

Asbestos - hazards and safe practice for clear-up after tsunami

What is asbestos?

The term “asbestos” is used for a group of naturally occurring minerals that take the form of long thin fibres and fibre bundles. These minerals have great tensile strength, conduct heat poorly and are relatively resistant to chemical attack. Asbestos is non-biodegradable.

The principal varieties of asbestos are chrysotile (known as white asbestos) a serpentine mineral, and crocidolite (blue asbestos), amosite (brown asbestos), anthophyllite, tremolite and actinolite, all of which are amphiboles. The chrysotile form is the one most commonly used now.

How is asbestos used?

Asbestos is widely used throughout the world, particularly in **building and insulation materials**. Typical uses include:

- ⌘ Boilers and heating vessels
- ⌘ Cement pipe
- ⌘ Clutch, brake, and transmission components
- ⌘ Conduits for electrical wire
- ⌘ Pipe covering
- ⌘ Roofing products
- ⌘ Duct and home insulation
- ⌘ Fire protection panels
- ⌘ Furnace insulating pads
- ⌘ Pipe or boiler insulation
- ⌘ Sheet vinyl or floor tiles
- ⌘ Underlay for sheet flooring.

Why is asbestos a problem?

Damage to asbestos-containing material can result in the release of small asbestos fibres that become airborne and are readily inhaled. These fibres can remain in the lungs for long periods and can cause serious lung disease.

Asbestos is not acutely toxic. Oral intake of asbestos fibres is not known to be harmful to human health.

What are the health concerns?

The principal health concerns are the development of asbestosis, lung cancer, pleural thickening and mesothelioma. These diseases have long latency periods, in the order of 10-50 years.

Asbestosis: This is a slowly developing and progressive scarring of the lungs caused by the inhalation of high concentrations of asbestos dust and/or long exposure. The elasticity of the lungs is reduced and also their ability to exchange gases. The result is decreased lung volume, increased resistance in the airways and reduced oxygenation of blood. It is associated with occupational rather than environmental exposure. Advanced asbestosis is often associated with lung cancer, especially among smokers.

Lung cancer The risk is related to the nature of the occupational exposure and also to smoking: smokers have a higher risk of developing lung cancer than non-smokers when exposed to asbestos.

Diffuse pleural thickening This is a non-malignant disease in which the lining of the lung (pleura) becomes scarred. Small areas of scarring are called pleural plaques. The disease is a chronic condition with no cure.

Mesothelioma This is a malignant tumour of the pleura or peritoneum. It is linked with exposure to all types of asbestos. As well as being an occupational hazard, it may develop in non-occupationally exposed people living in the same household as asbestos workers or in the vicinity of strong asbestos emission sources.

What is a safe level of exposure?

Asbestos is a proven human carcinogen (IARC Group 1). **No safe level can be proposed for asbestos because a threshold is not known to exist**¹. The greater the exposure, the greater the risk of developing lung disease, therefore exposure should be kept as low as possible. A number of occupational exposure limits have been set:

The USA Occupational Safety and Health Administration (OSHA) standard for asbestos in the workplace is² 0.1 fibres/ml of air as an 8-hour Time Weighted Average.

The UK Health and Safety Executive has set the following exposure limits³:

- **For the amphibole asbestos minerals** (amosite, crocidolite, fibrous actinolite, fibrous tremolite and fibrous anthophyllite, or any mixture of these with chrysotile):
 - Short-term exposure limit: 0.6 fibres/mL averaged over any continuous 10 min
 - Long-term exposure limit: 0.2 fibres/mL averaged over any 4 h
- **For chrysotile:**
 - Short-term exposure limit: 0.9 fibres/mL averaged over any continuous 10 min
 - Long-term exposure limit: 0.3 fibres/mL averaged over any 4 h

What sort of activities will cause the release of asbestos fibres?

Most asbestos materials pose little risk unless they are damaged or disturbed in some way that releases fibres into the atmosphere.

Low-density materials, such as asbestos-containing thermal insulation for pipes and boilers, some wall or ceiling plasters, some ceiling tiles, are friable and can crumble under hand pressure. These materials can release high concentrations of fibres when damaged or disturbed e.g. during maintenance, renovation or demolition work.

High-density, hard materials in which asbestos fibres are embedded in a matrix, such as asbestos cement pipes and sheets, floor tiles, and ceiling materials are less likely to release fibres

Sawing, drilling, crushing, scraping and sanding asbestos containing materials are particularly likely to release respirable fibres and dust.

Small diameter fibres and particles may remain suspended in the air for a long time and be carried long distances by wind or water before settling down.

Table 1 shows data on likely concentrations of asbestos fibres provided by the UK Health and Safety Executive based on exposure monitoring.

Table 1: Likely fibre concentrations of resulting from different kinds of work on asbestos containing materials³

Job	Likely fibre concentrations (fibres/mL)
Asbestos cement containing only chrysotile	
Machine sawing with exhaust ventilation (LEV)	Up to 2
Hand sawing asbestos cement with LEV	up to 1
Machine cutting asbestos cement without exhaust ventilation	up to 25
Asbestos insulating board (AIB) containing amosite asbestos	
Careful removal of whole AIB	up to 3
Breaking and ripping out AIB	5 to 20

Hand sawing AIB	5 to 10
Asbestos coating and lagging	
Well-conducted controlled wet stripping using manual tools (unless a dry patch is hit or lagging becomes detached)	up to 1
Well-conducted controlled wet stripping using power tools (unless a dry patch is hit or lagging becomes detached)	up to 10
Stripping pipe or vessel lagging - partially wetted or dry areas present	up to 100

What are the risks in the post-tsunami clear-up?

During the clear-up damaged and destroyed buildings after the tsunami it is likely that there will be a need to handle and break up and dispose of asbestos-containing building and insulation materials. Much of this work may be undertaken by volunteers and local residents who are unaware of the hazards of asbestos and who may be unable to identify asbestos-containing material.

How can risks be minimized?

The main principles of safe handling are to⁴:

- identify the locations of asbestos-containing materials and carry out a risk assessment
- ensure that people involved in clear-up work are adequately informed of the risks and the methods of best practice;
- minimize the disturbance of asbestos containing materials;
- minimize the release of respirable asbestos in the atmosphere by wetting;
- minimize the extent to which people have contact with asbestos; and
- ensure that waste is securely stored and adequately labelled.

Disposal of asbestos-containing materials^{2,4}

These materials should be disposed of by properly trained personnel.

Transport asbestos waste in bulk. During transportation ensure that containers remain covered or sealed so that dust and fibres do not escape.

Asbestos-contained materials can be disposed of in landfill sites provided these have appropriate measures to prevent release of asbestos fibre, e.g. a liner and a system for leachate collection.

Ensure that a record is kept of the location of this waste, including exact geographical coordinates.

NB:

- Do not mix with other waste prior to disposal
- Do not dispose of in a location where there is already asbestos containing material
- Do not dispose of in a location where there may be future construction of landfill components, such as leachate headwells or gas extraction wells.

DO NOT dispose of by burning.

Suggested actions are:¹⁴

Worker protection:

1. Provide simple and easy-to-understand information for people involved in clear-up work that describes what asbestos is, where it might be found, what the hazards are, and how to handle and dispose of it safely.

2. Trained personnel should inspect sites where there may be asbestos-containing materials to identify the type of materials, the hazard that they present and the safest course of action (e.g. to seal and leave in place, to remove). Friable materials present a particular hazard and should be removed by trained personnel following accepted procedures, with adequate personal protective equipment.
3. As a minimum provide workers with gloves, goggles, disposable clothing or replacement clothing (so that workers do not take contaminated clothing home) and disposable dust masks. Contaminated clothing and protective equipment should be disposed of in the same way as other asbestos containing materials.
4. Provide washing facilities for workers. Ensure that they are aware of the need to wash before eating, drinking or smoking and before returning home.

General Protection

5. Restrict access to sites where there are piles of building debris, and to demolition sites and waste sites. In particular, keep children away.
6. Try to keep any manipulation 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, keep them thoroughly wet to reduce the amount of airborne fibres and dust. Take particular care with friable materials.
7. Clean surfaces contaminated with asbestos-containing materials **using wet methods**. Do not dust or sweep or use a domestic vacuum cleaner because this will puff fibres and dust up into the air.
8. Keep piles of asbestos-containing materials covered e.g. with tarpaulins or sheets of plastic until they can be safely stored or disposed of. Wet thoroughly before moving the materials.
9. Store asbestos-containing waste material in sealable containers until it can be disposed of safely. Containers can be drums of metal, plastic or fibre, or strong polyethylene bags (ideally put one bag inside another, sealing each with tape). Label the containers in the local languages and a hazard warning, e.g. **"DANGER CONTAINS ASBESTOS FIBRES, HARMFUL IF INHALED, MAY CAUSE CANCER, KEEP SEALED, AVOID CREATING DUST"**.

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