Workplace Health and Safety Act 1995

Asbestos

Advisory Standard 2004

Queensland Government
Department of Industrial Relations

Workplace Health and Safety Queensland

Asbestos

Advisory Standard 2004

Table of contents

Asbestos has the potential to kill if handled without proper precautions.

- If asbestos is bonded and its fibres are unable to become suspended in the air we breathe it is not a risk to health.
- If asbestos products or materials are disturbed or broken so that fibres become airborne it is a major health hazard.
- Because asbestos was used for most of the 20th century, as a component of so many products, nearly all workers will encounter it at some stage of their working lives.
- This standard is designed to minimise the exposure to risk for workers and others who may come into contact with asbestos.

The scope of this advisory standard

Part A	is a general introduction to asbestos and the potential health risks associated with it.
Part B	is directed to building owners and deals with the on-site management of exposure to risk associated with asbestos materials.
Part C	is directed at ways to manage exposure to risk when treating or removing asbestos products such as asbestos-cement sheeting, friction materials and asbestos-coated metal sheeting (Galbestos), and handling their associated waste.
Part D	is directed at ways to manage exposure to risk when removing asbestos material such as sprayed asbestos coatings used for thermal and acoustic insulation in buildings and lagging containing asbestos used extensively on boilers and other industrial plant.

The work practices and control measures to be adopted for the safe removal of asbestos materials or asbestos products varies considerably depending on the type of product or material, volume of product or material, its condition and location.

A careful assessment must be made of:

- the type of asbestos present and
- the volume of the asbestos product or material

The relevant parts of this standard and the legislation should then be referred to.

Important information about this standard

1. It replaces the *Asbestos Removal Work Advisory Standard 1999* and the *A-C Sheeting Advisory Standard 1999*. It also incorporates and replaces *The On-Site Management of Asbestos Materials: A Guide for Owners of Buildings 2002*.

2. Was made on

3. Commences on

4. Expires 5 years after its commencement.

Part A

Asbestos

What is asbestos?

Asbestos is a mineral rock made out of naturally occurring mineral silicate fibres, which belong to either the serpentine or amphibole mineral groups. The three main types of asbestos are –

- Chrysotile ("white" asbestos – belonging to the serpentine group)
- Crocidolite ("blue" asbestos – belonging to the amphibole group)
- Amosite ("brown" or "grey" asbestos – belonging to the amphibole group)

Fibrous actinolite, fibrous tremolite and fibrous anthophyllite are less common types of the amphibole group. Asbestos types can not be identified by colour alone.

Asbestos is known for its strength and resistance to chemicals and heat. These properties resulted in asbestos becoming a component of thousands of different products.

Mining, milling and processing of asbestos into manufactured products creates asbestos dust that contains asbestos fibres. Asbestos was used in a variety of workplaces from the 1940s up until the early 1980s when the dangers to health inherent in exposure became more widely acknowledged. The range of applications included reinforcing in asbestos-cement sheeting, as an insulator on pipes and in buildings, as a fire retardant in textiles and as a filtering material in the chemical and food industries.

Why is asbestos a risk?

Inhalation of asbestos fibres has been linked to three respiratory diseases - asbestosis, mesothelioma and lung cancer. Exposure may also relate to other cancers, however, there is no conclusive evidence to support this. The three identified diseases are characterised by long latency periods, that is, 20-40 years from exposure to the onset of disease.

Asbestosis is a chronic lung disease that can lead to respiratory impairment and to diseases such as lung cancer. It results from the inhalation of asbestos fibres, which are deposited, in the lungs causing scar tissue. The pulmonary changes resulting from the scar tissue are irreversible. It has been found to occur in workers exposed to prolonged and heavy concentrations of asbestos fibres. Asbestosis cannot be effectively treated.

Mesothelioma is a cancer. There are two types of mesothelioma:

- pleural which is a tumour of the lung; and
- peritoneal, which is a cancer of the abdominal cavity.

The higher the level of exposure, the greater the risk of developing mesothelioma. However, the level of exposure does not affect the length of the latency period, which is usually between 30 and 40 years before the disease is identified. Mesothelioma cannot be effectively treated.

Lung cancer caused by asbestos cannot be distinguished from those cancers that are caused by other agents such as tobacco smoke. While persons who have been exposed to asbestos who develop lung cancer are usually tobacco smokers, it is generally accepted that asbestos is capable of causing lung cancer, and the tumour may develop where there is no co-existing asbestosis. Lung cancer related to

asbestos exposure usually has a latency period of 20 to 40 years between the first exposure and the onset of cancer.

What are the risks to be controlled?

Inhalation of airborne asbestos fibres can cause death and therefore concentrations of airborne asbestos are a risk, which must be controlled. Airborne asbestos fibres can result from:

- the release of asbestos fibres through renovation, maintenance or demolition of buildings containing asbestos products (such as asbestos-cement sheeting) or asbestos materials (such as thermal insulation)
- accidental contact with the asbestos material causing fibres to break free
- failure to adequately maintain an asbestos product resulting in the release of asbestos fibres.

National exposure standard

The Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC 1003] published by the National Occupational Health and Safety Commission (NOHSC) set exposure standards for asbestos. The exposure standard represents the average asbestos fibres present per millilitre of air (f/mL) breathed by a worker throughout a working shift.

At the time this advisory standard was made, the national exposure standards for asbestos were as follows –

Amosite - 0.1 f/mL
Crocidolite – 0.1 f/mL
Chrysotile – 0.1 f/mL

Mixtures of any form of asbestos or where the composition of the forms is unknown – 0.1 f/mL.

To determine the current exposure standards for asbestos reference should be made to the NOHSC *Exposure Standards for Atmospheric Contaminants in the Occupational Environment* [NOHSC 1003].

Asbestos kills

- Asbestos fibres can enter your body when you breathe.
- Microscopic fibres can lodge in your lungs.
- Asbestos fibres can cause a fatal disease which may not show up until 40-60 years after exposure.
- Repeated exposure increases the risk of contracting an asbestos related disease.
- Smokers, who are exposed to asbestos, are at a greater risk of developing lung cancer.

Where can asbestos be found in a building?

A number of different types of materials containing asbestos may be encountered in a building.

- Any product that is **friable** (i.e. easily crumbled or reduced to powder by hand) is particularly hazardous. The friable asbestos that is likely to encountered is usually thermal or acoustic insulation containing asbestos. Such installed thermal or acoustic insulation is defined as “asbestos materials” in the *Workplace Health and Safety Regulation 1997*. Its treatment and removal is regulated by Part 11 of the Regulation.
- The other type of asbestos encountered will be anything else which contains asbestos.

These items are referred to as "asbestos products" in the *Workplace Health and Safety Regulation 1997*. The most commonly encountered asbestos product is asbestos-cement sheeting.

"Asbestos materials" – thermal and acoustic insulation

Asbestos materials can take a number of forms. The most common are:

- **Sprayed on fireproofing/soundproofing/ thermal insulation.** These vary from hard impervious well sealed materials to friable materials that have been applied by spraying or trowelling. Colour can vary from white to grey brown to blue although in some instances the area may be painted. This material is found on structural steel members and decks (as fireproofing) ceilings, fire-plugging, fire doors and occasionally on walls. They may be exposed or concealed.
- **Acoustic plaster soundproofing.** This is a firm open poured plaster like material applied by a trowel. It is usually exposed and not painted.
- **Thermal insulation.** This is used in the insulation of air conditioning ducts, hot and cold water pipes, hot water reservoirs, pressure tanks and boilers. Fire doors may contain laminates of asbestos material sandwiched between panels.

Removal of any asbestos material requires special precautions. These are dealt with in Part 11 of the *Workplace Health and Safety Regulation 1997* and Part D of this standard.

"Asbestos products"

Asbestos Cement

Asbestos cement is a mixture of cement, sand, cellulose and asbestos which forms a hard, light grey material. It generally contains 10-15% asbestos fibre. Asbestos cement products include asbestos-cement sheeting, gutters, downpipes and ridge capping. Asbestos-cement sheeting can be flat or corrugated and is often referred to as "fibro". Asbestos-cement products were commonly used in the building industry between the 1940s and early 1980s.

The age of a building or structure can serve as a guide to the likelihood of whether a product contains asbestos.

To confirm this, a sample may be analysed by optical microscopy by a laboratory. Alternatively, it can be assumed that all cement sheeting and associated building materials (ridge capping, guttering etc) in the building or structure contains asbestos and be treated accordingly.

The most common asbestos cement product is asbestos cement sheeting. Part C of the standard focuses on treatment and removal of asbestos-cement sheeting. However, the advice is applicable to treatment and removal of all asbestos cement products.

Friction and other Materials

Because of its strength and ability to withstand heat, asbestos was a common component in friction materials such as brake shoes, disk pads, clutch housings and elevator brakes.

At its peak it was used in the manufacture of some 3000 products. While its use has been phased out and all new products must be non-asbestos many products which were produced before the ban on asbestos, may be encountered. For example asbestos fibre was used in roof sealants, textiles, plastics, rubbers, door seals for furnaces, paper and floor tiles.

Every time -before every job

If no asbestos is discovered then proceed with work - but stay alert – asbestos was used for many purposes – it may still be there

Check to see if any asbestos is present:

- Ask the owner
- Check if there is an asbestos materials register for the building
- A building built before 1980 is more likely to contain asbestos
- **If in doubt get material analysed or treat it as asbestos**

If work can be carried out without disturbing asbestos then proceed with work

Identify type of asbestos present

"Asbestos Material"

- Asbestos acoustic insulation
- Asbestos thermal insulation

Asbestos Removalist Needed

Arrange for person with "appropriate authority" (certificate to work as asbestos removalist) to remove or treat asbestos material

The asbestos removalist should:

Follow **Part D** of the Advisory Standard

or

Devise and implement a system of work which gives the same level of protection against the risk of exposure to asbestos as the Advisory Standard

"Asbestos Product" for example

- Asbestos cement-sheeting (fibro)
- Galbestos
- Friction products
- Floor tiles containing asbestos

Refer to the Asbestos Advisory Standard:

- **Part A** Introduction to asbestos
- **Part C** Treatment and removal of asbestos products

Follow the Advisory Standard

or

Devise and implement a system of work which gives the same level of protection against the risk of exposure to asbestos as the Advisory Standard

Part B

On-site management of asbestos materials

The **hazard** is: Asbestos fibres

The **risk** is: Inhalation of asbestos fibres

The way to **eliminate** or **minimise** the **risk** is:

- **Identify** materials that contain asbestos
- **Adopt** work methods that prevent or minimise release of asbestos fibres into the air
- **Wear** and properly use personal protective equipment

1. Building owners' obligation

Division 1 (On-site management of asbestos materials), Part 11 (Asbestos) of the *Workplace Health and Safety Regulation 1997* places obligations on "building owners" to conduct an examination of buildings which are "work places" to discover if any asbestos materials are present in the building.

The aim of this Regulation is to prevent or minimise asbestos-related disease among people likely to be exposed to airborne asbestos in workplaces located in buildings, particularly where people are required to do work on the building, for example, tradespersons and maintenance workers.

Division 1, Part 11 of the Regulation applies only to a building or part of a building that is a workplace. Further, it only applies to buildings built under a building approval given before 1 January 1990, as these buildings are most likely to contain asbestos materials, installed for a variety of functional uses such as fire protection and thermal and acoustic insulation.

Where the obligation applies:

Division 1 Part 11 of the Regulation applies to:

- Places that are primarily used as workplaces, that is, where work is carried out by employers, self employed persons and workers on an ongoing basis

The Regulation requires owners of buildings, or their agents, to ensure that a process is undertaken to –

(a) identify whether asbestos materials are present;

(b) assess the risk of exposure of workers and other persons; and

(c) control any risk of exposure.

It should be noted that there are other workplace health and safety requirements about asbestos that places responsibilities on employers and self-employed persons.

Division 2, Part 11 of the *Workplace Health and Safety Regulation 1997* and Part D of this Standard deal with asbestos removal work and applies to asbestos removalists carrying out asbestos removal work.

Part C of this Standard provides advice about managing exposure to risks associated with treatment, removal and disposal of asbestos-cement sheeting and other asbestos products.

Employers must ensure their workers are not exposed to levels of asbestos fibres in excess of the national Exposure Standard (which is set out in the National Occupational Health and Safety Commission document *Exposure Standards for Atmospheric Contaminates in the Occupational Environment* [NOHSC:1003]).

Division 1, Part 11 of the Regulation does not apply to –

- a place used for domestic residential purposes; or
- common property that only serves places used for domestic residential purposes; or
- a workplace that from part of a place used for domestic residential purposes (e.g. a house used for residential domestic purposes even though an employer or self-employed person operates a small business from a part of the house)

In Division 1, Part 11 of the Regulation:

- The owner of the building means *"a person who holds title to the building and has effective management or control of the building and any essential plant"*.
- The owner is defined to include *"a person who manages a building as an agent for the owner"*.

Examples of how Division 1, Part 11 (On-site management of asbestos materials) of the ***Workplace Health and Safety Regulation 1997*** *is intended to apply to different places*

Places where the laws do not apply	Places where the law does apply	Combinations
■ a house, block of units or townhouses (including common property) used for domestic residential purposes. ■ a house used for domestic residential purposes even though an employer or selfemployed person operates a small business from part of the house, eg an IT consultant or book keeper who uses a home office for their work. ■ a surf life saving club house or rowing shed merely used for storage of lifesaving equipment and/or change facilities. ■ the rural industry (the "rural industry" is defined in the *Workplace Health and Safety Regulation 1997*).	■ shops and shopping centres ■ nursing homes ■ hospitals ■ office buildings ■ cinemas, theatres, museums and galleries ■ factories ■ saw mills, sugar mills, refineries ■ processing plants ■ abattoirs ■ gaming rooms, licensed venues (hotels and bars) ■ restaurants ■ sporting stadiums ■ schools, universities ■ other registered workplaces	■ If some places in a building are used for domestic residential purposes, and other places are used as shops and restaurants, the laws do not apply to the places used for domestic residential purposes or any common property that only serves the places used for domestic residential purposes. However, the laws do apply to places in the building that are shops and restaurants and any common property that serves the shops and restaurants. ■ A building is clearly differentiated into two sections. The front section of the building is operated as a shop only, and the rear section is used for domestic residential purposes only. The laws apply to the part of the building that is the shop but not to the part of the building that is used for domestic residential purposes.

2. When must an owner comply with Division 1 Part 11 of the Regulation?

For owners of buildings built under a building approval given before 1 January 1980, the regulation commenced on 1 November 2000. These owners were given a 2 year phase-in period to comply with the requirements.

From 1 November 2002, workplaces must comply with the regulation. Owners of buildings built under a building approval given between 1 January 1980 and 31 December 1989 had until 31 October 2004 to comply with this regulation.

In any case, if the owner intends to sell, lease, dismantle or demolish the building within the stated compliance period, the owner must

comply with the law before the building is sold, leased, dismantled or demolished.

3. Consultation

Where installed asbestos materials are present (or thought to be present) in workplaces located in buildings, consultation, involvement and information sharing should occur between the building owner (or agent), employers, workers and their representatives, at each step of the identification, assessment and control process.

4. What are asbestos materials used for and where are they commonly found?

A range of asbestos materials may be found in buildings and plant. Asbestos-containing sprayed insulation materials may be encountered throughout buildings, especially those built in the 1950s to late 1970s. The use of asbestos materials in buildings was phased out over the 1970s and 1980s.

Any building built after 1989 is unlikely to have asbestos materials fixed or installed. The types of asbestos materials that may be installed in a building which are of most concern from a health perspective include:

Sprayed on fireproofing/ soundproofing/thermal insulation	Acoustic plaster soundproofing	Insulation
These vary from hard impervious and well-sealed materials to friable (easily crumbled or reduced to powder) materials applied by spraying or trowelling. The colour will normally vary from white to brown/grey to blue, although in some instances products may have been painted or dyed. These materials are often found on structural steel members and decks (as fire proofing), ceilings, fire plugging, fire doors and occasionally on walls (as fireproofing and/or soundproofing). They may be exposed or may be concealed by suspended ceilings or other decorative structures. It should be noted that where the materials have been used exclusively for fireproofing it is likely they have been used for the same purpose throughout the building. In some instances, asbestos materials may have been removed from parts of buildings as a result of renovations or refurbishments over time.	This is a firm, open pored, plaster-like material, applied by a trowel. The soundproofing material is usually exposed and not usually painted.	Asbestos materials used in the insulation of air conditioning ducts, hot and cold water pipes, hot water reservoirs, pressure tanks, and boilers are generally covered with a fabric or metal jacket. Fire doors often contain laminates or cores of asbestos material covered by wood or metal. Thermal insulating boards, e.g. millboard, are lower density soft-surfaced materials intended primarily for thermal insulation purposes and are “asbestos materials” subject to the provisions of Division 1, Part 11 of the Regulation.

Asbestos-Cement products including A-C sheeting (flat, profiled or perforated) are higher density, hard-surfaced materials intended for structural and plumbing purposes.

These are defined as “asbestos products” not “asbestos materials” and are therefore **not** subject to the requirements of Division 1, Part 11 of the Regulation.

It should be noted that not all spray-on fireproofing/soundproofing, acoustic plaster and insulation contains asbestos.

Only laboratory analysis of samples of the particular material can conclusively identify the presence, type, and proportion of asbestos.

If you are not sure whether a particular material is asbestos or not, then you should either assume that it is asbestos and treat it as such, or have it analysed to determine whether it is asbestos.

Alphabetical List of Asbestos Materials and Uses

Air conditioning duct – exterior or interior acoustic and thermal insulation

Arc shields in lift motor rooms or large electrical cabinets

Asbestos felts

Asbestos mattresses used for covering hot equipment in power stations

Asbestos paper used variously for insulation, filtering and production of fire resistant laminates

Asbestos textile gussets in air-conditioning ducting systems

Asbestos textiles

Asbestos yarn

Autoclave / steriliser insulation

Boiler gaskets

Boiler insulation, slabs and wet mix

Cable penetration insulation bags

Calorifier insulation

Electric heat banks – block insulation

Electric light fittings, high wattage, insulation around fitting (and bituminised)

Fire blankets

Fire curtains

Fire door insulation

Fire-rated wall rendering containing asbestos with mortar

Fire-resistant plasterboard

Fire-retardant material on steel work supporting reactors on columns in refineries in the chemical industry

Fuse blankets

Header (manifold) insulation

Insulation blocks

Insulation in electric reheat units for air-conditioner systems

Lagged exhaust pipes on emergency power generators

Lagging in penetrations in fireproof walls

Lift shafts – asbestos packing around penetrations

Limpet asbestos spray insulation

Millboard between heating unit and wall

Millboard lining of switchboxes

Packing materials for gauges, valves, etc., may be square packing, rope or loose fibre

Penetrations through concrete slabs in high rise buildings

Pipe insulation including moulded sections, water-mix type, rope braid and sheet

Pitch-based (eg. Zelemite) electrical switchboard

Refractory linings (eg. Used in lining furnaces)

Refractory tiles

Sealant between floor slab and wall, usually in boiler rooms, risers or lift shafts

Sealant or mastic on windows

Sealants and mastics in air-conditioning ducting joints

Spackle or plasterboard wall jointing compounds

Sprayed insulation – acoustic wall and ceiling

Sprayed insulation – beams and ceiling slabs

Sprayed insulation – fire retardant sprayed on nut internally, for bolts holding external building wall panels

Tape and rope – lagging and jointing

Tapered ends of pipe lagging, where lagging is not necessarily asbestos

Valve, pump, etc., insulation

5. Who is responsible for identifying asbestos materials in buildings?

The building owner has responsibility to ensure that an "Appropriately Qualified Person" (AQP) takes reasonably necessary steps to find out whether there are any asbestos materials installed in the building, including in essential plant in or on the building. Essential plant includes, but is not limited to, *"air conditioning plant, boilers, cooling towers, escalators, lifts and piping"*.

An **Appropriately Qualified Person** means, *"...the person possesses the qualifications and experience necessary to find asbestos materials in a building"*.

If the workplace was built in the late 1980s then the assessment is likely to be very simple. For example, the reasonably necessary steps that the AQP may take to determine whether asbestos materials are present may include checking building records and with the builder to make sure that asbestos materials were not re-used when the workplace was built.

From a practical standpoint all asbestos products can be included in the AQP's inspection and assessment. However, this is not a mandatory requirement under the regulation and is entirely at the discretion of the building owner.

The person chosen may be a builder, a building surveyor, an occupational hygienist, an architect or an asbestos specialist, among others. More than one person may be involved in the process.

For example, at the building end, a person may conduct an inspection to find the asbestos materials or suspected materials, and another person may then analyse a sample of the material to identify the type of asbestos fibre present.

Any analysis should be undertaken by either a government or National Association of Testing Authorities (NATA) accredited laboratory.

There is no requirement under the regulation for the AQP to be approved by the Division of Workplace Health and Safety. However, the building owner should be satisfied that the person conducting the inspection is familiar with building and construction practices, and is able to recognise possible asbestos materials in the workplace.

If there are asbestos materials at the workplace, it is necessary to ensure that the AQP does an assessment to determine the potential exposure of people entering the building. It may be expeditious to have the assessment conducted at the same time as the inspection.

The AQP is required to give an "asbestos materials report" about asbestos materials found in the building or plant within 3 months after the materials are found. However, if the AQP becomes aware that the building or plant is to be sold, leased, dismantled or demolished within the 3 months, the AQP must give the owner an asbestos materials report as soon as practicable.

The report must state –

- where the asbestos materials were found in the building or plant;
- the type of asbestos materials;
- the form of the asbestos materials;

- whether the asbestos material is friable or poorly bonded or in an unstable condition; and
- any potential health risks to occupants of the building because of the presence of the asbestos materials.

6. Conducting the assessment and reporting the outcomes

The assessment can be compared to carrying out a building survey or stocktake. The condition of all asbestos materials installed in the building for thermal or sound insulation should be visually assessed by the AQP to evaluate the potential of those products to release airborne asbestos fibres.

If the AQP was requested to include all asbestos products in his or her inspection, in addition to asbestos materials, it may also be decided to include these products in the assessment. Again, this is entirely at the discretion of the building owner.

Section 69E(3) of the *Workplace Health and Safety Regulation 1977* lists the things to be included in the asbestos materials report, which will guide the AQP in carrying out the assessment. There is no approved format for the report, but the following guidance may be useful.

6.1 Identify/describe the workplace and the date of the assessment

This section of the report may include:

- the name of the building owner(s);
- any companies/workplaces located in the building;
- the name of the building(s);
- address of the building(s);
- details of areas in the building that were inspected or not inspected;
- the date the assessment was carried out; and
- the date of the report.

6.2 Finding and recording the location(s) where asbestos materials are present

To determine whether asbestos materials are present, the AQP will need to conduct surveys of parts of the building and essential plant. Examples of the parts of the building that should be surveyed include –

- Plant rooms;
- Service risers, e.g. electrical, telecommunications, plumbing and fire;
- Air handling systems, e.g. car park exhausts, toilet exhausts, air plenums;
- Ceiling spaces;
- False spaces, e.g. service spaces between two levels;
- Fire doors and walls; and
- Lift services.

The report must describe the location of asbestos materials sufficiently so it is easy for people to understand where the asbestos materials are located. Following are examples of location descriptions–

- Building A, Level 2, northeast corner of ceiling space, sprayed asbestos on protruding steel girder.
- Building B, basement plant room, asbestos lagging on boiler.
- Building C, plant room 1, asbestos lining on the air-conditioning duct.

Photographs will assist in clearly identifying locations where asbestos materials are found or suspected to be present.

6.3 Type and form of asbestos materials

The report must also set out the type and form of the asbestos materials found in the building, e.g. chrysotile asbestos in the form of lagging. This information may be more easily illustrated in a table where the type and form of asbestos material can be documented with the relevant location information. To assist in determining potential health risks an estimate of the quantity and type of asbestos in the material, established through microscopic analysis, may be useful.

6.4 Statement of the nature of the asbestos, description of its condition and potential health risks

The risks associated with asbestos arise from inhaling airborne fibres. The nature of the asbestos materials identified and its condition will have a significant impact on the potential health risks. For example, friable asbestos, particularly when it is poorly bonded, readily releases fibres. Therefore, the risks associated with friable asbestos material are much greater than the risks associated with non-friable products like sealant or mastic on windows.

The report prepared by the AQP must set out if the asbestos material identified is friable or poorly bonded or in an unstable condition. It must also set out the potential health risks to the occupants of the building because of the presence of the asbestos materials. Again, photographs will complement the condition descriptions.

Air monitoring should be undertaken when asbestos materials are subjected to external conditions that are likely to result in the release of fibres. The results of the monitoring will assist in determining whether persons are likely to be exposed to airborne asbestos, and if so, what controls should be implemented to remedy the situation.

The following scenarios outline situations where the proximity of work will affect the potential exposure to health risks –

Scenario 1: Plumbers who are working on a long pipe that does not directly have asbestos insulation where the work is being done may cause a disturbance to asbestos insulation on the pipe some metres away, possibly generating airborne asbestos fibres in areas where workers or other persons are working.

Scenario 2: People who are laying down electrical wiring in a ceiling space containing extensive sprayed friable asbestos material are likely to be exposed to significant risk from airborne asbestos dust.

Scenario 3: If asbestos materials are found to be present in an air-conditioning system, there is a significant risk of asbestos fibres being widely dispersed throughout the building. This should be given urgent attention.

In determining the potential health risks it will be necessary for the AQP to establish whether the type of work or location of the work is likely to cause a disturbance to the asbestos material.

To undertake this task the AQP should consult with you as the building owner and/or the lessees and/or the business operators occupying the building, to ascertain the following things undertaken in the building –

- routine work;
- unusual and infrequent activities;
- maintenance work; and
- emergency activities.

On ascertaining these things, the AQP will need to take into account the proximity of the asbestos materials to the work and activities

undertaken in the building to report on the potential health risks to occupants of the building because of the presence of the asbestos materials.

In addition to establishing whether the type of work or location of the work is likely to cause a disturbance to the asbestos material, the AQP should also consider whether the asbestos materials are likely to suffer further damage or deterioration, thereby impacting on potential health risks.

This consideration should include an examination of:

- the location of the material;
- any work on the asbestos material;
- whether the asbestos material is poorly bonded (especially if exposed to the weather);
- whether the material's exposure to the weather is likely to affect its condition;
- whether the asbestos material is in machinery; and
- whether the asbestos material is likely to deteriorate through wear in machinery use, e.g. gaskets.

Poorly bonded asbestos material may suffer further damage without being exposed to the weather, e.g. it can fall from ceilings and structures from its own weight.

You should also document any actions you have taken in determining whether asbestos materials are present in the workplace.

Where no asbestos material is found, a record of such a finding should be kept.

Airborne asbestos monitoring, if required as part of the assessment, should be performed by a competent analyst. Samples should be taken of all suspect material, unless the material is known or is assumed to contain asbestos. It is important that representative samples are taken. Any variation in the appearance, texture or colour of the material will necessitate additional samples being taken.

The AQP should detail in the asbestos materials report any limitations because of circumstances existing at the time of the assessment, such as inaccessible areas of a building, or where the asbestos is encapsulated and the condition of it cannot be assessed.

7. Keeping a register for asbestos materials

If asbestos materials have been found in the workplace, an asbestos materials register must be established and maintained. The register must contain the information in the asbestos materials report and any changes necessary because the building or plant is dismantled or demolished.

The register must be made available to each occupant and anyone entering the building to perform work. A copy must be given to any employer, self-employed person or principal contractor who proposes to demolish or dismantle any part of the building where asbestos materials are present. The register must be given to the new owner when a building is sold.

A notice in a prominent place in the building must be displayed, stating that there is an asbestos materials register for the building, and when and where a person can inspect it. For example, the prominent place in a shopping

centre may be outside the building/centre management office or building maintenance office, as this is often the first place tradespersons report to before beginning work in the building.

8. Controlling exposure to asbestos materials

The building owner must ensure policies and procedures are established to control the exposure of people in the building to the asbestos materials.

The policies must include –

- steps to be taken to restrict access to, and prevent disturbance of, the asbestos materials;
- work practices in the vicinity of the asbestos materials; and
- requirements for reassessment of the asbestos materials at regular intervals of at least 1 year and earlier if the nature or location of the work in the vicinity of the asbestos materials changes.

The method chosen to control exposure to asbestos materials will be dependent on the potential risks to occupants as stated in the asbestos materials report.

These risks will be determined by the AQP's assessment of the –

- state of the asbestos material;
- potential disturbance to the asbestos material; and
- likelihood of further damage or deterioration.

As a general guide, asbestos materials, if stable and inaccessible, should be left in situ until demolition, partial demolition or renovation.

Where in situ asbestos materials are in a stable condition, but accessible, they should be controlled appropriately through encapsulation, sealing, enclosure or removal.

Asbestos materials that are friable, poorly bonded or in an unstable condition, preferably should be removed.

If asbestos materials are to be removed, removal must be done by an asbestos removalist issued with a certificate by the Division of Workplace Health and Safety.

Part C

Treatment and removal of asbestos products

The **hazard** is: Asbestos fibres

The **risk** is: Inhalation of asbestos fibres

The way to **eliminate** or **minimise** the **risk** is:

- **Identify** products that contain asbestos
- **Adopt** work methods that prevent or minimise release of asbestos fibres into the air
- **Wear** and properly use personal protective equipment

1. Prohibitions involving asbestos products

The *Workplace Health and Safety Regulation 1997* prohibits certain activities associated with asbestos products, including asbestos-cement sheeting.

An employer, self-employed person or worker must **not** do the following –

- Use a power tool or high pressure water process to clean an asbestos product at the workplace
- Use compressed air at a workplace to clean a surface where asbestos may be present

An employer must not allow his or her workers to do any of the above.

As from 31 December 2003 there is total ban on the use of **any** asbestos product for **any** purpose other than some very limited exemptions. These exemptions are set out in *Schedule 7* of the *Workplace Health and Safety Regulation 1997*.

Most asbestos-cement sheeting profiles are now replaceable with asbestos-free products. Re-use of an asbestos product, including roof and wall sheeting that contains asbestos, is prohibited.

The only **limited** exception is reinstallation of an asbestos product in the position it was installed immediately before 31 December 2003. The exception will operate to allow reinstallation of an asbestos-cement product where the product has been removed for such purposes as repair or inspection of something behind or adjacent to it and the asbestos-cement product has not been damaged or degraded by its removal or reinstallation.

2. Assessing the risks

2.1 Before work starts

Before work starts, an employer or self-employed person must assess the risk associated with the work activity and decide on the control measures to prevent or minimise the level of risk. Reference should be made to the *Risk Management Advisory Standard*.

Employers must ensure that their workers who are involved in removing asbestos-cement sheeting –

- have a basic understanding of the risks associated with breathing asbestos fibres
- have an understanding of specific risks associated with removing asbestos-cement products, and understand the proper work methods to be used in the planned work activity

- are trained in the proper use of personal protective equipment, including respiratory protective equipment
- are trained in the proper use of other equipment used when treating or removing asbestos-cement products; and
- are trained in the proper use of any chemicals used to treat asbestos-cement sheeting.

2.2 Managing other risks to workplace health and safety

Work involving treatment or removal of asbestos-cement products can involve exposure to other health and safety risks e.g. falls from heights, falling objects or manual handling. The *Workplace Health and Safety Regulation 1997*, advisory standards and industry codes of practice provide further information about requirements to manage other health and safety risks.(Note also section 5.1 regarding possible brittle and slippery surfaces)

3. Cleaning and treatment of asbestos-cement sheeting

3.1 The cleaning process

There is a risk to health when the surface of asbestos-cement sheeting is disturbed (e.g. from hail storms and cyclones) or when the sheeting has suffered deterioration due to aggressive environmental factors e.g. pollution. Weathering of asbestos-cement sheeting to the extent that the sheet surface is cracked or broken can also result in the erosion of the asbestos-cement matrix with the possibility of asbestos fibres being released. Fungal growth covers the sheeting and tends to protect the surface from degradation.

Unless cleaning is required for purposes of water quality on building roof catchment, it should not be carried out because of its impact on the fungal growth.

Where treatment of asbestos-cement sheeting is considered essential, a method that does not disturb the matrix of the asbestos-cement sheeting should be used. Chemical treatment and sealing is the preferred method of treating asbestos-cement roofing as there is negligible disturbance of the asbestos-cement matrix. The method usually involves the application of a fungicide either separately or included in the base primer followed by subsequent applications of chemical sealant. The sealant should not deteriorate when subjected to adverse environmental conditions. Fungicides should not be sprayed during strong winds.

When working with chemicals that are hazardous substances, the Material Safety Data Sheet (MSDS) must be referred to for information on the PPE to be used and any specific precautions to be taken when using the chemicals.

4. Drilling holes in asbestos-cement sheeting

Machine drilling asbestos-cement sheeting can cause the release of asbestos fibres into the atmosphere. This can result in fibre concentrations up to ten times the national exposure standard.

Obviously precautions must be taken to protect the drill operator from exposure to these fibres. The quantity of fibres will be drastically reduced if a hand drill is used.

4.1 Preparation

4.1.1 Personal protective equipment

Make sure you are wearing clothing appropriate for the job – either disposable overalls or overalls that will need to be decontaminated after the job is finished.

An appropriate respirator should be worn - usually a disposable particulate respirator - however refer carefully to Section 6.2 Part C before making a final decision about the type of respirator needed.

4.1.2 Preparing the work area

Generally restrict access to the work area and carry out the work with the minimum of people present.

Cover any areas likely to be contaminated with dust from the drilling with polythene sheeting.

4.2 Drilling

Tape both the point to be drilled and the exit point with a strong adhesive tape such as duct tape to prevent the edges crumbling.

Cover the area around the exit and entrance points including the taped area with a thick paste such as wall paper paste and allow to dry before drilling.

After drilling is completed use wet rags to clean off the paste and debris and dispose of debris as asbestos contaminated waste.

5. Dismantling, demolition and removal of asbestos-cement sheeting

5.1 Preparation

(a) Define the work areas and erect barriers and/or signs to advise of the work area where potential exposure to members of the public exists. In the case of houses and similar buildings where asbestos-cement is to be removed from within the building, all windows and doors should be closed to confine the potential spread of asbestos dust.

(b) Determine the type of personal protective clothing and equipment that will be required for the safe removal of the asbestos-cement sheeting, e.g. respiratory protective equipment and protective clothing. More information about personal protective equipment is contained in Section 6 of this standard.

(c) Prevent all other persons from entering the work area.

(d) If the sheeting has deteriorated and become friable such that it is likely that asbestos fibres will be released during removal, then spray the asbestos-cement sheets with a sealant or wet with water and keep damp during removal. Where there is a possibility of the asbestos-cement sheeting drying out before removal is complete, use an emulsion spray or similar substance that inhibits the release of fibres.

The effects of any liquids on roofs can create a risk of slipping and falling and should be taken into account before carrying out work.

Figure 1 - spraying of asbestos-cement sheeting

Beware lest you fall

Brittle

Although asbestos-cement sheeting may be capable of carrying some distributed load and give the impression of a surface which is solid enough to bear a person's weight, in most instances the sheeting will not carry a concentrated load such as that applied by the heel of a person walking, or by a person stumbling and falling.

Slippery

Asbestos-cement sheeting can be a very slippery surface when it is wet and cause a person to slip and fall. Information about managing the risk of working at height can be found in the *Workplace Health and Safety Regulation 1997* and other guidance material produced by the Workplace Health and Safety Queensland.

(e) Select an area where the asbestos-cement sheeting can be placed so it will not be in the way of the work being carried out at the site and will not be damaged. If being left for any period before disposal asbestos sheeting should be kept wet.

5.2 Removal

(a) Avoid use of power tools during removal, with the exception of removing fastening screws. Tools that would generate airborne asbestos fibre contamination should not be used.

(b) Remove asbestos-cement sheeting with minimal breakage. The sheeting must be lowered, not dropped, to the ground.

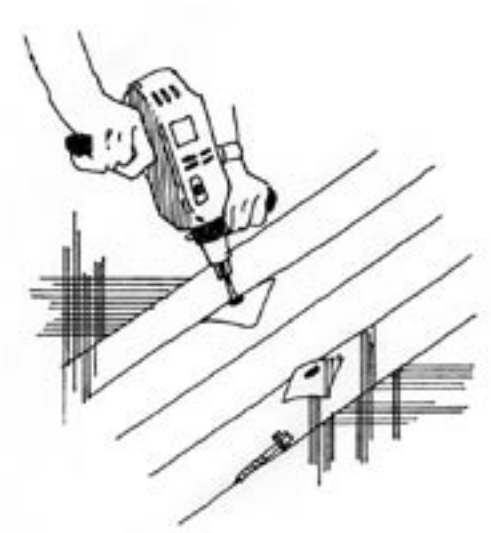

Figure 2 - electric drill removing fastening screws

(c) Stack the asbestos-cement sheeting on polyethylene sheeting, wrapped and sealed into appropriate bundles for disposal. If being left for any period before disposal asbestos sheeting should be kept wet.

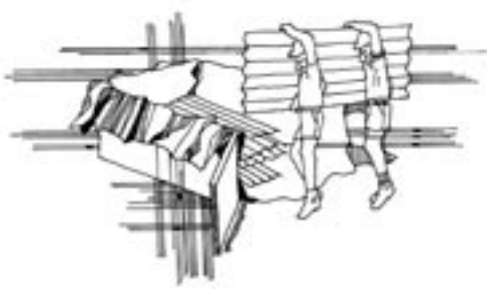

Figure 3 - stacking asbestos-cement sheets ready for wrapping

Destroying asbestos-cement sheeting can destroy your life

One of the greatest hazards that can be created during the removal of asbestos cement sheeting is the release of fibres into the air by breaking of the sheeting.

Every precaution should be taken to avoid breaking the sheeting:

- Where sheeting is attached by bolts (as is usually the case with roofing) undo the bolts or dampen the area around the bolt and use bolt cutters to remove the head of the bolt, avoiding as much as possible contact with the sheeting to remove the bolts. The sheeting can then be lifted off with out breaking. Screws and bolts should be disposed of as asbestos waste.
- When sheeting is attached by nails, wet the area around nail and punch out area around nail to allow sheet to be removed in one piece. Nails can be removed later. Make sure any pieces of sheeting which remain around nail are kept wet and properly disposed of as asbestos waste.
- Lower sheeting to the ground and stack carefully. Keep damp to prevent fibres entering the atmosphere. As soon as possible wrap in polythene sheeting and seal with strong tape.
- In some instances it may not be possible to remove sheeting other then by breaking it. Make sure sheeting is wet and that appropriate personal protective equipment is being worn including respiratory equipment and protective overalls.

IMPORTANT IMPORTANT IMPORTANT

Where asbestos-cement sheeting cannot be removed without excessive breaking, a risk assessment should be made to determine if a person who is the holder of a certificate as an asbestos removalist should be engaged.

Alternatively the removal task should be treated as requiring the same approach and precautions as demolition of an "unsound structure" and the measures set out in Section 5.3 should be followed.

(d) Broken sheeting and associated wastes should be placed directly into disposal bins that have been lined with polyethylene sheeting or placed in heavy duty, 0.2 mm thick polyethylene plastic bags. The bags should be no larger than 1200 mm by 900 mm. Bins and bags should be sealed for removal. To make handling and sealing easier, bags should only be partially filled.

Figure 4 - polyethylene plastic bag indicating contents

(e) Ensure removed sheeting does not lie about the workplace where it may be further broken or crushed by machinery or traffic. Mechanical methods exist for the handling of asbestos-cement sheeting. This reduces potential asbestos exposure and minimises manual handling.

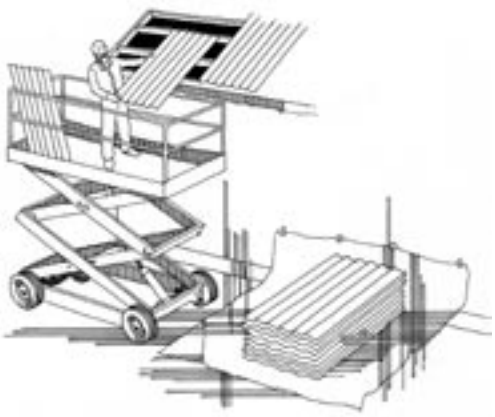

Figure 5 - removing asbestos-cement sheeting using an elevating work platform and stacking it on polyethylene sheeting

(f) When stacking the asbestos-cement sheeting, avoid sliding one sheet over the surface of another as this action will result in scuffing and the release of asbestos fibres.

(g) Keep all asbestos waste wet, and/or wrapped in polyethylene or otherwise sealed and removed from the site as soon as practicable.

If the worker has chosen to wear a disposable protective garment, the contaminated disposable garment, disposable masks and any used respirator filters should be placed in bags for removal with other asbestos waste.

The respirator should continue to be worn until the disposable coveralls have been removed and bagged.

(h) Gutters should be checked for asbestos-cement residue. If there is residue, it should either be lightly wetted before removal or washed away, with the waste water passing through a fine filter so that waste residue can be collected for disposal. Note: Where the guttering is to be used to collect residue, the condition of the guttering should be checked before work commences to determine if it will contain the entire residue.

(i) Any asbestos-cement residue remaining in the roof space or the removal area must be cleaned up. If vacuuming is the chosen method, an industrial vacuum cleaner - not a domestic cleaner - conforming with the requirements of *AS 3544 Industrial vacuum cleaners for particulates hazardous to health* must be used.

Figure 6 - removing asbestos-cement residue using an industrial vacuum cleaner

(j) These vacuum cleaners must also be fitted with high efficiency particulate air (HEPA) filters conforming to the requirements of *AS 4260 High efficiency particulate air (HEPA) filters - Classification, construction and performance*.

Alternatively, a damp cloth can be used to remove dust. If this method is used, the cloth should be sealed in a plastic bag while still damp and safely disposed of as asbestos waste.

(k) All sheeting and debris should be disposed of at a site approved for asbestos waste. Check with the local government authority and the Environmental Protection Agency as to the requirements for transporting and disposal of asbestos waste.

Figure 7 - industrial vacuum cleaner with a high efficiency particulate filter

Unacceptable asbestos-cement removal practices

1. Non-removal of internal mouldings (architraves, skirting and cornice etc) before the attempted removal of flat AC sheeting.
2. Usage of a hammer or hand tools to directly smash away flat, corrugated and profiled wall and roof sheeting, unless PVA sealant spray is being simultaneously applied.
3. Not attempting to remove whole sheets of flat AC sheeting from around window openings prior to the salvaging of window frames.
4. Leaving broken AC sheeting needlessly on the ground where it can be further broken by plant or workers.
5. Pulling over AC sheeted walls with mobile plant

5.3 Demolition of unsound structures containing asbestos cement sheeting

Buildings can become structurally unsound as a result of fire, explosions, earthquakes, termite damage, strong winds or because of impact by other objects e.g. a vehicle that crashes into a building.

People working in or on buildings that have been damaged structurally can be exposed to the risk of injury as a result of falls from heights or falling objects.

Structurally damaged or unsound buildings containing asbestos-cement sheeting may be demolished by mechanical means if –

- strict control measures, are used to minimise the release of asbestos fibres into the atmosphere

- any potentially contaminated materials are properly removed from the site; and
- air monitoring is performed to verify the control measures are effective

The following controls should be used:

- A system of water misting or spraying should be used to suppress dust and asbestos fibres until refurbishment is carried out. The water supply should be drawn from a reliable source which can deliver sufficient pressure and volume to provide water in a "fan-like" or "rose" pattern at height.
- The building or structure and surrounding ground should be lightly watered before any demolition starts.
- During demolition the water spray should be concentrated in the area where the actual breakage is occurring.
- The water spraying process should continue to operate during demolition.
- Water run-off from the demolition site should be minimised. Small sand or earth levy banks may be used to prevent run-off of excess water on to adjacent premises or into storm water drains.
- Weather forecasts and prevailing weather conditions should be taken into account as heavy rain or strong winds may decrease the effectiveness of the asbestos fibre containment procedures.
- Where parts of the building are to remain after demolition of another part, the remaining part may need to be treated with emulsion spray (poly vinyl acetate or PVA) to seal and encapsulate any asbestos.

The interior of transportation receptacles (e.g. trucks, trailers and skips) should be double-lined with polyethylene sheeting to minimise drying out and releasing fibres into the atmosphere.

- Debris generated by the mechanical demolition should be treated as contaminated waste and disposed of as such.
- After contaminated debris has been removed from the site, and before the air monitoring equipment is removed, the top surface of the ground should be skimmed by appropriate earth moving equipment. The skimmed material should be treated as contaminated waste and transported to a disposal site. The surface of any porous material like sand should be skimmed to a minimum depth of 100mm. Any soil used to form levy banks must also be treated as contaminated waste and disposed of appropriately.
- A site that has impervious ground surfacing like bitumen or concrete should be gently washed down with water. Any interception levy banks should then be treated as contaminated waste and disposed of appropriately.
- Loading the debris at the demolition site should occur while the material is still damp. The debris should not be saturated to reduce the risk of contaminated water run-off during transport should the polyethylene liner be ruptured.
- Truck bodies, trailers and skips containing contaminated debris should have their tops fully encapsulated and sealed during transportation to prevent the debris.

Personal decontamination

Don't take asbestos home with you

Asbestos fibres should be prevented from being transported outside the workplace by thoroughly vacuuming asbestos fibres from work clothes worn by those working with asbestos-cement sheeting.

Disposable contaminated coveralls or clothing should be placed in a plastic bag and disposed of as asbestos waste.

Respiratory protective equipment should remain in use until the contaminated disposable coveralls or clothing have been either cleaned or removed and bagged.

If bagged for washing the clothing should be thoroughly wetted before removal from the bag.

The contaminated clothes must be washed separately from other clothing.

Caution should be exercised to:

- keep disturbance of the clothing during the wetting process to a minimum,
- ensure no water escapes and
- ensure no potentially contaminated air escapes from the bag.

The entire contents of the bag should be emptied into the washing machine. The bag which contained the clothing should be immediately disposed of.

If for some reason clothing is heavily contaminated it should be treated as asbestos waste and disposed of accordingly. Alternatively it may be dispatched to an appropriate commercial laundry in a wetted state in a sealed container and clearly marked as ASBESTOS CONTAMINATED CLOTHING.

It should not be laundered at an employee's home or in a domestic laundry.

6. Personal protective equipment

6.1 General

Personal protective equipment is only one method of reducing exposure to asbestos fibres and should not be used as a substitute for the other control measures outlined in this standard to reduce exposure.

People working with asbestos-cement sheeting should wear appropriate personal protective equipment (PPE). The type of PPE required will depend on the work activity and the likely exposure to asbestos fibres.

Disposable protective garments may be worn and disposed of as asbestos waste. Where significant amounts of asbestos fibres may be present because asbestos-cement sheets have to be broken to remove them from a confined area, e.g. ceiling of a room, disposable overalls and gloves should be worn.

A person should not wear clothing made from wool or other materials that attract fibrous dusts. Asbestos fibres should be prevented from being transported outside the workplace by thoroughly vacuuming asbestos fibres from work clothes using an industrial vacuum with a high efficiency particulate filter (see section 4.2 (h) for further details

Respiratory protection should remain in use until the disposable garment has been removed and bagged or work clothing has been cleaned.

6.2 Respiratory protection

There is a wide range of respiratory protective equipment (RPE) available to provide protection against airborne asbestos fibres. All RPE should meet requirements in *AS/NZS 1716 Respiratory protective devices*.

The following is offered as a guide for the use of personal respiratory protective equipment (RPE) when removing asbestos-cement sheeting. Three classes of particulate filter (P1, P2 and P3) are differentiated according to filtering efficiency (See ***AS/NZS 1716 Respiratory protective devices****).*

Job	RPE
unscrew sheets and remove whole	P1 filter if done wet or P2 filter half face piece with replaceable filter or fully disposable facepiece
fractured sheets, hail damage etc.	P2 filter half facepiece - replaceable filter or disposable facepiece
sheets requiring breakage to remove	Minimum P2 filter with half facepiece and replaceable filter or disposable facepiece
Manual removal of sheets which have suffered destruction such as in a fire or explosion	Class P3 filter with full face respirator or PAPR with class P3 filtration

Note: class P2 and P3 filters can be used in place of a class P1 filter

In general, the selection of particular RPE is determined by the nature of the asbestos work and the probable maximum concentrations of asbestos fibres that would be encountered in this work. An explanation of selection and use of RPE is contained in Appendix 2 to this standard.

Understanding the use of RPE is integral to any asbestos work and it is important that any person undertaking the work has a clear understanding of the selection and use of this equipment

7. Galbestos

Galbestos sheeting includes profiled sheets used on roofs and walls, and flat sheets used in flashings. The steel sheeting is sealed with molten zinc and the hot zinc is then bonded to hot bitumen containing chrysotile asbestos (white asbestos) felt. Because of this construction, the asbestos is in a bound matrix which inhibits the ready release of asbestos fibres until deterioration due to ultra violet light exposure causes the matrix to break down. The asbestos content is approximately 5% of the finished product. A gradual corrosion of the surface coatings means that maintenance or replacement will be required. Before walking on Galbestos sheeting, the condition of the sheeting and its capacity to support the work operation should be checked.

The advice provided in this standard in relation to removal of asbestos-cement sheeting also applies to Galbestos.

8. Removal of asbestos friction linings (brake assemblies, clutch housings etc.)

8.1 Preparation

8.1.1 Personal protective equipment

Make sure clothing appropriate for the job is worn– either disposable overalls or overalls that will need to be decontaminated after the job is finished.

An appropriate respirator should be worn – usually a disposable particulate respirator - but refer carefully to Section 6.2 Part C of this standard before making a final decision about the type of respirator needed.

8.1.2 Preparing the work area

Generally restrict access to the work area and carry out the work with the minimum of people present.

The following table is an extract from a guide produced by the Health and Safety Executive in the United Kingdom, ***Working with Asbestos Cement, 2nd edition, 1999.*** *This table provides guidance on typical exposures during work with asbestos cement.*

Activity	Typical exposure (f/mL)	
Machine sawing with exhaust ventilation	Up to 2	
Machine cutting without exhaust ventilation		
- abrasive disc cutting	15 – 25	
- circular saw	10 – 20	
- jig saw	2 - 10	
Hand sawing	Up to 1	
Machine drilling	Up to 1	
Removal of asbestos cement sheeting	Up to 0.5	
Stacking of asbestos cement sheets	Up to 0.5	
Remote demolition of asbestos cement structures dry*	Up to 0.1	
Remote demolition of asbestos cement structures wet*	Up to 0.01	
Cleaning asbestos cement	Roofing	Vertical cladding
Dry brushing (wire)	3	5 – 8
Wet brushing (wire)	1 - 3	1 - 2

* *Subsequent sweeping up after remote demolition may give rise to concentrations greater than 1 f/mL.*

1. Inclusion of a technique does not indicate that it is acceptable (e.g. machine cutting without exhaust ventilation). These concentrations are given to illustrate the high exposures which can result if good work practices are not followed.
2. The exposures quoted are based on measurements taken by the HSE. The same process in different locations may result in higher or lower concentrations.
3. The exposures relate to the work period and are not calculated as time-weighted averages.

Cover any areas likely to be contaminated with dust from the removal process with polythene sheeting.

8.2 Removal

Partially open the housing and spray the inside with water being careful to collect any run-off as this may contain asbestos.

Open the housing and use wet rags to clean out the housing.

Remove the friction linings and dispose of as asbestos waste.

Clean up general area using wet rags then dispose of rags and covering sheet as asbestos waste.

Make sure you follow the personal decontamination processes described in Section 6 of Part C.

Part D

Removal of asbestos materials

The **hazard** is: Asbestos fibres

The **risk** is: Inhalation of asbestos fibres

The way to **eliminate** or **minimise** the **risk** is:

- **Identify** materials that contain asbestos
- **Adopt** work methods that prevent or minimise release of asbestos fibres into the air
- **Wear** and properly use personal protective equipment

Asbestos materials are defined in the *Workplace Health and Safety Regulation 1997* as "installed thermal or acoustic insulation materials comprising or containing asbestos".

Asbestos removal work is a "prescribed activity".

Anyone carrying out such work must have a certificate under s29B of the *Workplace Health and Safety Regulation 1997*.

1. Planning and programming considerations

1.1 Work method statements

Part 11, Division 4, Subdivision 1 of the *Workplace Health and Safety Regulation 1997,* Work Method Statements, requires that a work method statement be prepared by the holder of a certificate under s29B (i.e. a certificate to perform a prescribed activity namely the removal of asbestos materials) before removal of the asbestos material starts.

Legislation

S75C Workplace Health and Safety Regulation 1997.

A work method statement must state:

- that the activity being undertaken is asbestos removal which is a prescribed activity
- the ABN number of the holder of the certificate under s29b
- the certificate number
- the specific control measures proposed to be used to comply with the certificate holders workplace health and safety obligations
- the way the activity is to be performed including how the control measures are to be implemented
- how the effectiveness of the control measures will be monitored and reviewed
- the arrangement for appropriate training under Part 3A of the workplace health and safety regulation 1997.
- the arrangements for supervision (under Part 3A *Workplace Health and Safety Regulation 1997*) of the performance of the activity by a competent person.

1.2 Preliminary considerations

Before work starts, an employer or self-employed person must assess the risk associated with the work activity and decide on

the control measures to prevent or minimise the level of risk. Reference should be made to the *Risk Management Advisory Standard*.

Prior to preparing the work method statement, the asbestos removalist should request details of the required removal work and any hazards that may pose a risk during removal. The asbestos removalist should obtain information on:

(a) location of the proposed removal work-

- indoors
- outdoors but protected
- outdoors exposed to weather
- enclosed in ducts or trenches below ground level
- difficult or unusual site conditions which will influence the selection or application of removal methods, particularly concerning transport,
- scaffolding or weather protection;

(b) a description of the asbestos material to be removed, the type of asbestos present and any special or unusual materials;

(c) dimensions of surfaces. Where these are adequately detailed on drawings, preferably coloured to indicate areas for removal, provision of copies of the drawings would be sufficient. Where drawings are not available, information of the following nature should be obtained:

- surface dimensions of flat or large curved areas, and thickness of insulation
- external diameters and lengths of each size pipe
- number and type of pipe fittings, for example, flanged joints, valves, tees, expansion bends
- particular detail where asbestos material is to be removed from any part of the building's air conditioning system;

(d) any pipework sections that are steam or electrically heated and the arrangement of its insulation;

(e) any residual heat that will remain in pipework, boilers, turbines or refinery equipment during the removal work;

(f) temperature

- normal working temperature for each section of the plant concerned
- ambient temperature at the removal area;

(g) sections or materials to be left in place

Legislation

S75F *Workplace Health and Safety Regulation 1997*

A work method statement:

- must take into account, if the asbestos removal is to take place at a construction workplace, the construction workplace plan
- must take into account circumstances at the workplace that will or are likely to affect the way the asbestos removal will be performed
- be written in a way likely to be understood by workers and those who are likely to be affected by the activity
- be signed and dated by the certificate holder

(h) Unusual or specific hazards associated with the removal work For example, where there is a potential hazard from contact with live electrical equipment in the removal area;

(i) location of any relevant electrical cables;

(j) electrical switch gear or panels to be sealed and any supplementary ventilation required to minimise the potential for heat build-up and consequent fire risk;

(k) conditions of substrate surfaces - special requirements, such as the removal or otherwise of protective paint or lacquer from pipework or for the application of paint or other

(l) protective coatings to the substrate from which the asbestos material has been removed;

(m) types of fittings and supports and whether or not these may be removed or disposed of with the waste.

1.3 Preparing the work method statement

In addition to addressing any of the hazards identified above, a workplace health and safety plan for asbestos removal should include detail on:

(a) the type and extent of isolation required at the asbestos removal area and location of restricted access barriers;

(b) the methods to be adopted when removing asbestos material, including detail of the contamination control program, for example:

- provision of negative air pressure and the location of the exhaust unit
- location of decontamination unit;

(c) waste disposal program:

- storage on-site
- storage in bin on-site
- removal from building (eg. using an isolated lift);

(d) waste disposal site and approval from relevant local disposal authority;

(e) shapes and sizes of temporary buildings required by the removalist, together with particulars of water, light and power requirements;

(f) how access to the asbestos removal area will be restricted.

Frequently, asbestos removal work is dependent on the progress of work undertaken by other contractors at the workplace. The asbestos removalist should obtain details of any planning schedules that have the potential to impact on the asbestos removal work. This will allow the removalist to schedule and undertake the removal work without other workers being present at the removal site. Conversely, the work of other contractors should be scheduled to preclude work near to, or accidentally breaking into, the asbestos removal area. In order to prevent or minimise the risk of disease from airborne asbestos fibres for workers and other persons at the asbestos removal site, the asbestos removalist should provide information about the asbestos removal work to each employer and self-employed person at the workplace.

Legislation

Workplace Health and Safety Regulation 1997

s75G, s75H, s75K, s75L

Unless all of the following criteria have been fulfilled asbestos removal work must not proceed.

An employer who is the holder of a certificate

(i) must not allow a worker to commence removal unless:

- All aspects of the work method statement have been discussed with the worker
- The worker has satisfactorily demonstrated that they understand and can comply with the work method statement

(ii) Once removal has commenced **the employer:**

- Must not allow a worker to perform the removal task other then in compliance with the work method statement
- Must not perform the removal task other then in compliance with the work method statement

An employer or self employed person must not start asbestos removal unless:

- the person holds general induction evidence
- if the workplace is a construction workplace the person has shown the principal contractor general induction evidence
- in the case of an employer, the employer has sighted general induction evidence for any worker

A **principal contractor** must not allow asbestos removal to commence unless a work method statement has been prepared.

A **worker** must not start asbestos removal work unless:

- the worker holds general induction evidence
- the worker has shown the employer the general induction evidence

2. Asbestos removal

2.1 Initial considerations

In order to prevent or minimise the risk of disease from airborne asbestos fibres to a person at an asbestos removal site, a number of factors should be considered when preparing the site for removal of the asbestos material. These include the method of containment of the removal area and whether or not complete enclosure is possible, the provision and location of decontamination and changing facilities, and the control measures to be implemented to prevent the release of asbestos fibres outside the removal area.

2.2 Determination of asbestos removal area where total enclosure is not possible

In some instances such as in large power stations or other industrial plant, it may not be possible to provide an enclosure around the asbestos removal area to prevent asbestos fibres entering the atmosphere. In these circumstances, the boundaries of the asbestos removal area, should be determined by the asbestos removalist, following an assessment of the site. However, the boundary would not normally be less than ten metres from the asbestos workplace unless an existing barrier

is already in place. The boundary may need to change depending on the results of monitoring.

The boundary of the removal area should be defined by barrier, rope or rail and signs indicating that it is an asbestos removal area. The signs should state:

Asbestos working area

no unauthorised entry

respiratory protection

essential

Static air sampling may be necessary to confirm the suitability of the selected boundaries.

Entry to the removal area should be restricted to workers directly engaged in the removal work. All dirty work clothing, tools, equipment and bagged waste asbestos materials should be decontaminated before being removed from the asbestos removal area. Those items that cannot be decontaminated through a decontamination unit, should be wrapped and sealed in plastic sheeting approximately 0.2mm thick, and only opened in another removal area.

2.3 Preparation for asbestos removal from buildings and other structures

2.3.1 Sealing the removal area

Where total enclosure of the removal area is possible, the area should be isolated using plastic sheeting (approximately 0.2mm thick) on the floor and walls of the structure. It may be necessary to erect a temporary timber or metal frame to which the plastic barrier can be attached. All joints should be overlapped (by approximately 200mm) and double taped to ensure the area is completely sealed off. In some circumstances the use of adhesives may supplement the use of tape.

Existing floor coverings should be removed. A double layer of plastic sheeting, fixed by double-sided tape or adhesive to prevent movement between layers, should be used on the floor of the containment area and a turn-up of 300mm should be used where the floor joins the sidewalls. Extra strength in the containment floor can be achieved by running the double layers of plastic at an angle of 90 degrees.

Where asbestos material is to be removed from an entire floor of a multi-storey building, ensure passenger elevators do not stop at that floor. Workers undertaking the removal may gain access to the floor via the fire stairs or from an elevator dedicated for this purpose.

All movable furniture, plant and fittings should be removed from the removal area. Immovable items should be fully wrapped and sealed in plastic sheeting approximately 0.2mm thick, so that they are effectively isolated from the removal area. It may also be necessary to provide additional masking or barricading in heavy traffic or high wear areas of the removal area.

Where masking work may release asbestos fibres into the atmosphere, all persons in the removal area should wear respiratory protective equipment suitable for use with asbestos. *AS/NZS 1715:1994 Selection, use and maintenance of respiratory protective devices* provides advice on respiratory devices for use with asbestos. Respiratory protection should also be worn when removing existing barriers or partitions such as false ceiling tiles. Where asbestos materials have fallen on to a false ceiling, the ceiling should be removed

only when the containment barrier has been constructed and under full removal conditions. Any utility or service line that penetrates into the ceiling space should be sealed, as it is located if it cannot be sealed from outside the removal area.

2.3.2 Sealing services to the removal area

Apart from asbestos exhaust extraction units, all ventilation and air-conditioning networks servicing the removal area should be closed down for the duration of the removal work. All vents should be masked to prevent the asbestos fibres entering the duct network. On completion of the removal work, and after final cleaning of the removal area, all mechanical ventilation filters for recirculated air should be replaced if possible.

An asbestos removalist should also ensure that asbestos fibres will not escape through points where pipes and conduits pass out of the removal area. Specific attention to masking and compliance testing may be required at these points, particularly if service riser-shafts pass through the removal area.

2.3.3 Emergency access to the removal area

When installing the containment barrier, consideration should be given to the alteration of the fire rating of the building and to the provision of fire fighting facilities, emergency exits and emergency lighting.

Emergency and fire exit arrangements should be established before removal work commences. Fire extinguishers and hoses should be placed at strategic locations within the removal area and removal site. For emergency evacuation, the asbestos removalist should provide an audible alarm, air horn or similar, positioned in a convenient location to be heard by workers in the removal area and other persons in the removal site.

In the event of a fire or to assist a seriously injured worker, decontamination procedures may be waived.

2.3.4 Exhaust extraction from the removal area

Exhaust extraction should be provided to maintain the removal area under a negative pressure to prevent the escape of airborne asbestos fibres. An exhaust extraction fan should be installed in a position to create a negative air pressure of approximately 12Pa (water gauge) within the removal area. In this arrangement, the only route of air into the removal area should be through the decontamination unit.

The air extracted by this system should pass through a High Efficiency Particulate Air (HEPA) filter to remove any asbestos fibres. Ideally, air extraction units should be situated so that access to the filters can be gained from the removal area, while the unit is kept outside the removal area. This will speed up decontamination of these units and allow another unit to be brought into service in the event of a breakdown. Where it is not possible to change the filter within the removal area, a temporary enclosure should be constructed around the unit during the filter replacement.

The HEPA filter should comply with the minimum 99.97 per cent efficiency requirement detailed in *AS 4260 – 1997 High efficiency particulate air (HEPA) filters: Classification, construction and performance*. A coarse pre-filter should be installed prior to the HEPA filter to prolong the useful life of the high efficiency filter.

Where possible, the discharge point for this extraction unit should be to the outside air, distant from other working areas, air-conditioning inlets or breathing air compressors.

The most satisfactory method for assessing the integrity of the filter and seal fittings is by regular inspection, in conjunction with a static pressure alarm, which indicates a failure in the system.

The extraction equipment should be in continuous operation while the containment barrier is in place. In the event of a breakdown, the removal work should be stopped until the extraction equipment is again operational.

2.3.5 Compliance testing of removal area containment prior to commencement of work

Before commencement of asbestos removal work, a non-toxic smoke generator should be used to test the integrity of the containment barrier. The testing should occur prior to operation of the extraction unit. If the smoke reveals a leak in the containment barrier, the containment barrier should be repaired and retested prior to commencing the removal work.

A visual inspection of the containment barrier should also be carried out at the beginning of each working shift. Any fault identified during inspection that has the potential to result in the release of asbestos fibres should be remedied immediately.

2.4 Decontamination facilities

Asbestos removal work creates a risk of disease from inhalation of airborne asbestos fibres from contaminated personal protective equipment. In many instances, the only satisfactory method of providing suitable changing facilities to ensure decontamination is by the provision of a mobile or specially constructed unit at the removal site. The decontamination unit should be sited immediately adjacent to, and joined to, the enclosed asbestos removal area and be divided into three distinct areas. These are the:

- dirty decontamination area
- clean decontamination area
- clean changing area

The three areas should be separated by means of an airlock or buffer zone. Normally this airlock would consist of spring loaded doors or two or more overlapping sheets of plastic positioned so as to define the boundary between each segment of the decontamination unit, while allowing workers access and airflow towards the removal area. To ensure a good airflow through the unit when doors are used to segment the decontamination unit, large openings with a hinged flap to operate as a one-way valve should be provided. The decontamination unit should be separate from the facilities used by other workers at the workplace.

A diagrammatic view showing an example of the arrangement of this facility is presented in Figure 1.

The dirty decontamination area should have provision for:

- vacuum cleaning or hosing down of contaminated clothing and footwear
- storage of contaminated clothing and footwear
- airflow towards the removal area
- a shower area with an adequate supply of warm water

The clean decontamination area should have provision for:

- storage of individual respirators in containers or lockers
- airflow towards the dirty decontamination area
- a shower area with an adequate supply of warm water

The clean changing area should have provision for:

- storage of clean clothing
- separate storage of clean and dirty towels
- airflow towards the clean decontamination area

All water from the decontamination unit should pass through a filter or other trap before it passes into sewer mains.

Procedures for the use of decontamination facilities are set out in section 6 of this standard.

2.5 Changing facilities where a decontamination unit is inappropriate

To prevent or minimise the risk of disease from airborne asbestos fibres when removing small amounts of asbestos material, where the decontamination facilities described earlier are inappropriate, an arrangement should be adopted to ensure that personal protective equipment used for asbestos work should not be worn away from the immediate vicinity of the asbestos removal area.

Normally this would require a worker to remove their outer protective clothing and overshoes in a designated area attached to the removal area, and then proceed directly to the changing and showering facilities. The discarded protective clothing should be stored in appropriate sealed containers at the removal area. Respirators should be worn when removing protective clothing and during showering, and then stored in containers or lockers.

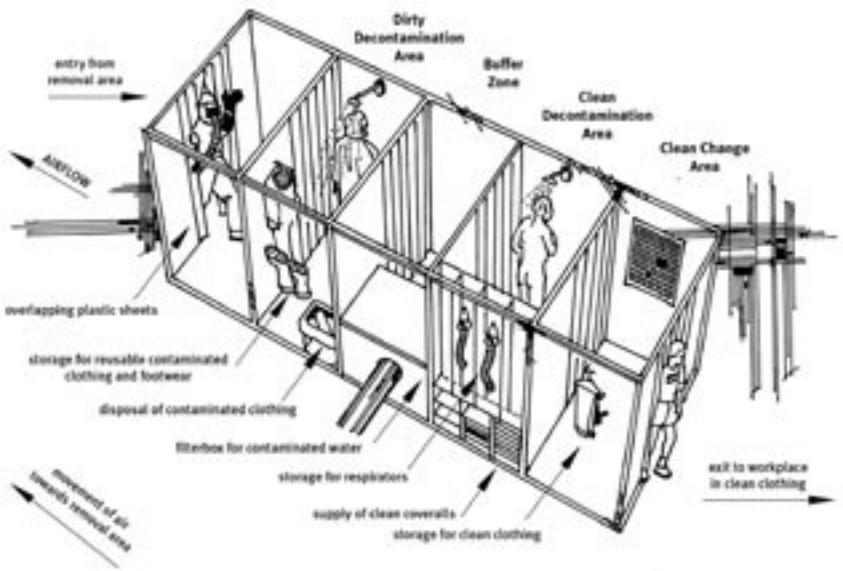

Figure 1 - Components of a decontamination facility

Changing facilities should be made available for the exclusive use of persons working in an asbestos removal area. Separate storage provision should be made for portable equipment, respirators, clothing and any other materials used in the removal work.

Where a permanent changing facility is necessary (for example, in larger power stations or dockyards), the changing room should have separate sections, designated as dirty or clean as appropriate, with clothes lockers in each.

3. Plant used for asbestos removal

3.1 Selecting the correct plant

Plant such as electrical and pneumatic tools when used in asbestos removal work can result in the release of large quantities of asbestos fibres. The selection of suitable plant will assist the asbestos removalist in preventing or minimising the risk of disease from airborne asbestos fibres for a person in an asbestos removal site.

3.2 Cutting tools

Breaking through the finishing compound and cutting the reinforcing wire in the lagging are operations, which can release considerable quantities of asbestos fibres.

Care should be taken in the selection of tools and in keeping the asbestos material wet.

Tools should allow cutting of the asbestos material into small sections while keeping dust levels in the removal area to a minimum.

Power, telephone and fire alarm cables may lie underneath asbestos material. These cables should be clearly identified prior to the commencement of any cutting, as an additional risk may be created to a worker from these hazards. Where cables are identified, these should be recorded in the workplace health and safety plan.

Service lines under insulation, particularly on turbines, are vulnerable to damage from cutting tools. Alternate routing, cabling or deactivation of such lines is suggested.

The use of any power tool in asbestos removal work requires careful consideration since not all types are suitable, particularly in relation to internal dust collection and electrical safety in wet conditions. For this reason compressed air driven power tools are preferable.

3.3 Spray equipment

Surface soaking from a spray jet should be used for small areas and where total saturation is not possible. The spray could be from an adjustable pistol grip, garden hose spray, fed from a main supply, or where no supply is readily available, from a portable pressurised vessel, such as a pump-up garden sprayer. A constant water pressure is desirable to ensure the material is wet to a consistent depth.

3.4 Vacuum cleaning equipment

Vacuum cleaning equipment used in asbestos removal work should conform to the requirements of the relevant Australian Standard. In particular, all extracted air should pass through a HEPA filter before discharge into the atmosphere.

3.5 Waste disposal equipment

The appropriate containers for the removal of asbestos waste should be heavy-duty polyethylene bags, approximately 0.2mm thick. The bags should have a maximum size of 1200mm (length) and 900mm (width).

To reduce the potential for bag rupture and to minimise asbestos contamination, asbestos waste should be double-bagged; once at the work face and a second time away from the work face but prior to leaving the removal area enclosure.

Where hard or sharp asbestos waste is to be disposed of, it will require preliminary sealing or a protective covering prior to being bagged.

Where large metal storage bins or kibbles are provided, in or immediately adjacent to the removal area, a single bag may be adequate. In these circumstances, washing down of the bags in the removal area would be satisfactory method of contamination control. The bins should have lids and rims in a good condition to allow them to be sealed.

In order to minimise the risk of tearing or splitting, bags used for asbestos waste should not be filled to more than half their holding capacity. Each bag or other container should be labelled on its outermost surface, with the following warning statement:

Caution - asbestos

Avoid creating dust

Serious inhalation health hazard

Asbestos waste should not be allowed to accumulate in the removal area. The waste should be bagged or placed in storage bins and removed from the removal area as the removal work proceeds. Bags designated for asbestos waste should not be used for any other purpose, and should never be reused.

All asbestos waste should be disposed of at an approved disposal site.

3.6 Inspection of equipment

Equipment used for the removal of asbestos material should be inspected prior to commencement of the removal work, after repair and at least once in every seven days where equipment is in continual use. A register containing details of the examination, state of equipment and repair (if any) will ensure that particular items of plant are not overlooked.

4. Removal techniques for buildings & other structures

4.1 Choosing a removal method

The removal of asbestos material from buildings and other structures should be carried out in a way that will prevent or minimise the risk of disease from airborne asbestos fibres for a person in an asbestos removal site. The choice of method should be determined by the nature of the asbestos material, the quantity and its location.

As the techniques used for the removal of sprayed thermal insulation from buildings are not dissimilar from those used for removal from steampipes and boilers, the following removal methods can be adapted for the removal of asbestos from plant.

4.2 Spray method

This method should only be used when relatively small quantities of asbestos material are to be removed and when the following conditions apply to the material:

- the asbestos material is not covered with other materials such as calico or metal cladding which require prior removal;
- there is no reinforcing wire or other similar restrictions to removal;

- the asbestos material is not coated with paint or mastic;
- rapid temperature drop due to excessive water could cause damage to heated metal components;
- no live electrical conductors are present and where no damage to electrical equipment can arise from the ingress of water.

The spray should be applied in such a manner as to ensure that the entire surface of asbestos material is wet with minimal run-off occurring.

In many instances, it may be advisable to add a wetting agent (surfactant) to the water to facilitate more rapid wetting of the asbestos material. The asbestos material should be wetted through to its full depth and maintained in a wet condition. A manually controlled, consistent low pressure, coarse spray such as from an adjustable, pistol-grip garden hose should be used for this purpose. The design of the spraying equipment will be dependent on availability of water supply and access to the area to be sprayed. It is important that the spray is plentiful, but not to the extent that water droplets generate asbestos fibres on impact with the surface of the asbestos material.

When using cutting equipment to remove asbestos, the water spray should be directed at the site of the cut and the wetted material removed as the cut progresses.

The wetted asbestos material should be removed in sections and immediately placed in suitably labelled containers and properly sealed. Any small sections, which may be dislodged, should also be collected and disposed of.

This method will significantly reduce, although not entirely eliminate airborne asbestos fibres. As a result, workers and other persons entering the removal area will require respiratory protection.

4.3 Removal by soaking

The quantity of asbestos material to be removed from pipes or ducts is often so extensive, or the material so thick, that the spray method may not suppress the dust sufficiently. An alternative approach is to soak the material using a water injection device. Where the pipes or ducts have been in use, soaking of the asbestos materials may start as soon as metal temperatures permit. However, where metal cracking could occur, the metal should be allowed to cool to a suitable temperature.

Ensure the following issues are taken into account during the soaking procedure:

- when cloth, mastic or other such materials cover the asbestos material, loose asbestos fibres or other nuisance dust should be removed by vacuum cleaning or by wiping with a damp cloth;
- when cladding has to be removed before access is obtained to the asbestos material, the cladding should be removed with caution and surfaces vacuum cleaned continually or, if possible, sprayed with water;
- make holes or cuts in the outer covering, to enable water to be injected in such a manner and quantity as to ensure that asbestos material is wetted, but not washed out by the passage of water. It has been found that slow saturation from the metal interface outwards is quite successful;

- the quantity of water required and the time to soak will depend on factors including thickness of insulation, access and location of holes;
- the saturated asbestos material should be removed in sections and immediately placed in labelled containers and sealed. During this process, it may be necessary to carefully cut reinforcing wire or similar restraints. The material should be thoroughly soaked, and small sections that may have been dislodged should also be collected and disposed of;
- although sufficient water is needed to saturate the asbestos material, excess water may create contamination. Waste water should be filtered to remove asbestos fibres prior to discharge into sewer mains.

4.4 Dry removal

This method is considered to be the least desirable removal technique and should only be used where the spray and soaking methods cannot be used. This method may be necessary in situations where there are live electrical conductors or where major electrical equipment could be permanently damaged or made dangerous by contact with water.

The increased potential for the generation of airborne asbestos fibres in dry removal techniques requires that:

- the work area should be fully isolated with impermeable sheeting and the interior maintained at a slight negative pressure, using suitable exhaust equipment;
- all persons entering the removal area should wear full-face, positive pressure, supplied air respirators;
- asbestos material should be removed in small pre-cut sections with minimum disturbance in order to reduce the potential for generation of asbestos fibres. Waste material should be immediately placed in wetted containers. Also see Section 4 for information on waste disposal equipment;
- in some cases it may be possible to use local exhaust extraction to minimise airborne concentrations of asbestos fibres. In order to achieve the required efficiency, a minimum air velocity at the extraction point of 1 m/s is recommended and the area of the hood inlet should be large enough and placed close enough (not greater than the diameter of the hood inlet) to ensure efficient dust collection. Filtration should be sufficiently complete to permit the return of air to the workplace. In particular, all extracted air should pass through a HEPA filter before discharging into the atmosphere.

4.5 Removal from hot metal

Removal of asbestos from hot metal presents one of the worst conditions of removal due to the potential spread of asbestos fibres on convection currents of air. Where possible, sufficient time should be given to allow the plant to cool to temperature below 100 degrees C before removal work is undertaken.

When using the dry removal method on hot surfaces, the selection of dust extraction equipment should take account of the convection currents involved. The selection of personal protective equipment should also take account of this.

4.6 Techniques for small removal jobs

4.6.1 Use of glovebags

Glovebags are single use bags constructed from transparent, heavy-duty polyethylene, with built-in arms and access ports. Glovebags are approximately 1 metre wide by 1.5 metres deep and are designed to isolate small removal jobs from the general working environment. As such, they provide a flexible, easily installed and quickly dismantled temporary enclosure for small asbestos removal jobs. See Figure 2 for illustration of a glovebag.

This method is suited to the removal of asbestos lagging from individual valves or joints in steampipe or other similar locations. There are a variety of commercial bags, which are suitable for this purpose.

The major advantage of glovebags is that they contain all waste and contamination within the bag, eliminating the need for extensive personal protective equipment and decontamination. The only significant limitation to the use of glovebags is the volume of waste material they may contain. Consequently, care needs to be exercised to prevent overfilling with water or waste.

The method for use of a glovebag is as follows:

- the glovebag should be installed so that it completely covers the pipe or the structure where asbestos removal work is to be carried out. The pipe lagging on either side of the bag should be sufficiently sound to support the weight of the bag and its wet contents. Glovebags are installed by cutting the sides of the glovebag to fit the size of the pipe from which asbestos is to be removed. The glovebag is attached to the pipe by folding the open edges together and securely sealing them with tape. All openings in the glovebag should be sealed with duct tape or equivalent material. The bottom seam of the glovebag should also be sealed with duct tape or equivalent to prevent any leakage from the bag that may result from a defect in that seam.
- workers using glovebags should as a minimum, wear a half-face respirator fitted with particulate filters approved for asbestos. This precaution should be taken in case the bag is punctured or a leak develops from a poor seal.
- the asbestos material from the pipe or other surface that has fallen into the enclosed bag should be thoroughly wetted with a wetting agent. This should be applied using an airless sprayer through the pre-cut port in the glovebag, or where this does not exist, applied through a small hole cut in the bag.
- once the asbestos material has been thoroughly wetted, it can be removed from the pipe, beam or other surface. The choice of tool used to remove the asbestos material depends on the nature of the material to be removed. Asbestos materials are generally covered with painted canvas and/or wire mesh. Canvas may be cut and peeled away from the asbestos material underneath. Where the material is dry, it should be re-sprayed with a wetting agent to minimise the potential for asbestos fibres to be generated during the removal work.
- after removal of the asbestos material, the pipe or surface from which asbestos has been removed should be thoroughly cleaned with a wire brush and wet-wiped until no traces of the asbestos material can be seen. In addition, the upper section of the bag should be washed down to remove any asbestos materials that have adhered to the bag.

- any edges of asbestos materials exposed as a result of the removal or maintenance activity should be encapsulated with a sealing compound to ensure that the edges do not release asbestos fibres into the atmosphere after the glovebag has been removed.
- once the asbestos removal and encapsulation (if any) work has been completed, a vacuum hose from a vacuum cleaner suitable for work with asbestos, should be inserted into the glovebag through the access port to remove any air in the bag that may contain asbestos fibres. Following this, the bag should be squeezed tightly (as close to the top as possible), twisted and sealed with tape, keeping the asbestos materials safely in the bottom of the bag.
- the vacuum line can then be removed from the bag and the glovebag itself removed from the workplace for disposal.

4.6.2 Mini-enclosures

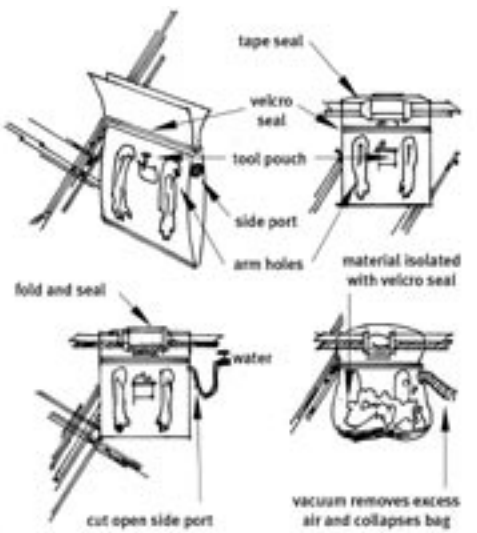

Figure 2 - use of glovebags

In some instances, such as the removal of asbestos material from a small ventilation system or from a short length of duct, a glovebag may not be either large enough or of suitable shape to enclose the item and ensure that the release of asbestos fibres into the atmosphere is prevented or minimised. In these cases, a mini-enclosure may be built around the area where small-scale, short-duration asbestos maintenance or removal work is to be done.

A mini-enclosure should be constructed from polyethylene sheeting (approximately 0.2mm thick) and can be small enough to restrict entry to the asbestos removal area to one worker. The plastic sheeting should be fixed to the walls of the room or other existing or temporary supports, and a double layer of plastic should be laid on the floor. There should be adequate overlap where the walls and floor are joined. The two layers on the floor should be secured to minimise movement between layers. Any penetrations into the mini enclosure such as pipes or conduits should also be sealed.

The mini-enclosure should include two small changing rooms, of approximately 1 metre square each. The changing rooms should be separated from the removal area by double, overlapping layers of plastic. A similar arrangement should also separate the dirty changing area from the clean changing area outside the enclosure. This arrangement is presented diagrammatically in Figure 3.

While inside the mini-enclosure, the worker should wear disposable coveralls, overshoes and suitable respiratory protection. Upon leaving the removal area part of the enclosure, the worker should vacuum down coveralls, removing them in the dirty changing area section of the enclosure. After leaving the enclosure, the worker should shower and then

remove respiratory equipment before changing into fresh clothing.

In this situation, an airline respirator would be inappropriate, as the worker should continue to wear the respirator on the journey from the removal area to the shower.

The advantages of a mini-enclosure are that it:

- limits the potential spread of asbestos contamination;
- reduces the potential exposure of other persons and workers who may be working in adjacent areas;
- is quick and easy to install.

The disadvantage of a mini-enclosure is that it may be too small to contain the equipment necessary to create a negative pressure within the enclosure. However, the double layer of plastic sheeting separating the removal and changing areas will serve to restrict the release of asbestos fibres from the enclosure.

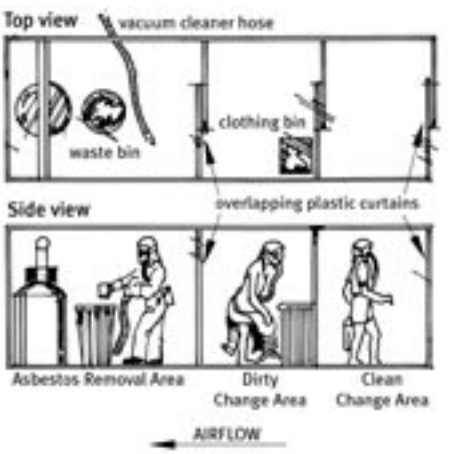

Figure 3: Layout Of A Mini-Enclosure For Asbestos Removal

The procedures to be followed in dismantling the mini-enclosure are the same as those outlined for larger enclosures in section 8 of this standard.

5. General hygiene requirements

5.1 Containing asbestos fibres

To ensure that asbestos fibres are not taken from the asbestos removal area into other parts of the workplace, exposing other persons to the risk of disease from airborne asbestos fibres, the asbestos removalist and workers undertaking asbestos removal work should:

(a) before leaving the removal area, first go through the decontamination procedures determined for that site;

(b) be provided with changing facilities separate from those used by other groups of workers at the workplace. Clean overalls, outer clothing and dirty overalls should be segregated.

Note: Work clothing should not be taken home and under no circumstances should outer clothing worn in the removal area be worn outside the removal area.

In addition, workers should not be allowed to eat, drink or smoke in the asbestos removal area, as this would require the removal of respirators, exposing workers to potentially high concentrations of asbestos fibres.

5.2 Decontamination procedures

In circumstances where the decontamination unit cannot be located adjacent to, and joined to, the removal area enclosure, procedures to prevent or minimise asbestos contamination should be implemented. Usually this would require workers to discard their coveralls and overshoes or other outer garments in an

isolated changing area attached to the removal area enclosure, and change into fresh outer clothing for the journey to the decontamination unit.

Where use is made of these temporary-changing facilities in the removal area, de-dusting should be carried out before the protective equipment is placed in the dust-proof accommodation provided.

5.2.1 Workers

Workers and other persons leaving an asbestos removal area should ensure that protective clothing and footwear are thoroughly cleaned of any visible asbestos material by vacuuming with a vacuum cleaner suitable for work with asbestos, or by hosing down with water, prior to entering the decontamination unit. Under no circumstances should asbestos fibres be removed from clothing by shaking or blowing off with compressed air.

Following this initial cleaning, the worker should shower fully clothed in the dirty decontamination area, with respirator worn and operating. After showering, the wet clothing is removed and placed in the storage provided.

The worker then passes through the buffer zone or airlock and removes the respirator while showering in the clean decontamination area. The discarded respiratory equipment is then stored in a locker or other suitable enclosure. Where airlines are brought through the decontamination facility, provision should be made to wash the airline and enclose the end in plastic once it is disconnected from the respirator mask.

During the final shower, the worker should pay particular attention to washing of hair, face and fingernails.

Following this final shower, the worker passes through the second airlock or buffer zone into the **clean changing area**. Here the worker changes back into conventional work clothing stored in the lockers provided.

Workers should not smoke, eat or drink in any part of the decontamination unit.

The asbestos removalist should ensure that provision is made for routine cleaning of the decontamination facility, disposal of discarded coveralls and overshoes, and the laundering of wet garments and towels.

5.2.2 Equipment

All plant and electrical equipment such as vacuum cleaners and power tools should be left in the removal area until completion of the removal work. When the equipment is removed it should be vacuumed thoroughly and all accessible surfaces wiped over with a damp cloth. Where decontamination is not possible, the item should be plastic wrapped and sealed, and opened only in another removal area.

6. Personal protective equipment

6.1 Minimising the risks

It is not technically feasible to prevent the risk of disease from airborne asbestos fibres for a person doing asbestos removal work solely by engineering controls, although such controls will help minimise that risk. As a result, the provision of personal protective equipment is essential in minimising risk of disease. Personal protective equipment should be worn at all times in the removal area.

6.2 Respiratory protection

The degree of respiratory protection required is determined by the nature of the removal

job, the type of asbestos and the potential for exposure to asbestos fibres.

A guide to the selection of appropriate respiratory protection for asbestos removal work is presented in Appendix 2 of this standard.

For minor removal jobs, especially when using glovebags, an approved disposable respirator or half-face respirator fitted with particulate filters should be worn. Alternatively, an air purifying ventilated helmet or visor respirators complying with *AS/NZS 1716:1994 Respiratory protective devices*, may be used.

During masking of a removal area or during final cleaning where there is potential for exposure to airborne asbestos, the use of an approved disposable particulate filter respirator would be sufficient. However, these conditions would not apply inside the removal area during other asbestos removal operations.

A positive pressure, hood or full-face piece powered air-purifying respirators with Class P 3 filters or positive pressure demand compressed airline respirators should be worn by any person directly engaged in asbestos removal work inside a removal area. However, the asbestos removalist or other persons engaged in inspecting and supervising the removal work, may use powered air-purifying respirators fitted with appropriate particulate filters when inspecting or supervising the work in the removal area.

The air supply equipment for airline respirators should be located outside and distant from the removal area. The equipment should be maintained in good order to avoid interruption in the air supply or deterioration in the quality of the breathing air.

Audible and visual warning of compressor failure should be provided to warn persons in the removal area of any system malfunction. The air supply equipment should be of sufficient capacity to allow time for persons in the removal area to clear the area if a supply failure occurs.

Powered, air-purifying respirators should be designed, or shielded, so that their operation is not degraded by water from showering.

Respiratory protective equipment used in asbestos removal work should be manufactured to the Australian Standard and carry a Standards Mark. In addition to supplying respiratory protection that conforms to *AS/NZS 1716:1994 Respiratory protective devices*, the asbestos removalist should be familiar with the content of *AS/NZS 1715: 1994 Selection use and maintenance of respiratory protective devices*, in relation to the need for regular inspections and servicing of non-disposable respirators.

Respirators should be issued on a personal basis with each person receiving instructions on the correct method of use and the importance of good facial fit. The user's name should be clearly marked on all non-disposable respirators.

It is the asbestos removalist's responsibility to ensure that all personal protective equipment is maintained in a clean and safe working condition.

6.2.1 Face seal

Workers who wear glasses or have beards, sideburns or even a visible growth of stubble, may not get adequate protection from asbestos fibres where the type of respirator worn relies on a good face seal, that is, a close contact between face and seal. This problem can be

overcome by the use of equipment, which does not require a face seal, for example, ventilated helmet respirators, or positive pressure powered respirators with blouses.

If there is any doubt as to the adequacy of protection, individuals concerned should not be permitted to work in the asbestos removal area.

6.3 Protective clothing

Coveralls should be made from either 100% synthetic material or a mixed natural/synthetic fabric capable of providing adequate protection against fibre penetration. All fabric should be capable of preventing the penetration of asbestos fibres down to a diameter of 0.5 micrometres and to a maximum 1% penetration of all airborne asbestos fibre.

Coveralls without pockets or cuffs, but including an integral head covering, in combination with disposable overshoes, will assist in personal decontamination. However, these synthetic garments may contribute to the heat stress for workers undertaking the removal work. Trousers and coverall cuffs should be worn outside of boots and gloves. Disposable coveralls should not be reused or laundered.

All gloves, rubber soled work shoes or boots provided to workers for use in the removal of asbestos material should remain in the removal area for the duration of the removal work. On completion of the removal work, these items should be disposed of as asbestos waste.

7. Environmental monitoring of removal site

7.1 Airborne monitoring program

Monitoring will assist an asbestos removalist in ensuring the risk of disease from airborne asbestos fibres is minimised for a person at the removal site during removal work.

An airborne asbestos monitoring program will allow the asbestos removalist to determine if the control measures implemented are effective in ensuring that airborne concentrations of asbestos fibres outside the removal area do not exceed the levels specified in the *Workplace Health and Safety Regulation 1997 Part 11 Asbestos Removal Work*.

Air monitoring is not intended to be used as a control measure, but as a check at intervals, to ensure that controls are operating effectively.

The location and frequency of air monitoring is dependent on the method of removal, the quality of the removal area containment, the monitoring history at the particular site and the possible consequences of an accidental release. Before removal work commences a monitoring program should be implemented to check the integrity of the containment and decontamination facilities.

The need for further monitoring and its frequency should be determined on the basis of the results obtained. Problem areas, or neighbouring regions with a high occupancy of unprotected persons, should be routinely monitored every shift, while consistently clear areas may only require a random sample.

Air monitoring should be undertaken on a continuous basis during the removal work.

7.2 Where should monitoring occur?

Monitors for the static sampling of concentrations of airborne asbestos fibres at the removal site should be located so that the

results will be representative of the removal work being tested. Depending on the nature of the removal work, the location of monitors may change as a result of variations in the work or work procedures.

In unenclosed areas, air monitoring should consist of static monitors, placed at the four compass points around the removal work in progress, or upwind and downwind of removal work. Depending on the size of the removal site, additional monitors may be required in locations likely to identify a release of asbestos fibres. The results of monitoring will be important in deciding:

(a) if a change to the position of barriers is necessary; and

(b) whether the control measures have been effective.

Where the removal area is enclosed, static air monitoring should be conducted:

(a) at the clean entrance to the decontamination unit

(b) near the exhaust outlet of negative air enclosures

(c) in lunch rooms

(d) in laundry rooms

(e) on each side of the enclosure

In addition, where the removal work is being undertaken in a multi-level building, static air monitoring should also be conducted on the levels above and below the removal area.

7.3 Air monitoring technique

Legislation

S72(1) *Workplace Health And Safety Regulation 1997*.

When doing asbestos removal work in an asbestos removal area, an asbestos removalist must ensure:

the asbestos removal site's atmosphere is monitored to find out if asbestos fibres are being released from the area into the site's atmosphere; and

(b) the way the site's atmosphere is monitored complies with *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust* (other than part 1) contained in NOHSC's document entitled *Asbestos – Code of Practice and Guidance Notes*.

The measurement is achieved by drawing an accurately measured volume of air through a specially prepared membrane filter, and following this, counting the number of asbestos fibres collected on the filter, using an optical microscope (see *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust*). This data can then be used to calculate a result, which may be compared to the standards specified in the Regulations.

Legislation

S72(2) *Workplace Health And Safety Regulation 1997.*

If monitoring shows the fibre count in the asbestos removal site's atmosphere exceeds 0.02 fibres/mL. then the asbestos removalist must immediately:

- find out how the asbestos fibres are being released from the asbestos removal area
- reduce the asbestos fibre concentration to 0.02 fibres/mL or less

Since the measurement of airborne concentration is an important and highly skilled process, the monitoring can only be carried out by suitably trained persons who have been instructed in the sampling techniques and analytical procedures.

It should be noted that the Membrane Filter Method is the only technique, which can be used to determine compliance with the national exposure standard for asbestos.

Consequently, monitoring should be undertaken using this method and be undertaken by persons accredited by the National Association of Testing Authorities, Australia (NATA). Because of the four hour sampling period required under this technique and the time needed to prepare and count samples, short term removal operations may be better controlled by undertaking frequent inspections of the containment barrier around the removal area. These inspections should enable the asbestos removalist to identify a release of airborne asbestos fibres from the containment area.

Legislation

S74 *Workplace Health And Safety Regulation 1997.*

If monitoring shows fibre concentration in the asbestos removal site's atmosphere is more than 0.5 of the concentration stated in the national exposure standard (see part A) then the removalist must:

- **stop work immediately**
- find out how the asbestos fibres are being released from the asbestos removal area
- reduce the asbestos fibre concentration to 0.02 fibres/mL or less

8 Dismantling the containment barrier

8.1 Completion activities

To prevent or minimise the risk of disease from airborne asbestos fibres for a person in an asbestos removal site following completion of the removal work:

(a) remove all tools and equipment not used for cleaning from the removal area so that efficient vacuuming of the inside of the enclosure can be undertaken. In removing these tools and equipment from the removal area, appropriate decontamination procedures outlined in section 6 should be followed;

(b) after carrying out a thorough visual inspection, spray the internal surfaces of the

containment barrier around the removal area with polyvinyl acetate (PVA) or similar water-based paint, in order that any asbestos fibres adhering by electrostatic attraction will be effectively encapsulated. Workers involved in this spraying operation should wear an airline respirator or a half-face respirator fitted with combined organic vapour/dust filters;

(c) ensure that the plastic enclosure surrounding the removal area is dismantled only if a thorough inspection reveals no visible traces of asbestos contamination, and air samples taken inside the enclosure indicate a result below 0.01 fibres/mL. Air monitoring should only be undertaken once the PVA has dried, as the airborne mist will adversely affect the ability to detect fibres in the sample;

(d) following this clearance, the sealing plastic can be dismantled, folded and placed in appropriate disposal bags and sealed. The sealing plastic should not be re-used, but treated as asbestos waste. Safety barricades and warning signs should not be removed until the complete area has been thoroughly cleaned.

Prior to resumption of work in the area by unprotected workers, a visual inspection should be undertaken to ensure removal has been satisfactorily completed and that no source of asbestos fibres remains in the area. Attention should be paid to examination of ledges, tops of air conditioning ducts, cracks in the floor, folds in plastic sheeting and crevices or areas which may have been overlooked in the initial clean-up.

The asbestos removal work is considered to have been finalised only when an inspection reveals no further evidence of asbestos debris and static air samples give a clear result.

Appendix 1

Published technical standards, guidance notes and codes of practice

Australian standards

Code	Name
AS 1216 - 1995	*Class labels for dangerous goods*
AS 1318 - 1985	*Use of colour for the marking of physical hazards and the identification of certain equipment in industry (known as the SAA Industrial Safety Colour Code).*
AS 1319 – 1994	*Safety signs for the occupational environment.*
AS 1324	*Air Filters for use in general ventilation and air conditioning*
AS 1324.1-1996	*Application, performance and construction*
AS 1324.2-1996	*Methods of test*
AS 1530.3 - 1989	*Simultaneous determination of ignitability, flame propagation, heat release and smoke release.*
AS/NZS 1715: 1994	*Selection, use and maintenance of respiratory protective devices.*
AS/NZS 1716: 2003	*Respiratory protective devices.*
AS 2342 - 1992	*Development, testing and implementation of information and safety symbols and symbolic signs.*
AS 2601 - 1991	*The demolition of structures.*
AS 3544 - 1988	*Industrial vacuum cleaners for particulates hazardous to health.*
AS 4260 - 1997	*High efficiency particulate air (HEPA) filters: Classification, construction and performance.*

National Occupational Health and Safety Commission publications

(NOHSC publications can be viewed at the NOHSC website www.nohsc.gov.au)

Code of Practice for the Safe Removal of Asbestos [NOHSC:2002 (1998)]

Guide to the Control of Asbestos Hazards in Buildings and Structures [NOHSC:3002 (1998)]

Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust [NOHSC: 3003 (1998)]

Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment [NOHSC: 1003 (1995)]

Appendix 2

Guide to the selection of appropriate respiratory protection

Appropriate respirators

There is a wide range of respiratory protection available for protection from airborne asbestos fibres. In general, the nature of the asbestos work and the probable maximum concentrations of asbestos fibres that would be encountered in this work determine the selection of a particular respirator. Another consideration would be the personal characteristics of the wearer that may affect the facial fit of the respirator; for example, amount of facial hair, or whether glasses are worn.

Table A provides, in approximate order of increasing efficiency, an indication of some respirators that may be used for protection against asbestos fibres. The protection afforded by each device depends not only upon the design and fit of the respirator, but also upon the efficiency of the filters (P 1, P 2 or P 3) where applicable.

AS/NZS 1715:1994 Selection, use and maintenance of respiratory protective devices and *AS/NZS 1716:1994 Respiratory protective devices* provide detailed advice on the selection, use and maintenance of respiratory protective equipment and should be consulted for more detailed advice on Nominal Protection Factors and other relevant matters.

Table A

Figure	Type of Respirator
4.	Disposable, half-face particulate respirators
5.	Half-face, particulate filter (cartridge) respirator
6.	Powered, air-purifying, ventilated helmet respirator
7.	Full-face, particulate, filter (cartridge) respirator
8.	Full-face, powered air-purifying particulate respirator
9.	Full-face, positive pressure demand airline respirator
10.	Full suit or hood, continuous flow, airline respirator

Figure 4

Figure 5

Figure 6

Figure 7

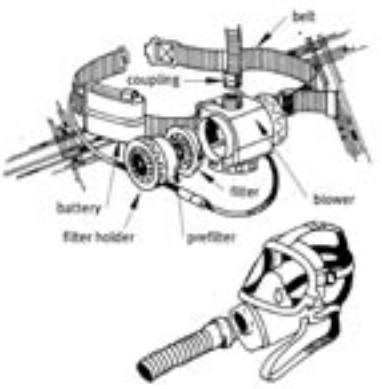

Figure 8

Figure 9

Figure 10

Table B: Guide to probable exposure levels and appropriate respiratory protection for particular asbestos removal jobs

Conc. Fibres/ml	Job	Equipment
0 to 2	simple short sampling; simple enclosure erection; clearance sampling; but not for use for removal of insulation or use inside enclosures when removal is in progress.	any approved respirator, including disposable or half-face Class P1 or P2 particulate filter respirators.
2 to 4	some sampling operations; perhaps enclosure erection under adverse conditions; but not for use for removal of insulation or use inside enclosures when removal is in progress.	any approved respirator with Class P2 or P3 particulate filters except disposable respirators or those fitted with or consisting of half-face masks; or any positive pressure airline respirator.
4 to 20	extensive sampling operations perhaps on friable lagging; some sealing operations; enclosure erection under adverse conditions and on friable lagging, but not for use for removal of insulation or use inside enclosures when removal is in progress.	any approved full-face respirator fitted with Class P3 particulate filters; or any approved full face powered air purifying respirator fitted with Class P3 particulate filters; or any positive pressure demand or continuous flow airline respirator.
0 to 180	certain forms of wet stripping in which wetting is prolonged and effective, certain small-scale dry stripping operations.	any approved, full face Class P3 particulate filtering powered air purifying respirator. **Ventilated helmet or visor respirators are not appropriate.**
180 to 500	certain forms of dry stripping; ineffective wet stripping (light wetting - no time given to saturate).	any approved positive pressure full-face, airline respirator, or any full-face powered air purifying respirator fitted with Class P3 particulate filters. **No lesser respirator will suffice.**
500+	dry stripping in confined areas	positive pressure, airline supplied suits or hoods only. **No lesser respirator will suffice.**

Note:

1. "Approved" means respiratory protection manufactured using a recognised quality program and carrying a Standards Mark.

2. **This guide does not take account of personal features such as facial hair or the need to wear spectacles. Full protection will not be achieved if either of these is present and interferes with the face seal. In addition the guide does not take account of misuse of protective equipment.**

Adapted from the Health and Safety Executive (UK) publication: Respiratory Protective Equipment for Use Against Asbestos with changes in nomenclature to suit Australian practice. (Reproduced with permission of the HSE and the Controller of Her Majesty's Stationery Office).

Appendix 3

Glossary

For the purpose of this advisory standard the following definitions apply.

"asbestos"

means the fibrous form of the mineral silicates belonging to the serpentine and amphibole groups of rock forming minerals and includes-

(a) actinolite, amosite (brown asbestos), anthophyllite, crocidolite (blue asbestos) chrysotile (white asbestos), tremolite; and

(b) any mixture containing 1 or more of the minerals mentioned in (a).

"asbestos fibre"

means a fibre of asbestos having-

(a) a diameter of less than 3 micrometres; and

(b) a length more than 5 micrometers; and

(c) a length to diameter ratio of more than 3:1.

"asbestos materials"

means installed thermal or acoustic insulation materials comprising or containing asbestos.

"asbestos product"

means anything that contains asbestos.

"asbestos removal area"

means an area where an asbestos removalist is doing, or proposes to do, asbestos removal work.

"asbestos removal site"

means an area immediately outside a containment barrier for an asbestos removal area.

"asbestos removal work"

means work to remove asbestos materials other than work to remove asbestos materials, that is done entirely in a containment device.

"asbestos removalist"

means-

(a) an employer whose business or undertaking includes asbestos removal work; or

(b) a self-employed person whose work includes asbestos removal work.

"containment barrier"

means a barrier, erected around an asbestos removal area.

"containment device"

means a device that:

(a) is used for the removal of asbestos materials; and

(b) when in use, prevents the release of airborne asbestos fibres outside the device.

"national exposure standard"

for asbestos means the exposure standard for the asbestos stated in the Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment contained in NOHSC's document entitled "Exposure Standards for Atmospheric Contaminants in the Occupational Environment".

V.2-03.04
KDE 08-35.03