SICK BUILDINGS & WORKPLACE DISEASES SEMINAR

ANTHONY GRIEVE

EXPERT EVIDENCE IN ASBESTOS EXPOSURE CASES

Introduction

For decades asbestos and asbestos-derived products have played an integral role in Australia's built environment. Of these, the most prominent and enduring is the ubiquitous "fibro", the vernacular for Hardie's Fibrous cement – essentially a sheet of cement strengthened by asbestos fibre. Invented in Austria in 1900 by Ludwig Hatschek,[1] this cheap, long-lasting, corrosion resistant and easy to erect material created new horizons for economical innovation in commercial architecture (the buildings in Sydney's Luna Park were predominantly clad in fibro). It also helped thousands of owner builders in the 1950's and 60's realise the dream of home ownership and entire new suburbs of fibro dwellings evolved during this period.[2] Many of these homes were built on weekends with the help of family and friends, using generic plans provided in the popular newspapers of the day.

However the use of asbestos in building and building products has a darker history, one that continues to be played out today. Even limited exposure to this seemingly inert mineral substance can trigger fatal disease, including asbestosis, lung cancer and mesothelioma. Worksafe Australia estimates 16,000 asbestos-related mesothelioma deaths and 40,000 ling cancer deaths nationally between 1987 and 2010.[3] But the focus of this paper is not sick people, it is about those buildings that result in sick people. Often referred to as "sick buildings", these structures have a propensity to harm their occupants – a

[1] Pickett C, *The Fibro Frontier: a Different History of Australian Architecture*,(Sydney 1997) at 10;
[2] *Ibid*;
[3] Electronic newsletter article: "AMWU Pursues Total Ban on Asbestos", *AMWU – What's Happening*, October 2000, www.amwu.asn.au/what/healthsafety;

condition often manifest because asbestos-containing building products having been applied in their initial construction or subsequent refurbishment.

The expert witness will be called upon to assess and provide advice upon such buildings when and if asbestos linked damage and injury occurs and litigation ensues. When this happens two fundamental questions will guide the expert witness's inquiry: was a particular building known to contain asbestos-containing materials, and if it did what action was taken to assess the risk and if necessary minimise or neutralise the asbestos hazard to anyone exposed to it? To consider how these questions might be approached and answered in practice, this paper initially examines the background of asbestos use and identifies the variety of asbestos based products historically used in buildings and habitable structures. It then details a strategy to enable building owners and managers to assess whether an asbestos threat exists in a building, and if it does, the size and seriousness of the problem and options available to neutralise or minimise this threat in both the short and long term. Finally, the role of the expert witness is assessed in the context of this strategy.

Asbestos – a background of its use in building

Known to man for over 5000 years, asbestos is a mineral rock extracted from the earth and characterised by the attribute of breaking down into fibres when crushed or processed.[4] Finnish archaeologists reportedly uncovered fire resistant bowls made from asbestos fibre reinforced clay dating back to 4000 BC.[5] Once known as 'stone flax', Greek coastal villagers at one time made from it a fabric that could be cleaned by placing it in fire.[6] Stone flax eventually came to be known as asbestos, derived from the Greek for incombustible. While there are six distinct types of asbestos fibre, Crysotile – or white asbestos – is by far the most commonly used form and accounted for 85% of total asbestos use in

[4] Jackson R, *The Problem of Asbestos in Buildings*, University of NSW School of Building (1986) at 5;
[5] Smith B, "Asbestos: Friend Turned Foe" (1993) 4 (3) *Waste Management & Environment* at 15;
[6] Note 4 above at 6;

Australia. The other 15% comprised amosite (brown asbestos) and crocidolite (blue asbestos).

Modern industrial use of asbestos commenced in the 1880's when it was used for heat shielding and gaskets in steam engines and to produce incombustible packing materials.[7] By the 1960s it was estimated that asbestos was being used in over 3000 different products worldwide.[8] It became a popular component in many building materials as a consequence of its desirable physical and chemical properties combined with the advantage of low material cost. Asbestos-containing products were extensively used in the building industry since the 1940's - when asbestos-based compounds were initially applied for acoustic and decorative purposes - and remained in use until the gradual prohibition of all asbestos-containing building materials commenced in the late 1970's.

Asbestos has typically been used in the following building applications:

(1) Sprayed asbestos (or 'limpset' asbestos)

Originally employed for decorative and acoustic applications then later for thermal insulation and fire protection. Applied with pressure air guns, the sprayed surface had a fluffy coating and was liberally applied to steel and concrete beams, walls and ceilings, and ducts and pipes rising between floors. The sprayed material was often given a decorative paint finish, particularly where exposed. The high asbestos content of this material - around 85-90% - combined with a typically weak and unstable matrix[9] makes it comparatively

[7] *Ibid*;
[8] Note 5 above;
[9] The 'matrix' refers to the integral compound which mechanically bonds the asbestos fibres into the asbestos containing product;

more friable[10] and potentially the most hazardous of the applications considered here.

(2) Acoustic plaster soundproofing

Applied by trowel, this porous, plaster like material is usually exposed and not usually painted. Its moderate matrix strength and asbestos content combine to make it a moderately hazardous material, depending on its condition and location

(3) Thermal lagging

Applied as insulation to the lining of boilers and on hot and cold steam pipes. The pipes were generally enclosed with an asbestos based rope then covered with asbestos cloth and either painted or enclosed with canvas or metal jackets. Asbestos content ranged from 5-55%. Generally considered to pose a considerable hazard, particularly where protective jackets have been damaged or have deteriorated.

(4) Asbestos boards

Products such as Mill board, was used for thermal insulation applications such as air conditioning ducts, stoves and kitchen ranges and as a lining for electrical switch boxes. Typically has a higher asbestos content (up to 40%) than asbestos cement products (10-15%) and is considered hazardous.

(5) Asbestos cement products.

Essentially Portland cement combined with asbestos fibres for tensile strength, this compound can be compressed and set into many forms, including:

- corrugated roofing and walling
- flat sheet wall lining
- compressed flooring and partitioning

[10] The tendency for the matrix to deteriorate, crumble or perish, thereby releasing asbestos fibres into the atmosphere;
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- downpipe and guttering
- pipes and ducts

Asbestos cement with its relatively low asbestos content is considered the least hazardous of the asbestos-containing materials under normal conditions, particularly in view of its tough and durable matrix composition.

(6) Vinyl floor tiles, tile cements, caulking and spackling compounds.

The inclusion of asbestos fibres improved the strength, durability and heat resistance of these products, increasing their versatility in many applications. The potential hazard of these products, for similar reasons as given for asbestos cement, is considered to be comparatively low under normal conditions.

Sprayed asbestos, asbestos lagging and asbestos cement products were the most commonly used asbestos-based products in buildings. Indeed by the 1950's it had become virtually standard practice in all multi-storey buildings and many hospitals and schools to fire proof structural steel elements with sprayed asbestos. This pervasive use of asbestos-containing materials in both the private and public domain - particularly the more hazardous sprayed asbestos and lagging - underlies the gravity of the problem faced today. Sprayed asbestos, as with many other asbestos products, will deteriorate over time and inexorably release asbestos fibres into the atmosphere, often to be circulated by ventilation and air conditioning systems. Any person breathing this contaminated air is at risk - and while accepting that the more asbestos fibres you are exposed to the greater the risk of asbestos related illness, there is no accepted "safe" level of exposure to asbestos.[11]

Given the above revelations, the prudent building owner or manager might well consider that the wisest course would be to remove the offensive substance -

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11 Health and Safety Fact Sheet, Asbestos Removal – A Major Health Hazard for Workers, Workers health Centre, Granville NSW (2001);
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indeed the emotive nature of the asbestos debate may well conspire to preclude other options.[12] In Canberra sprayed asbestos was removed from over 3000 homes at a cost of $70,000 to $100,000 per home and anything short of removal was not considered an option.[13] However, removing asbestos or demolishing structures that contain it are costly and extreme measures that themselves present serious health risks unless stringent control measures are taken. Other, more practical and cost-effective measures are available and these will be discussed shortly in the context of an asbestos management plan. First, brief reference will be made to the legislative framework concerning asbestos in buildings.

The Legislation

In NSW the most important laws covering removal are the *Occupational Health and Safety Act* and the *Construction Safety Act and Regulations*. The National Code of Practice for the Safe Removal of Asbestos (Worksafe Australia 1988) sets out the minimum industrial hygiene procedures to be used for the removal of asbestos insulation material such as lagging and sprayed asbestos.

National asbestos fibre exposure standards have been established and currently stipulate as follows:[14]

White Asbestos (chrysotile) 0.5fibres per millilitre of air
Blue Asbestos (crocodilite) 0.1 fibres per millilitre of air
Brown Asbestos (amosite) 0.1 fibres per millilitre of air

These are the maximum airborne asbestos fibre levels that workers may legally be exposed to, but it should be remembered there is no safe level of exposure and these levels are subject to continual revision as asbestos related disease has mounted, the exposure standards have become increasingly stringent. For

[12] Willis R, "Asbestos Management" (1993) 4 (3) *Waste management & Environment* at 19;
[13] Duffy M, "Looking for Mr Fluffy" (1991) June, *Independent Monthly* at 17;
[14] NSW Hazardous Substances Regulations (1996);
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example, in 1973 the exposure standards for blue and brown asbestos were 4.0 fibres per millilitre – 40 times higher than today's standard.

An approach to managing asbestos in buildings – the asbestos control programme

The issue of what to do with asbestos in buildings is, not surprisingly, an emotive and somewhat controversial issue. While, as suggested above, removal may immediately recommend itself as the most appropriate course of action (and one frequently demanded by concerned but ill-advised interests), this is comparatively expensive and of itself creates a considerable hazard for those undertaking the work and considerable inconvenience for those affected by it. In reality most asbestos-containing products in buildings, if left undisturbed, will not release fibres in substantial enough quantities to create significant risk to occupants[15] and indeed some suggest there is little empirical evidence to suggest that such undisturbed materials create any risk at all.[16] Hence, rather than making or taking pre-emptive decisions and actions, or by negligently doing nothing at all, a more tenable strategy is to assess the overall problem and from this knowledge base establish and implement a plan to manage the problem, a strategy referred to herein as an asbestos control programme (ACP).

To develop and implement an ACP, owners and managers of contaminated or suspect buildings should first and foremost seek expert consultative advice. Two issues should be borne in mind when selecting such a consultant: first, to ensure independent advice, the person chosen should not be directly affiliated with contractors who may be engaged to perform asbestos removal or other corrective services. Secondly, the person should ideally demonstrate a strong background in related industrial hygiene issues and a substantiated track record

[15] Asbestos Institute of Canada, *Assessing Asbestos in your Buildings*, www.asbestos-institute.ca/buildings;
[16] Ferguson D, "Low Level Asbestos: The Priorities are Wrong" (1990) 152 June 18, *Medical Journal of Australia* at 617;

in providing assessment and advice relating to asbestos problems in buildings similar to the type of building under investigation. An expert on asbestos in factories may have little experience with problems in commercial office environments

A primary role of the consultant chosen will be the development of the ACP, which in specific terms will comprise the following elements/activities:[17]

A. Inventory of materials suspected of containing asbestos in a building

To facilitate this inventory the following activities will need to undertaken in the context of a building survey and audit:

- study building plans and specifications (if available);
- assess any history of additions, alterations, and refurbishments;
- design a bulk sampling programme appropriate to the particular context;
- perform the bulk sampling survey and have the samples tested by an accredited laboratory that will prepare an analytical report. This report should indicate:
    - whether asbestos is present;
    - if asbestos is present, its type (blue, white or brown) and the percentage of asbestos and other materials in the sample, and;
    - what identification method was used and the accuracy of the method.

Generally, an extensive survey of non-friable materials suspected of containing asbestos (for example fibro and vinyl tiles) is not undertaken except where major renovations, demolition or other large potential disturbances are expected or planned.

[17] The programme presented here is a composite derived from a number of sources, both local and international. For an excellent overview of an effective asbestos control programme (and one largely relied on here) see: "Asbestos in Buildings: Practical Guidelines for Building Owners": www. asbestos-institute.ca/buildings/girgis.html;

B. Assessment of asbestos-containing materials

Once the locations and nature of potentially hazardous asbestos-containing materials have been identified, physical inspection and assessment of the materials in situ is required. Evaluating the degree of potential hazard will involve the consideration of a number of factors, including the:

- likelihood of fibre release from the material, based on its current condition and the potential for future disturbance or damage;
- type of asbestos and the percentage present in the material;
- friability of the material;
- level of accessibility by building occupants and maintenance personnel;
- existing degree of any water damage or other type of damage;
- the level of vibration the material is subjected to under normal conditions;
- the level of activity in the immediate area, and;
- presence and concentration of asbestos fibres in an air plenum direct air stream, assessed by use of highly sophisticated measuring apparatus.

In addition, the following conditions should be documented:

- any missing sections of sprayed-on fireproofing or thermal insulation;
- any fallen asbestos-containing insulation materials on surrounding surfaces, and;
- the presence of pieces hanging loose from asbestos-containing materials.

And the following factors should be investigated:

- the potential causes of observed damage, and;
- the potential for disturbance by normal operations and maintenance activities

From the above information it will be possible to determine a comprehensive schedule for future action - what this will involve and when it should occur – and to ensure that interim risks are minimised.

C. Implementation of corrective measures

Corrective measures, if required, may include one or more of the following courses of action:

1. Label the asbestos and leave it

This will often be the most practical solution if the asbestos is in good condition and is unlikely to be disturbed. Adequate signage[18] and routine training and instruction of building management/maintenance personnel will help protect the safety of workers and contractors who may have occasion to interfere with or work near the asbestos in the future. Periodic re-inspections (every year) should be undertaken to re-assess any degradation or change in the condition of potentially hazardous materials.

2. Enclose the asbestos-containing material

This entails physically enclosing the hazardous material so that disturbance and the contamination of breathable air will not occur. Entry into enclosed areas should, therefore, not be possible under normal circumstances and the enclosed areas should be identified through the use of appropriate signage.

3. Seal the asbestos

The asbestos is deep sealed or encapsulated by proprietary products designed to permeate and bind the matrix and prevent fibres being released into the atmosphere. This option is only viable as a long-term

[18] All identified asbestos in a building should be labelled so that it is clearly visible to any and all persons using the area until it is finally removed. This requirement applies equally to asbestos-containing materials in good condition and to treated asbestos. All signage/labelling should comply with AS 1216 and AS 1319;
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solution if the asbestos-containing material is in good condition and is unlikely to be disturbed. Sealing is also worth consideration as an effective temporary measure to minimise risk until hazardous material can be removed permanently. Both sealing and enclosure of asbestos-containing materials should be carried out by suitably experienced specialists.

4. Removal

If the asbestos material is damaged or crumbling or prone to frequent disturbance due to maintenance or other activities, removal may be the only real alternative. Removal eliminates the problem permanently, provided it is done with the best control procedures and equipment under the supervision of competent removal experts utilising a well-informed and trained workforce.[19] These conditions, however, frequently do not occur in practice. Many authorities are thus of the opinion that removal of asbestos-containing materials often does more harm than good. For example, the New Jersey Department of the Public Advocate has reported that:

Improper asbestos removal places workers and building occupants at risk of serious health injury and that it is well documented that the improper removal of asbestos can be far more hazardous than if the asbestos is not removed at all.[20]

Some studies have found asbestos levels in buildings to be higher after materials were removed than before removal, indeed “weeks and sometimes months must pass before ambient air levels of friable

[19] A review of the various statutorily enforced code regimes for safe removal and disposal of asbestos is beyond the scope of this paper. A good starting point however is the code compiled by the National Occupational Health and Safety Commission (NOHSC);
[20] Note 15 above;
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asbestos fibre drop below acceptable levels"[21] and it is clear that poor abatement practices may exacerbate existing conditions rather than solve the problem. Unsatisfactory removal practices in a limited area of a building may result in the contamination of the entire structure[22] and the removal of some asbestos-containing materials could generate fire hazards if suitable substitute materials are not employed.[23]

The overarching theme is that if removal can be safely and responsibly avoided then it is generally prudent to do so. If removal is however, the only option, ensure that the contractors undertaking the work are accredited and licensed, and can offer a verifiable track record. Once the work is complete, it is necessary to periodically reassess the effected environment for asbestos fibre levels.

When planning the mix and implementation of corrective measures, the following factors should be taken into consideration:

- to what extent it is possible or practical to incorporate abatement activities with other activities such as refurbishment or repairs; generally if major refurbishment or demolition works are proposed then the asbestos will have to be removed first;
- how to stage abatement activities in the most practical and economical manner, and;
- how to minimise disruption of the activities of the building.

Generally, the more friable asbestos-containing materials such as sprayed asbestos or thermal lagging are likely to be the most problematic in terms of cost and corrective measures. Asbestos-containing products with intrinsically stable matrix compounds, such as asbestos cement and vinyl floor tiles,

[21] *Ibid*;
[22] National Occupational Health and Safety Commission, *Asbestos – Guide to the Control of Asbestos Hazards in Buildings and Structures*, AGPS Canberra (1987) at 19
[23] *Ibid*;
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generally require only simple, straightforward workplace practices when installing, repairing or removing these materials.

D. Operation and maintenance procedures

As an ongoing component of the Asbestos control program a procedure should be developed and implemented to ensure that appropriate precautionary measures are taken by all building occupants, particularly maintenance workers and contractors, when conducting activities that could disturb asbestos-containing materials. This procedure should include:

- notifying the building occupants of any work which may disturb asbestos;
- informing in-house maintenance personnel and outside contractors of the location of asbestos-containing materials;
- applying safe work practices for planned work and emergency situations;
- maintaining and updating records pertaining to asbestos control;
- ensuring that any workers who are likely to disturb asbestos-containing materials, have received appropriate training in safe work practices.

Ideally this procedure should be outlined and detailed in a site-specific manual, developed by a competent consultant, made available to all relevant personnel, and updated as conditions require. Finally, changing legislative requirements (for example legal exposure levels) should also be monitored to ensure ongoing compliance. This function might best be undertaken on a retainer basis by the consultant who compiled the ACP.

The Expert Witness

The ACP template provided above, essentially suggests the areas of investigation an expert witness would pursue in a case involving asbestos related injury or disease allegedly contracted by exposure to asbestos-

containing materials in a building. In specific terms, the expert witness would seek answers to the following inquiries.

- Did the owner/manager of the subject building have reason to seek and did seek expert consultative advice to ascertain if an asbestos problem existed in that building?
- If so, was an ACP developed and implemented?
- Did this ACP include an adequate asbestos inventory, based on effective sampling and tests by an accredited lab, and an assessment of asbestos-containing materials in situ throughout the building?
- Was this information used to develop an effective programme for correction or control of the problem and was this programme implemented in a timely and efficient manner?
- Were any procedures developed and implemented to ensure routine and extraordinary operations and maintenance in the subject building would not disturb or detriment control or correctional measures already undertaken, thus exposing people to risk?
- Was the building routinely re-inspected to assess any change in condition and ongoing compliance with statutory requirements?

If the ACP template provided here were followed diligently, then the answer to these enquiries would invariably be “yes”. However the expert witness would comprehensively investigate the possible implications of any “no” response and also examine in detail all components of the programme in order to identify any shortfalls, mistakes or oversights in its design, implementation and maintenance.

Conclusion

The presence of asbestos-containing materials in buildings is a widespread reality throughout Australia. The ramifications of this reality for the health of building occupants may be grave and the costs of addressing the problem effectively can be high. Another reality is that the ultimate cost of ignoring the

problem or initiating poorly conceived half-measures could be much higher, both in economic and human terms. As an owner or manager of a building constructed or refurbished twenty or more years ago you should already know if it incorporates asbestos-containing materials. If you know it does, you should know where these materials are, what condition they are in, what risk they presently pose and, most importantly, how you intend to control or negate this risk. Just as important is that all the people who work or undertake activities in your building know about any risks and what you are doing to mitigate them. In short a building “sick” with asbestos can - with initiative and planning -effectively be prevented from putting people at risk.