not be moved unless there is an immediate risk to public health or the environment.

Where hazardous need to be handled and contained, it is vital that those handling the waste are provided with appropriate personal protective equipment. A minimum will be heavy-duty gloves, safety glasses, overalls (preferably disposable), dust mask, appropriate to the waste being handled (care should be taken when handling asbestos that a mask sufficient to block asbestos fibres is used).

The waste management system used should be designed to minimise contact with hazardous wastes. For example, reduce double handling, provision of good storage facilities, effective transportation, etc.)

Hazardous wastes must not be burnt under any circumstances (the only exception to this would be some medical wastes but only under controlled and appropriate incineration methods).

Risks of indirect contact with hazardous wastes can be reduced by appropriately containing the wastes in sealed drums, which are appropriately labelled. Vector control should be applied, such as covering waste and containing within strong vector resistant drums. Water sources should be protected from contamination from hazardous wastes. Good hygiene practice should be implemented by those handling and dealing with the wastes, such as hand washing and not taking contaminated personal protective equipment home.

Separation of Hazardous Wastes

Hazard wastes should be sorted from the general waste and stored separated in order to prevent contamination with normal waste. Hazardous wastes should be separated by chemical and physical properties. Many wastes change over time so on-going monitoring should take place.

Separation of medical wastes

Medical wastes can be easily separated at source by providing a minimum of three separate segregated containers. One for general waste, one for infectious and pathogenic waste, and the third for sharps. Other separate containers can be provided if additional disposal options for example, placentas that are disposed of separately from infectious waste in for example a placenta pit.

A minimum of three separate containers should be provided at each treatment, diagnosis and consultation area, such as wards, laboratories, immunisation points, etc. to enable appropriate disposal options to be undertaken for each type of waste.

Storage of Hazardous Wastes

A storage area should be identified for hazardous wastes, so that they can be stored safely whilst final disposal options are being identified. The storage area should be on solid impermeable ground (preferably concrete), sheltered from rainwater where possible and banded. The storage area should be secure, fenced with appropriate signage. This could include a specifically identified structurally sound building.

The storage site should be located away from water sources, water holes and land depressions (a minimum distance of 150m) and located away from heat sources. Additionally, the storage site should not be on the highest point.

Good access to the storage area would be preferable to ease the transportation of the waste to the temporary storage area and also transportation to the final disposal site.

Photo: Examples of Labelling of Hazardous (Medical) Waste



Separated hazardous wastes should be stored in sealed containers appropriately labelled including a hazard-warning label. Labels should include content and date placed in drum.

A register should be kept of all waste stored.

The relevant government body (Ministry or Department for Environment) should be informed about the location, kind and amount of hazardous waste being stored.

| Waste material | Guide |
|-------------------------|---|
| Asbestos | <ul style="list-style-type: none"> Separate from general waste Do NOT crush Must use personal protective equipment When working with asbestos ensure that is kept wet to prevent dust Store in a safe and protected area Store in sealed and labelled drums or strong plastic bags Do NOT burn |
| Waste oil | <ul style="list-style-type: none"> Collect and store in sealed drums on banded hard standing Take care of leaky drums Do NOT burn |
| Clinical waste | <ul style="list-style-type: none"> Collect and store in sealed drums appropriately labelled Do NOT burn uncontrolled |
| Heavy contaminated soil | <ul style="list-style-type: none"> Store in drums on a safe site |

Storage of medical wastes

As with other hazardous waste all containers should have lids and should be watertight. Where possible, containers should be the same colour for each type of medical waste. If this is not possible, same colour labels for same type medical wastes should be used.

Containers for needles should be designed appropriately to eliminate further handling of the needles. A simple sharp container can be made from empty pharmaceutical containers with the lid glued or taped shut. A small triangular slot cut in the lid will enable used syringes to be dropped into the container and the syringe pulled away without the need to handle the used needle.

WHO/UNICEF have approved a cardboard sharps box, which can be obtained from UNICEF or other medical agencies.

Sharps boxes must be sealed and stored securely to prevent theft or harm to waste-pickers or scavengers.

Photo: WHO/UNICEF sharps container (courtesy of WHO Europe)



Disposal Options

Final disposal of hazardous wastes should be undertaken by the appropriate authorities in an approved manner by properly trained personnel only. This may include disposal at appropriately designed and management sanitary landfill.

Oxfam staff should not attempt to dispose of hazard wastes.

The responsibility for the disposal of medical wastes should be clearly defined and should remain with the organisation managing the facility. Oxfam are unlikely to be involved. However, if disposal is observed not to be undertaken safely Oxfam can offer assistance.

Medical wastes can be incinerated but only in appropriately designed incinerators, which are properly managed and operated. Incineration of sharps, for example, must be in excess of 1000°C, also toxic fumes can be emitted from incinerating expired medicines. Ineffective incineration may not remove all hazards and may cause air pollution. MSF provide detailed design guidance on medical waste incinerators (Ref: MSF Health care waste management manual and the De Montfort medical waste incinerator.

http://www.mw-incinerator.info/en/101_welcome.html)

Health and Safety

Education, training and awareness raising of dangers of hazardous wastes should be provided to all those handling hazardous wastes and others who are likely to come in contact with such wastes (waste-pickers, scavengers, children, etc.)

Handling of hazardous wastes should always be undertaken with great care. Protective clothing and equipment must be obligatory. As a minimum this should include overalls, gloves, mask and helmet. This personal protective equipment should remain stored in an allocated area when not in use or be disposal. Under no circumstance should personal protective equipment used for dealing with hazardous waste be taken home.

Appropriate equipment should be provided to collect, load and transport waste. Where ever possible equipment should be used to reduce direct contact of workers with hazardous wastes.

Washing facilities must be provided for workers. Workers should be aware that they need to wash before eating, drinking or smoking and before returning home.

Those handling hazardous wastes should be appropriately immunised such as for tetanus, Hepatitis B, etc. Additionally access to appropriate healthcare facilities should be available.

People not involved with cleaning up the hazardous waste should be kept out of the clean-up operational area. Suitable hazard warning labels should be provided to mark out the operations area.

Handling Asbestos

Particular measures need to be undertaken when handling asbestos. These include:

Personal protection clothing must be worn, and this must include an appropriate mask/respirator, with a filter sufficient for handling asbestos materials.

Keep the material wet to prevent dust.

Keep handling of asbestos containing materials to a minimum. Asbestos structures should be dismantled as gently as possible. If it is necessary to move, saw or break up such materials, the materials should be thoroughly wet to reduce the amount of airborne fibres and dust.

Cleaning of surfaces contaminated with asbestos containing material should be cleaned using **wet methods**. Under no circumstances should dusting or sweeping or use of a vacuum cleaner be undertaken to ensure against dust and fibres in the air.

Asbestos should be stored in strong sealed drums or plastic sacks such that dust cannot be released.

Handling Oil

Particular measures, which should be undertaken when handling oil and similar products, include:

- Personal protection clothing must be worn.
- Containers should never be filled to the top to allow expansion of the oil.
- Keep different types of oil separate, e.g. machine oil, hydraulic oil.

Photo: an example of a De Montfort medical waste incineration



Sphere standards

Pages 84 & 85 of SPHERE, section 5 – Solid Waste Management, refers to the separation of and separate disposal of medical wastes.

Medical wastes are separated and disposed of separately and there is a correctly designed, constructed and operated pit, or incinerator with a deep ash pit, within the boundaries of each health facility (see guidance notes 3 and 6)

There are no contaminated or dangerous medical wastes (needles, glass, dressings, drugs, etc.) at any time in living areas or public spaces (see guidance note 3).

Guidance Note 3.

Medical waste: poor management of health-care waste exposes the community, health-care workers and waste handlers to infections, toxic effects and injuries. In a disaster situation the most hazardous types of waste are likely to be infectious sharps and non-sharps (wound dressings, blood-stained cloth and organic matter such as placentas, etc.). The different types of waste should be separated at source. Non-infectious waste (paper, plastic wrappings, food waste, etc.) can be disposed of as solid waste. Contaminated sharps, especially used needles and syringes, should be placed in a safety box directly after use. Safety boxes and other infectious waste can be disposed of on-site by burial, incineration or other safe methods.

Guidance Note 6.

Staff welfare: all solid waste management staff who collect, transport or dispose of waste should be provided with protective clothing, at minimum gloves and ideally overalls, boots and protective masks. Water and soap should be available for hand and face washing. Staff who come into contact with medical waste should be informed of the correct methods of storage, transport and disposal and the risks associated with improper management of the waste.

Further information

Emergency Sanitation – Assessment and Programme Design (Chapter 8, Waste management at medical centres), Peter Harvey, Sohrab Baghri & Bob Reed, WEDC, 2002.

Asbestos – hazards and safe practice for clean-up after tsunami - WHO

Waste management aspects after tsunami disaster – A guideline for solid waste management activities during clean up and reconstruction – Ministry of Environment and Construction, Republic of Maldives

MSF Public Health Engineering in Emergency Situations

MSF draft Health Care Waste Management manuals

Additional Support / Expert Advice

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