UK ASBESTOS - THE DEFINITIVE GUIDE

Working Party: Brian Gravelsons, Wendy Hawes, Sylwia Jakubowski, Anthony Kent, Julian Lowe (Chairman), Andy Macnair, Darren Michaels, Anita Morton, David Sanders, Philip Towell, Andy Whiting, James Widdows, Anthony Williams

Keywords: "asbestos", "asbestosis", "mesothelioma"

Summary:

The estimated future cost to the UK insurance industry of asbestos-related claims is £4-£10b. Well over half of this relates to mesothelioma claims, numbers of which are predicted to continue to rise for the next ten years. By contrast, claims for other asbestos-related diseases, such as asbestosis, are expected to fall in the coming years, as the number of claims mirrors the declining use of asbestos since the 1970s.

Most estimates of the future number of mesothelioma claims are based on the latest (2003) HSE projections. We have reproduced the HSE projections in a spreadsheet model to help practitioners understand the HSE model. This highlights the sensitivity of the projections to a number of key parameters. In particular, the future number of mesothelioma deaths is very dependent on how the disease continues to develop at older (80+) ages, with over half of all claims being in respect of those aged over 80 by the year 2020. The future number of mesothelioma deaths could easily be considerably higher or lower than the current projections, depending on the experience of this age group. We suspect that the variability of the HSE projections is greater than most practitioners who use the model would currently assume to be the case.

In producing our estimates, we have used data collected via an anonymous survey from all major UK insurers, representing the majority of the UK market. We have also developed a simplified model of the emergence of asbestos-related diseases, to help project claim numbers for non-mesothelioma diseases. Our data survey has highlighted a range of practices in recording relevant information regarding asbestos-related claims. With such potentially large numbers at stake, the insurance industry would do well to improve its ability to record relevant information electronically.

The range of potential outcomes for the cost to the insurance industry highlights the difficulty in assessing, let alone pricing, latent disease claims. This lends weight to the argument for potentially "separating" these types of claim from non-disease claims for the purpose of providing Employers' Liability insurance.

As well as our projections, the paper describes the main types of asbestos and asbestos-related diseases, health and safety regulations, claims handling protocols and relevant court cases. We've also reviewed information regarding the use of asbestos in the UK and around the world, other relevant data sources and given a brief overview of asbestos-related developments in the US.

UK ASBESTOS - THE DEFINITIVE GUIDE

CONTENTS

Section

5. **Previous claim projections and available data**

    5.1 The main projections of British mesothelioma deaths
    5.2 Peto et al 1995 paper
    5.3 Peto et al 1999 paper
    5.4 HSE 2003 paper
    5.5 British Medical Journal 2004 paper
    5.6 EL premium data as a proxy for exposure
    5.7 ABI data
    5.8 DWP data
    5.9 HSE data

6. **Our survey says….**

    6.1 Introduction
    6.2 Questionnaire about the data
    6.3 Results from analysing the data
    6.4 Questionnaire about reserving/projection methods

7. **Estimated insurance industry costs**

    7.1 Introduction
    7.2 Understanding the HSE 2003 projections
    7.3 Our own simplified model
    7.4 Derivation of average claims costs
    7.5 Combining our survey data with projected future claim numbers
    7.6 And the answer(s) is (are) ….

8. **Lessons from the US**

    8.1 Asbestos use and exposure in the US
    8.2 A brief history of US asbestos litigation
    8.3 Deterioration in the asbestos claims environment
    8.4 Estimates of the ultimate cost of US asbestos
    8.5 The “FAIR” Act
    8.6 Differences between US and UK asbestos

9. **Some provocations based on the paper**

    9.1 Reforming EL insurance
    9.2 Better data collection/disclosure
    9.3 Prescribed benchmarks/valuation methodologies

APPENDICES

1. INTRODUCTION

1.1 Overview of the paper

We have tried to gather together as much information as possible about UK asbestos, particularly as it relates to UK insurers. We start by summarising what asbestos is, the types of disease it can lead to and the development of UK health and safety regulations in section 2. We then look at various insurance-related protocols for apportioning liability and providing compensation when insurers or employers are insolvent in section 3.

Section 4 looks at a number of socio-economic aspects of asbestos - in particular a number of relevant UK court cases. This section includes a fair bit of information on two significant UK asbestos employers, Cape and Turner & Newall. It also looks at medical protocols for recognising asbestos disease (The Helsinki Criteria) and the state compensation available for asbestos-related diseases. Although the bulk of the paper relates to UK developments, we look at worldwide asbestos consumption/production and provide a quick overview of worldwide asbestos regulations and the compensation environment around Europe.

Section 5 concentrates on reviewing papers that have made projections of UK mesothelioma deaths and describes some of the available data on asbestos claims and exposures. As part of the paper we conducted a survey of practitioners. We asked insurers to provide details of their asbestos-related claims in an "anonymous" fashion that let the working party look at aggregate data but not see any individual company contribution. We also asked a range of insurers, consultants and other interested parties for information about how they currently project asbestos liabilities. The results of the survey are detailed in section 6.

In section 7 we describe a number of spreadsheet models we have used to make some industry-wide estimates of the cost of UK asbestos claims. In part these are based on models of the number of mesothelioma claims developed by Professor Peto and the HSE. The projections were calibrated using data provided as part of an industry-wide survey. We have expanded these models to include non-mesothelioma claims and added an estimate of cost as well as numbers of claims. We hope these spreadsheet models give actuarial practitioners a practical tool to assist in making asbestos-related projections.

Although our main focus is the UK, developments in the US loom large in any discussion of asbestos, so we have provided an overview of the US asbestos environment in section 8. Finally, we include some thoughts and provocations relating to the insurance of latent claims in the UK in section 9.

1.2 Suggested sections for the reader-in-a-hurry

From a little acorn, this paper has developed into a weighty tome… If someone wants to get a general background to asbestos and insurance-related issues in the UK without reading all 200+ pages, can we suggest the following as a useful subset to give a flavour of the main topics in the paper:

- Sections 2.1, 2.2 and 2.3 on what is asbestos, types of asbestos-related disease and a chronology of UK use/regulation of asbestos.

- Section 4.1 describes some of the main court cases regarding asbestos.

- Section 4.3 gives a history of Turner & Newall, the UK's largest asbestos producer and a thorny legal dilemma it is involved in.

- Section 5.1 summarises the main previous estimates of UK mesothelioma deaths.

- Sections 7.3 and 7.6 summarise the modelling work we have done and the industry-wide estimates we have produced.

We have tried to provide a comprehensive Bibliography in Appendix I, including précis of some of the main papers we have drawn on.

1.3 Where to find the spreadsheet model(s)

We hope to make the spreadsheet model we have developed available on the UK Actuarial profession's web site at www.actuaries.org.uk under the "General Insurance" section. Failing that, interested parties are welcome to contact the Chairman for a copy at julianlowe@norwich-union.co.uk

The model lets an interested reader reproduce the UK market-wide estimates in the paper and produce reprojections based on their own chosen parameters. It can be used as a base to assist insurers, or other interested parties, in making projections of their own asbestos-related liabilities.

1.4 Thanks

A number of people have helped the working party members produce this paper. These include Catherine Gwinnett and Evonne Twite, not to mention the heroic endeavours of the Chairman's secretary, Sarah Williams, in pulling together the document from many disparate sources.

1.5 What the paper is not

We hope many interested parties will pick up this paper over time as a source of reference. It is worth therefore spelling out what we haven't covered in depth in this paper.

We have not engaged in lengthy discussions about the toxicity of different types of asbestos. There are hundreds of papers looking at the epidemiological aspects of asbestos, but we have not set out to be a comprehensive medical reference, though we touch on some of the contentious issues around this subject (in section 2.5). In the same vein, we haven't tried to give details of potential treatment for asbestos-related diseases, though again we touch on some recent thinking in this area (section 5.5).

Finally, we have not set out to provide sources of help or advice to sufferers of asbestos-related diseases. However, the references in Appendix I, particularly the web site references, may be helpful in this respect and we do describe the available state compensation in section 4.7.

2. BACKGROUND

2.1 Types of asbestos

What is asbestos?

The word is derived from ancient Greek and means “inextinguishable, unquenchable or inconsumable”.

It is a naturally occurring silicate that has six varieties from two groups of minerals (the serpentine minerals and the amphibole minerals). The six varieties are described below.

Chrysotile

This is commonly known as white asbestos. It has white, soft, curly fibres and its fibre bundles have splayed ends and kinks. This mineral accounts for about 95% of the world production of asbestos and is the only member of the serpentine group. Chrysotile is chemically and crystallographically distinct from the five forms of amphibole asbestos. Its chemical formula is: $Mg_3Si_2O_5(OH)_4$.

Actinolite

Like all the remaining types of asbestos, actinolite is a member of the amphibole family. Its chemical formula is: $Ca_2(Fe^{2+}, Mg)_5Si_8O_{22}(OH)_2$.

Amosite

Amosite is commonly known as brown asbestos. It was discovered in Transvaal, South Africa and the word amosite was coined from the “Amosa” mines which stands for “Asbestos Mines of South Africa”. It has pale brown needle-like fibres (all the amphiboles have hard needle-like fibres). Its chemical formula is: $(Fe^{2+}Mg)_5Si_8O_{22}(OH)_2$.

Anthophylite

Anthophylite’s chemical formula is: $(MgFe^{2+})_7Si_8O_{22}(OH)_2$.

Crocidolite

Crocidolite is commonly known as blue asbestos. Blue and brown asbestos owe their colour to the large amounts of iron they contain. Its chemical formula is: $Na_2(Fe^{2+}, Mg)_3Fe^{3+}Si_8O_{22}(OH)_2$.

Tremolite

Tremolite's chemical formula is: $Ca_2Mg_5Si_8O_{22}(OH)_2$.

Of the six types of asbestos, only chrysotile, amosite, crocidolite and to a lesser extent anthophylite are mined for commercial use. Tremolite and actinolite have not generally been mined commercially although can be found as impurities in other commercially available mineral products.

Also known as….

There are sveral varieties of the main types of asbestos. For example:

- Bowenite - is a variety of chrysotile with densely packed fibres.
- Deweylite - is chrysotile containing stephanite.
- Tirodite - is tremolite with manganese oxide.
- Byssolite - is actinolite or tremolite, composed of tiny interwoven, fibrous crystals.

There are also some "common" names – for example Mountain Leather is a name for fibrous minerals of the amphibole group composed of a mat-like felt of fibres that feel like cloth. Amianthus is an old name for any asbestos mineral of the amphibole group.

Some gemstones include or are derived from asbestos. For example "Tiger's Eye" is a type of quartz that contains fibres of crocidolite that have been replaced by silica, with striking yellow and brown stripes. "Hawk's Eye" is another type of quartz, except the crocidolite was replaced by quartz before altering to Iron Oxide, giving it a blue-green tinge.

Why was it used?

The primary useful properties of asbestos fibres are their thermal and chemical stability and resistance, combined with high tensile strength. The presence of asbestos in commercial products varies depending upon the product's uses. While all forms of asbestos are fibrous silicates, they differ in their chemical composition and properties, crystalline structure and fibre dimensions and as such their commercially useful properties also vary.

All asbestos types are excellent thermal insulators and have been widely used as fire-proofing (on steel structural beams and soffits) and insulation materials (on boilers, ovens, kilns, steam pipes and hot water pipes). The amphibole group has considerable resistance to chemical corrosion and as such has been used in environments which are prone to attack by acids. Both chrysotile and crocidolite have high tensile strength, lending themselves well to the manufacture of woven asbestos products. All the asbestos types show low electrical and thermal conductivity, low biodegradability and good sound absorption properties.

In summary, asbestos is a very versatile mineral with many favourable qualities. It is also available in abundance and easily mined, which makes it relatively inexpensive to use. It was therefore considered a very useful material in the construction and manufacturing industries, and was often referred to as the "magic mineral" in the late 1800s.

Asbestos is not mined in the UK as it does not naturally occur in this country, and hence all exposure is related to asbestos imports from abroad. These imports began in the late 1800s due to the industrial revolution and the versatility of asbestos within the construction and manufacturing industry.

Commercially manufactured asbestos-containing materials can be broadly divided into the following categories:

- Thermal insulation (for example pipe and boiler insulation).
- Fire-proofing materials (for example sprayed insulation, fire door insulation).
- Asbestos cement/fibrocement products (for example roof and wall claddings).
- Decorative and acoustic applications.
- Electrical switchboards, insulators and fittings.
- Vinyl floor coverings.
- Asbestos felts and paper-like products.
- Friction materials (for example brake linings).
- Paints, coatings, sealants and adhesives.
- Packings and gaskets.
- Textiles (for example woven cloths, blankets).
- Miscellaneous and unusual products (for example asbestos socks, phone boxes and gas masks).

Asbestos has been used extensively in over 3,000 commercially manufactured products. Further details of the properties of asbestos, the types of use to which it has been put and an indication of the extent to which asbestos was used over time is given in section 4.8.

Why is asbestos dangerous?

Exposure to asbestos fibres is linked to a number of lung diseases, ranging from symptomless, harmless "scarring" of the lungs to a cancer of the membranes lining the lungs.

Asbestos-related diseases take a long time to develop following exposure to asbestos. The period between exposure to manifestation of the disease is known as the latency period. This time delay can be as long as 60 years. Hence the true dangers of asbestos were not fully understood until a long time after asbestos was extensively used and many people had been exposed.

The types of disease associated with asbestos exposure and corresponding latency periods are described in the next section.

2.2 Types of asbestos-related disease

There are five main conditions to be considered: calcified pleural plaques, pleural thickening, asbestosis, asbestos-related lung cancer and mesothelioma. These are listed below in increasing order of severity.

Calcified pleural plaques

It is a moot point whether pleural plaques are actually a "disease"; see the discussion of the pleural plaques test case in section 4.1. These are areas of thickening which occur on the parietal pleura, most commonly on the lower chest walls and diaphragm. They are diagnosed by X-ray or CT scan, showing up as shadows in the chest area. Because they occur outside the lungs, they are quite harmless. There are typically no symptoms related to pleural plaques (though some parties argue that there can be) and someone with pleural plaques has no impairment of normal lung function. Pleural plaques develop 15-20 years after first exposure to asbestos but, as there are no symptoms, the latency period can be much longer as the period will depend on when the plaques are detected.

Pleural thickening

This is thickening of the outer lining of the lung (mesothelium). The symptoms are reduced elasticity/capacity of the lungs with varying degrees of breathlessness.

Asbestosis

Asbestosis is diffuse, interstitial fibrosis of the lungs. It normally develops 15-40 years after first exposure to asbestos, and is normally associated with substantial dust exposure. It is a disabling and progressive condition, which leads to increasing breathlessness and, in extreme cases, death through heart failure. There is some interchangeability of the expressions “asbestosis” and “pneumoconiosis”. Pneumoconiosis is a lung disease caused by inhalation of mineral or metallic dust. Pneumoconiosis caused by asbestos fibres is effectively asbestosis. The expression pneumoconiosis also includes, for example, silicosis and kaolinosis.

Pleural thickening and asbestosis are benign, non-malignant diseases. Whilst they cause breathlessness and are unpleasant, they are not fatal per se. Unfortunately the remaining two types of asbestos-related disease are malignant, and account for the vast majority of asbestos-related deaths.

Asbestos-related lung cancer

Asbestos can cause cancer of the inner lining of the lung. It is associated with heavy asbestos dust exposure and hence asbestosis, and usually develops after 20 years from first exposure. As there are other causes of lung cancer (for example smoking), asbestos is not always identified as the cause or a contributing factor, and hence there have been relatively few asbestos-related lung cancer claims to date (see section 6).

Mesothelioma

Mesothelioma is the most serious type of asbestos disease. It is a tumour on the outer lining of the lung, and is usually fatal within two years of diagnosis. It is generally associated with amphibole asbestos fibres, and can arise from very low asbestos exposures, with onset typically 30 to 50 years after first exposure.

Dose-related versus event-related diseases

For some asbestos-related diseases, the greater the exposure (the higher the dose) to asbestos the likelihood of the disease developing and its severity increases. This is true for pleural thickening and asbestosis for example. These diseases are known as “divisible”. This is because, if there are a number of identified times when exposure to asbestos had occurred, then it is likely that these all had a bearing on the development of the asbestos disease. Hence the emergence of the disease can be divided between the different times when exposure occurred.

This is not the case for mesothelioma, where it is generally believed that exposure to one single fibre can be the cause of the disease. Indeed, there is no known threshold of asbestos exposure below which mesothelioma cannot occur (although this is not as clear cut as it sounds, with some experts arguing that there must be some threshold – see Hoskins & Lange in sections 2.4 and 2.5). Therefore there only needs to be one event where there is exposure to asbestos for mesothelioma potentially to develop. Hence the emergence of mesothelioma cannot be divided between the different times when exposure occurred, and diseases of this type are known as “indivisible”. These differences have had an impact on apportioning claims between employers / insurers – see for example the reference to the Holtby and Fairchild court cases in section 4.1.

2.3 Use of asbestos in the UK

It is informative to trace the historical use of asbestos in the UK. The following is a simple and by no means complete chronology of events:

1st Century - A historian, Pliny the Elder, noted the negative health effects of asbestos, referring to the sickness that seemed to follow those who worked with asbestos, and noted that slaves working in asbestos mines die young of lung disease.

1880s - The start of the commercial importation of asbestos, initially for use in the textile industry.
1897 - The first Workmen’s Compensation Act is passed (see section 4.7) – it makes no reference to industrial diseases.
1898 - Factory Inspector report is critical of dusty conditions in factories and adverse impact on health of workers (respiratory diseases).
1899 - Ferodo Limited (leading producer of asbestos brake linings) is established in Derbyshire.

1900 - Doctor Montague Murray performs a post-mortem on an unnamed worker who had worked for fourteen years in the asbestos industry. The lungs were stiff and black with fibrosis caused by inhalation of asbestos dust. The worker previously told Murray that he was the only survivor from ten others in his workroom. Dr Murray reported this to a UK government commission.
1906 - Compensation Act adds six industrial diseases to Workmen's Compensation Act, none of them are asbestos-related.
1920 - Turner and Newall Limited established in Rochdale, Lancashire, will become world-leading producer of asbestos products (see section 4.3).
1924 - Death of Nellie Kershaw: first officially recorded asbestos-related death due to "pulmonary asbestosis".
1930 – Government-commissioned report (Merewether) finds high levels of asbestosis in asbestos factory workers and recommends legislation.
1931 - Introduction of Asbestos Industry Regulations.
1930s - The Prudential loads mortality rates to allow for the impact of asbestos.
1948 - National Insurance (Industrial Injuries) Act of 1946 comes into effect, replacing the Workmen's Compensation Scheme with the Industrial Injuries Scheme.
1950s - Growing emergence of link between lung cancers and asbestos exposure, Richard Doll publishes evidence in 1955.
1960s - Growing emergence of link between mesothelioma and asbestos exposure, Professor Chris Wagner publishes evidence following study of South African miners.
1967 - Voluntary industry ban on import of blue (crocidolite) asbestos.
1968 - The British Occupational Hygiene Society suggests a safety standard for white (chrysotile) asbestos of 0.2 fibres/ml. The asbestos industry conducts a single survey at Turner and Newall's Rochdale plant and comes up with the level of 2 fibres/ml to be incorporated into the 1969 Asbestos Regulations. Later work suggests that 1 in 10 workers would contract asbestos-related disease at this level.
1969 - Asbestos Regulations 1969, first quantitative limit for asbestos dust exposure.
1974 - Health and Safety at Work Act.
1983 - The Asbestos (Licensing) Regulations are enacted, covering the most hazardous jobs such as asbestos stripping or removal.
1985 - Import of brown and blue asbestos banned.
1987 - CAW Regulations 1987 – further tightening of dust limits and controls.
1995 - Turner and Newall sells last asbestos business (T&N acquired by US firm Federal Mogul (1998) – both firms are now in insolvent administration).
1999 - Import of white asbestos banned – use permitted until 2005.
2002 - Control of Asbestos at Work Regulations ("CAWR").

Unpleasant skin conditions and respiratory illnesses were recognised in asbestos workers early in the 20th century. However, due to the long latency periods, the links with lung cancer and mesothelioma were only detected after a significant amount of exposure had occurred.

The 1931 regulations were heavily influenced by the asbestos manufacturers. The regulations failed from the outset because they applied only to a small minority of individual workers who were actually directly exposed to dust in asbestos factories (the so-called scheduled processes). The controls were inadequately policed and enforced, and in the meantime the success and proliferation of products and materials containing asbestos meant that not only did the core asbestos importing and processing industry grow, but so did the ancillary industries manufacturing asbestos-containing products. The number of individuals exposed grew at a huge rate, especially from the 1940s, with continuing public ignorance as to the true dangers and effects of breathing in asbestos dust.

The links to the more serious cancers were made through the 1950s and 1960s, but it still took nearly 40 years from the first asbestos regulations in 1931 until regulations controlling the amount of asbestos exposure were passed.

One reason, other than the Second World War, why asbestos regulation was not regarded as an important political or social issue during this time was probably the low number of deaths actually involved. The total recorded number of UK deaths in relation to asbestos in 1960 was only 31, compared with 1,503 in the mining industry, and hence the pressure for reform was more pressing in other areas. However, this short-sighted measure conceals that 700,000 were employed in the mining industry compared to 15,000 in asbestos manufacture, so the actual frequency per employee was very similar (0.207% compared to 0.215%). A more holistic review of risk/safety in different industries could have saved many lives – a point which may still have relevance today.

2.4 Health & Safety regulations

There are a number of health and safety and other statutory regulations that relate to asbestos. The following is a short summary of the most relevant.

The Factory and Workshop Act 1901

Section 79 of the 1901 Act fell within Part IV of the Act headed "Dangerous and Unhealthy Industries". It provided as follows:

“Where the Secretary of State is satisfied that any manufacture, machinery, plant, process, or description of manual labour, used in factories or workshops, is dangerous or injurious to health or dangerous to life or limb, either generally or in the case of women, children, or any other class of persons, he may certify that manufacture, machinery, plant, process, or description of manual labour, to be dangerous; and thereupon the Secretary of State may, subject to the provisions of this Act, make such regulations as appear to him to be reasonably practicable, and to meet the necessity of the case”.

The Asbestos Industry Regulations 1931 (S.I. No 1140)

The 1931 Regulations were made under section 79 of the 1901 Act. They applied to:

“All factories and workshops and parts thereof in which the following processes or any of them are carried on:

(i) Breaking, crushing, disintegrating, opening and grinding of asbestos, and the mixing or sieving of asbestos, and all processes involving manipulation of asbestos incidental thereto.
(ii) All processes in the manufacture of asbestos textiles, including preparatory and finishing processes.
(iii) The making of insulation slabs or sections, composed wholly or partly of asbestos, and processes incidental thereto.
(iv) The making or repairing of insulating mattresses, composed wholly or partly of asbestos, and processes incidental thereto.
(v) Sawing, grinding, turning, abrading and polishing, in the dry state, of articles composed wholly or partly of asbestos in the manufacture of such articles.
(vi) The cleaning of any chambers, fixtures and appliances for the collection of asbestos dust produced in any of the foregoing processes”.

Excluded from the scope of the Regulations were:

(i) Factories and workshops where certain of the processes referred to were carried out only occasionally and no one was employed on them for more than 8 hours in any week.

(ii) Factories or workshops where, by reason of the restricted use of asbestos, or the methods of working or otherwise, all or any of the Regulations could be suspended or relaxed without danger to the health of those employed there.

For the purpose of these Regulations "asbestos" was defined as meaning:

"any fibrous silicate mineral, and any admixture containing any such mineral, whether crude, crushed or opened".

"Preparing" was defined as:

"crushing, disintegrating, and any other process in or incidental to the opening of asbestos".

The Regulations set out the detailed duties of the occupier of the factory or workshop in matters of safety such as ventilation and the control of asbestos dust. For example regulation 8 governed, amongst other things, the cleaning of sacks that had contained asbestos dust.

Britain was the first country in the world to introduce such laws to govern the use of asbestos in the workplace. However, as can be seen from the above, these regulations only applied to workers involved in certain processes involved in the manufacture of asbestos – the scheduled processes. A large number of workers were not included in these scheduled processes, for example building trade workers, insulation engineers and plumbers.

<u>The Shipbuilding and Ship Repairing Regulations 1960 (S.I. No 1932)</u>

These regulations revoked and superseded the Shipbuilding Regulations 1931 (1960 Regs., reg. 1(2)), which did not refer to asbestos. Regulation 76 of the 1960 Regulations provided for protection from dust, which specifically included asbestos (regs. 76(1)(a) to (d)).

The Asbestos Regulations (1969)

These regulations revoked the 1931 regulations and expanded the statutory duty of employers to ensure that all staff in factories, power stations, warehouses, institutions and other premises were protected from the dangers of working with asbestos. The regulations applied to every process that used either asbestos, or any article that contained asbestos, and sought to minimise exposure to asbestos dust through:

- The use of exhaust ventilation.
- Protective equipment and clothing.
- Cleaning at regular intervals of machinery, plants and interior surfaces by dustless methods.
- Introduction of improved handling procedures.

The regulations set a limit of 2 fibres per millilitre of air for asbestos.

Health and Safety at Work Act 1974

This Act requires employers to conduct their work in such a way that employees will not be exposed to health and safety risks.

The Asbestos (Licensing) Regulations 1983 (as amended 1998)

These regulations were introduced when it was considered necessary to register all contractors working with high risk asbestos materials in order to control the standards of workmanship within the industry. Licences are issued to companies or individuals by the HSE, and may be revoked by them. Except for specifically exempted conditions, asbestos work must not be carried out without a licence, and the enforcing authority must be notified at least 14 days prior to works. Adequate information, instruction and training must be provided to those likely to be affected by the operations of a licensed contractor.

The Asbestos (Prohibitions) Regulations 1987 (as amended 1999)

These regulations were implemented in 1987 to prohibit the use of amosite (brown asbestos) and crocidolite (blue asbestos) in high risk activities. Most recently, the prohibition of chrysotile (white asbestos) came into effect on 24 November 1999. This pre-empts the European Directive requirement that chrysotile should be banned in the European Union by the end of 2004.

The 1999 legislation forbids the import of crude fibre, flake, powder or waste chrysotile and the new use of asbestos cement, boards, panels, tiles and other products. Chrysotile-containing products installed prior to 24 November 1999 can remain in place until they reach the end of their service life. The sale of second-hand asbestos cement products and building materials covered with asbestos-containing coatings is forbidden. Laid under the Consumer Protection Act, the Road Vehicles (Brake Linings Safety) Regulations 1999 prohibit "the supply, exposure for supply or fitting to a motor vehicle or trailer of brake linings containing asbestos" as of 1 October 1999.

The Control of Asbestos at Work ("CAW") Regulations 1987 (as amended 1998)

These regulations provide a framework for protection of workers involved in either the asbestos manufacturing industry or the removal industry. The CAW Regulations revoke the Asbestos Regulations 1969. The main requirements are to:

- Identify the type of asbestos.
- Assess, plan and notify work with asbestos materials.
- Prevent or reduce the exposure to asbestos through use of properly maintained control measures.
- Designate restricted access areas including respirator zones and asbestos areas.
- Monitor and record airborne fibre concentrations, to be carried out by an independent laboratory conforming with EN 45001 by accreditation with UK Accreditation Service.
- Provide proper storage, distribution and labelling of raw asbestos and asbestos waste.
- Make employers responsible for adequately informing workers, including provision of training and health surveillance when required.

The Control of Asbestos at Work Regulations ("CAWR") 2002

The objective of CAWR 2002 is to further reduce the risk of exposure to asbestos for the following target groups:

- Property maintenance/construction workers.
- Asbestos removal workers.
- Workers in buildings containing asbestos-containing materials ("ACMs").

CAWR 2002 builds upon the 1987 regulations. Employers continue to be required to prevent exposure at work to asbestos or, where this is not reasonably practical, to ensure that the exposure is kept below the (tightened) control limits.

CAWR 2002 also extends the scope and importance of the UK asbestos regulations, with the creation of "the dutyholder" and the "duty to manage asbestos".

The dutyholder is defined as:

(i) Every person who has, by virtue of a contract or tenancy, an obligation of any extent in relation to the maintenance or repair of non-domestic premises or any means of access thereto or egress therefrom; or

(ii) In relation to any part of non-domestic premises where there is no such contract or tenancy, every person who has, to any extent, control of that part of that non-domestic premises or any means of access thereto or egress therefrom.

Previous regulations imposed duties upon the employer; CAWR 2002 extends the class of persons affected (the dutyholders). This class will include landlords, tenants, property management companies, managing agents, contractors and all kinds of property and construction professionals. Essentially it ensures that every person or organisation which may be (or become) involved in the maintenance and repair of a property is required to comply with the regulations.

The broad requirements on the dutyholder are to:

- Assess the likelihood of the building to contain ACMs.
- Take reasonable steps to locate materials likely to contain asbestos.
- Presume materials contain asbestos unless there is strong evidence to suppose that they do not.
- Assess the likelihood of anyone being exposed to airborne, breathable asbestos from these materials.
- Make a written record (asbestos register) of the location and condition of the ACMs and presumed ACMs and keep it up to date for the lifetime of each building.
- Prepare an action plan to manage any risk and put it into effect ensuring that:
  - Information on the location and condition of the ACMs is given to anyone who may disturb them during work activities.
  - Any material known or presumed to contain asbestos is maintained in a good state of repair.
- Repair or remove any material which contains or is presumed to contain asbestos if it is likely to be damaged or disturbed and/or its location or condition makes it a hazard.
- Monitor the condition of the ACMs and presumed ACMs by periodic inspection.
- Carefully document each stage of the process and regularly review the action plan and arrangements made to put it in place.

Supporting the CAWR 2002 are a number of detailed Approved Codes of Practice and Guidance Notes. The enforcement of the new duty to manage asbestos is the responsibility of the HSE. Note that the regulations only apply to non-domestic properties. The regulations may be extended in the future to cover rented housing. However, it should be noted that landlords already have obligations under the Defective Premises Act 1972 to protect tenants from known defects and/or hazards. It is also established case law that common parts of domestic premises (for example entrance halls, stair wells and so on) fall under the definition of "non-domestic premises", and hence these parts of buildings should be covered by CAWR 2002.

The control limits for asbestos exposure in these regulations are as follows:

(i) For chrysotile:

(a) 0.3 fibres per millilitre of air averaged over a continuous period of 4 hours.

(b) 0.9 fibres per millilitre of air averaged over a continuous period of 10 minutes.

(ii) For any other form of asbestos either alone or in mixtures including mixtures of chrysotile with any other form of asbestos:

(a) 0.2 fibres per millilitre of air averaged over a continuous period of 4 hours.

(b) 0.6 fibres per millilitre of air averaged over a continuous period of 10 minutes.

Note that these limits are significantly less than those established in the 1969 regulations (2 fibres per millilitre). It is also interesting to note that asbestos is a minor pollutant in all air, so that we all receive an annual exposure of 0.001 fibres per millilitre per year. City dwellers typically receive several times this.

There is a certain amount of controversy regarding the CAWR 2002. The issue relates to the uncertainty surrounding the toxicity of chrysotile (white asbestos) and whether the CAWR should apply to ACMs that are made of 100% chrysotile asbestos. As noted in section 2.1, chrysotile is chemically and crystallographically very distinct from the five forms of amphibole asbestos.

The following abstract is quoted from "A Survey of the Health Problems associated with the Production and Use of High Density Chrysotile Products" (see section 2.5 and the précis of this paper in Appendix I) by J A Hoskins and J H Lange:

> "1. Chrysotile differs markedly from all other commercial asbestos: it is not acid-resistant, it is readily broken down in the lung and removed, while amphiboles persist.
>
> 2. Early mortality studies which led to the regulations we have today were concerned mainly with industries using mixtures of fibre types.
>
> 3. All studies of industries where only chrysotile was used show that, even at high exposures that were experienced in the past, its toxicity is relatively low".

The Hoskins & Lange paper states that no chrysotile-only product is ever thought to have produced mesothelioma. The paper concludes that it is difficult to demonstrate any health risks associated with high density chrysotile products, their manufacture and use. As described in section 2.5 however, there are a number of papers giving a diametrically opposite view. The cynical observer might notice that many of the pro-chrysotile papers are by people involved in, or sponsored by, the asbestos industry, whilst many of the anti-asbestos papers are by people involved in the asbestos-substitute industry.

White asbestos cement and Artex paint comprise well over 90 percent of all asbestos containing materials in some ten million buildings across the UK and it can be argued that these ACMs pose no risk to human health.

The controversy with the CAWR is that it does not distinguish significantly between the lower risks associated with chrysotile (white asbestos) and the higher risks associated with amphiboles (blue and brown asbestos). Furthermore, cellulose fibre materials promoted as a substitute for asbestos have properties which could make them just as damaging to health as the asbestos that they replace.

Don't panic!!! Despite the considerably tightened asbestos regulations, it is important to realise that the best advice, and HSE policy, is non-removal of asbestos when it is in good condition and does not need to be disturbed. This is supported by studies that observe higher fibre levels after removal. The US and Canadian agencies give similar advice to the HSE, the Environmental Protection Agency guidance in the US noting: "The presence of asbestos in a building does not mean that the health of building occupants is necessarily endangered. As long as asbestos-containing material remains in good condition and is not disturbed, exposure is unlikely".

2.5 Medical factors

Toxicity

An asbestos fibre is typically 2,000 times thinner than a human hair. That's pretty small! When asbestos fibres are inhaled, most fibres are expelled, but some can become lodged in the lungs and get into the alveoli, and remain there throughout life. The fibres can cause scarring and inflammation; enough scarring and inflammation can cause serious damage and lead to disease.

The different types of asbestos have different properties and can generally be distinguished by the properties of their fibres, their colour and the amount of calcium, iron, magnesium and sodium contained within them. Chrysotile fibres tend to be more flexible and are longer and thinner fibres than the fibres of amphibole varieties, and hence are generally more versatile which is why they account for the vast majority of asbestos use.

It is generally accepted that amphibole forms of asbestos pose a greater health risk than the chrysotile form because they are more rigid and less soluble, causing the particles to penetrate the lung tissue and remain within the tissue for a longer duration. The clearance rate (the rate at which the body naturally expels the fibres from the lungs) for chrysotile is generally greater than for the amphibole varieties. Chrysotile fibres are cleared from the body within a few weeks and readily break down in the lung into smaller particles. The extreme potency of crocidolite asbestos is related to the thin diameter of the fibre.

It is a generally held belief that crocidolite may be 2-4 times more potent, and amosite may be 2 times more potent that chrysotile. There has been much controversy in relation to the potency of chrysotile fibres with arguments that there is no casual link between exposure to chrysotile fibres and mesothelioma. This is one of the reasons why the ban on chrysotile asbestos was introduced much later than other types of asbestos. Many studies have been made into the link between chrysotile fibres and mesothelioma. Two such studies, concluding that there is a link between chrysotile and mesothelioma, are summarised below.

Asbestos Tissue Burden on Human Malignant Mesothelioma (Suzuki and Yuen, 2001)

In this study an analysis of tissue samples taken from the lungs and pleura of 151 malignant mesothelioma cases was broken into three groups. In one group both lung and mesothelial tissues were examined, in another only lung tissue was examined and in the final group only mesothelial tissues were examined. For approximately a quarter of the cases in each group, the only type of asbestos detected was chrysotile asbestos.

Cancer Mortality amongst Workers exposed to Amphibole-free Chrysotile Asbestos (Yano, Wang x 3 and Lan, 2001)

In this 25-year longitudinal study, covering 11,625 person-years of 515 male asbestos plant workers exposed only to chrysotile asbestos in Chongqin, China, researchers found two cases of mesothelioma accounting for 1.5% of the total deaths. Based on an expected rate of one mesothelioma in 1,000,000 person years, this finding documented a risk exceeding 170 times that of the non-exposed population.

A completely opposite view (that chrysotile is relatively harmless) continues to be put forwards by other medical experts, for example in the paper summarised below.

A Survey of the Health Problems associated with the Production and Use of High Density Chrysotile Products (Hoskins and Lange, 2004)

As noted in section 2.4, this paper comes to a sharply different conclusion about the link between chrysotile and mesothelioma. Some sound-bites from the paper illustrate its tenor:

“The conclusion has to be that it is difficult to demonstrate any health risks. The culture of fear that has grown up around all asbestos products would be better focused on the real dangers of amphibole materials than on the effective safety of high density chrysotile products”.

“The majority of scientific and medical opinion is that chrysotile alone does not produce mesothelioma. When there is dissension it is often revealing to read the author’s affiliation”.

“Although asbestos exposure is the most frequently recognised cause, approximately 20% or more of all mesotheliomas are not related to asbestos exposure (Lange, 2004; Baldi et al, 2002)”.

“To support the claim that mesothelioma is almost exclusively asbestos-related it has been proposed that even when the lungs are found to have low asbestos body counts … sub-microscopic fibres that do not readily form asbestos bodies are involved. This in spite of the wealth of good scientific evidence that points to long fibres as the causative agents”.

“In the case of mesothelioma, there is now a solid body of opinion that exposure to pure chrysotile does not cause the disease”.

Hoskins & Lange reject the previous studies, for example the Yano study above, as lacking relevant information and not being soundly based. They contend that at least some of the mesotheliomas found in those who have worked with only chrysotile arise because the chrysotile was contaminated with amphibole, or were caused by background exposure to amphibole asbestos, or due to other causes, such as exposure to other mineral fibres or non-fibrous minerals and organic chemicals.

The paper notes that alternatives to chrysotile are themselves untested and likely to be pathogenic, quoting from other sources:

"Because the fibre structure of asbestos is a major pathogenic factor, any new fibre proposed as an asbestos substitute (or for any other use) should automatically be suspected of being pathogenic because of its structure" (INSERM, Report of Expert Panel on "Health effects of asbestos substitute fibres)".

"… there is no significant epidemiology base to judge the health risks (of substitutes) … hence the conclusion that specific substitute materials pose a substantially lower risk to human health, particularly public health, than the current use of chrysotile, is not well founded…." (Scientific Committee of the European Commission's Directorate General XXIV, 1998).

The paper contains a wealth of references to other relevant papers, for example "There are other non-asbestos causes of mesothelioma", J H Lange, American Journal of Epidemiology (2004) and "Chrysotile, tremolite and carcinogenicity", MacDonald & MacDonald, Annals of Occupational Hygiene (1997).

Polio vaccines

In the 1950s the first polio vaccine was developed. As with most vaccines used today, the developed vaccine was a living virus weakened or killed such that the virus (or bacterium) does not cause the severe form of the disease, while at the same time being strong enough to give immunity.

A living virus must be "grown", and the virus needed for the vaccine grows well in the kidney tissues of monkeys. Thousands of Indian Rhesus monkeys were imported into the US and Europe in order to develop the vaccine. It was very quickly discovered that Rhesus monkey viruses were getting into the polio vaccine. However, it was initially thought that this was not dangerous because the polio vaccine most commonly used in the 1950s and early 1960s was based on a killed virus. It was presumed that the method used to kill the polio virus would also kill all the monkey virus contaminating the vaccine.

This presumption continued throughout the 1950s despite the discovery in 1956 that some agent in the monkey kidneys appeared to be causing cancers in hamsters into which it had been injected. By 1958, this agent had been identified as SV40 (the 40th simian virus identified).

Research was published in March 1961 in the British medical journal, the Lancet, that forced the US and UK authorities to act. This showed that SV40 survived the process that killed the polio vaccine and was alive and active in the vaccine. Of 20 British children who had received the polio vaccine, 13 tested positive for SV40, but none of the children who had not had the vaccine tested positive. By this stage, many millions of doses of contaminated polio vaccine had been administered worldwide to children, young adults and expectant mothers.

Following this research steps were taken to eliminate the SV40 contamination from all freshly manufactured polio vaccines. These measures included ending the use of Indian Rhesus monkeys and instead using African green monkeys, the latter being free of the SV40 contamination in the wild, and the replacement of the vaccine with an orally administered type, which contained a living weakened polio virus. This vaccine could not infect people with SV40 simply because it is taken by mouth: the human gut filters out all SV40 viruses. However, even after SV40-free vaccine became available, the US authorities did not simultaneously withdraw batches of contaminated polio vaccine that had already been released. Since it had a two-year shelf life, some contaminated vaccine was available as late as 1963.

In 1996, it was discovered that SV40 causes severe chromosome damage in humans. In particular, it appears to turn off the “p53” gene that controls the multiplication of cells and thus eliminates part of the human protection against cancer. SV40 has been found concentrated in certain human cancers, for example bone, brain and lung cancers. It is found in approximately 60% of mesotheliomas. It could be that SV40 facilitates the production of mesothelioma by switching off the p53 gene and thus leaving the body more vulnerable to causative factors such as asbestos. This is still being investigated, and has obvious legal ramifications (as the manufacturers and distributors of the polio vaccine may have contributed to the mesothelioma and other cancers).

Elimination of the virus from the vaccines did not end its spread across the human population. The virus seems to have become endemic among the human population, for example it has been found in brain tumours in children not exposed to the contaminated vaccine. It is possible for the virus to be transferred between humans, almost certainly from mothers to children. Indeed, research has shown the existence of the virus in samples of human semen. Research is being done into how the p53 gene can be effectively turned back on.

The impact, or otherwise, of SV40 on cancers generally and mesothelioma in particular is controversial. Like many medical aspects of any disease, there are no clear-cut answers and different researchers have put forward views and counter-views. But issues such as this show the additional complexities that can arise in determining and apportioning liability for asbestos-related diseases.

Smoking

Studies have shown that there is a ten-fold increase in the risk of developing lung cancer among asbestos textile workers. However, lung cancer from asbestos exposure is indistinguishable from lung cancer due to smoking, and the former is therefore submerged in the 50,000 annual UK lung cancer deaths ascribed to smoking.

The Health and Safety Executive ("HSE"), using occupational studies, has estimated that for each case of mesothelioma there could be two lung cancers. Using the HSE's ratio of 2:1 would imply around 3,000 lung cancer deaths each year due to asbestos exposure. However, considering the insurer data collected (see section 6.3), it appears that the ratio of lung cancer claims to mesothelioma claims is much less. This is probably because historically a lung cancer claim could only be attributable to asbestos if asbestosis was present. Medical practice for diagnosis and attribution of asbestos-related diseases has changed in recent years following the Helsinki Criteria, which attributes lung cancer to asbestos using other exposure indicators (see section 4.6).

It has been known for many years that the risk of lung cancer is increased from people who both smoke and work with asbestos. The risks are not additive, but multiplicative. In one study of smoking asbestos-removers, in the US, the risk reached an amazing 92 times that of the non-asbestos-exposed non-smoker.

The more commonly quoted figures are given in the table below:

Type of Person	Risk of Lung Cancer
Non-smoker / No Asbestos Exposure	1
Non-smoker / Asbestos Exposure	5
Smoker / No Asbestos Exposure	11
Smoker / Asbestos Exposure	52

Note that these smoking "multipliers" do not apply to mesothelioma, the incidence of which is unaffected by smoking. The compensation for lung cancer is often reduced for smokers because of the contribution smoking has made. This in large part explains why the average compensation for lung cancer is lower than that for mesothelioma (see sections 6 and 7). In a bizarre but loosely related US court case, Lorillard and Hollingsworth were sued by Charles Connor (in 1999) because Kent cigarette filters were made of asbestos in the 1950s. This (asbestos cigarette filters) is not the reason that smoking contributes so disproportionately to asbestos exposure!

3. INSURANCE-RELATED DEVELOPMENTS

3.1 Policyholders Protection Board

The Policyholder Protection Act of 1975 established the Policyholders Protection Board ("PPB") to provide compensation to the public in the event of the liquidation of an insurance company. This was a scheme operated under the Department of Environment, Trade and Regions. The Board made payments in respect of claims arising from post-1972 exposures (1975 in Northern Ireland). The payments covered full liabilities under certain policies of compulsory insurance and 90% of liabilities under other general and investment type policies up to a maximum payment of £2m. Compensation was restricted to individual policyholders or partnerships; corporate policyholders were not protected.

The Financial Services Compensation Scheme ("FSCS"), established under the Financial Services and Markets Act 2000 came into force in November 2001. Under this scheme for periods prior to 1972 (1975 in NI), to employees whose private sector employer no longer exists or is insolvent will receive payment of 90% of the compensation they would have been entitled to from their employers.

If the injury was sustained during a period of employment straddling 1972, the compensation award may be divided into post and pre-1972 (1975 in NI) elements, to determine how much compensation will be paid under the relevant policyholder protection scheme.

Because of the long latency period of asbestos-related diseases and the fact that exposure may have happened over the course of a working life, many sufferers of asbestos-related diseases have periods of exposure pre-1972. This means that if their insurer is insolvent, there may be periods of cover not caught by the PPB/FSCS safety net. The situation is further exacerbated since in many cases the original employer from periods prior to 1972 may also be insolvent or no longer exist.

This gap in the public safety-net came to a head with the collapse of Chester Street, formerly the Iron Trades Employers' Assurance Association, see section 3.4. The ABI put forward a plan to provide compensation for the pre-1972 periods of exposure, although there was no legal requirement for them to pick up this additional cost.

3.2 Claims handling agreements pre-Fairchild

In the 1970s the chief claims managers of a number of the major composite insurers set up an Industrial Disease Working Party. Their aim was to look into ways of handling disease claims so as to facilitate speedy payments to claimants and to minimise inter-company disputes. Over the years this resulted in a market understanding between those companies represented on the Working Party.

In respect of asbestos-related claims the understanding was:

(i) Sharing of cases would take place subject to the last 10 years prior to the date of diagnosis being ignored.
(ii) The insurers on risk where there was exposure prior to that 10-year period would share the claim according to their relative time on risk.
(iii) The co-ordinating insurer would be the last insurer on risk where there was exposure prior to the date of diagnosis.

In summary, the insurance industry treated claims for asbestos-related diseases uniformly in that all employers on risk were invited to contribute to awards on a time-exposed basis. A claimant would not be compensated for periods of asbestos exposure where Employers' Liability insurance was not in place.

In April 2000 the Holtby case (see section 4.1) brought the concept of dosage into the handling of asbestos-related claims. This particular case involved a claimant suffering from asbestosis. Medical opinion views asbestosis as a dose-related disease so that the more a person is exposed to asbestos, the greater the likelihood of developing asbestosis and the more severe the symptoms. In practice, apportioning claims between parties using a time-exposed basis weighted by the degree of exposure to asbestos is very difficult to apply.

As noted in section 2.2, asbestos-related diseases such as pleural thickening and asbestosis are "divisible". Mesothelioma is deemed to be "indivisible". There does not seem to be a clear practice as to whether lung cancers are treated as divisible or indivisible. There are very few asbestos-related lung cancer claims each year which is probably why there is no universal mechanism for apportioning liability.

3.3 Fairchild and the mesothelioma claims handling guidelines

Following the Fairchild case, the ABI introduced the mesothelioma claims handling guidelines. The agreement was implemented on 1 November 2003 for all mesothelioma claims not settled before that date which are being made in respect of Employers' Liability insurance. It should be noted that this is a voluntary, non-binding market agreement, not a method of claims handling set out in law.

The details of the Fairchild ruling are set out in detail in section 4.1. In summary, because mesothelioma is an "indivisible" disease, the claimant could not prove on the balance of probabilities where and when he had been exposed to the asbestos which caused the mesothelioma. It was thus not possible to prove which employer had materially contributed to the injury and the claim was rejected. The House of Lords overturned the Court of Appeal's decision and held that, where a claimant establishes breach of duty and causation against any one employer in a mesothelioma case, that employer will be liable for the full loss. In other words, the ruling gave the potential for individual insurers to be targeted by claimants for all of their compensation, even if they only provided insurance for part of the exposure period. The House of Lords decided that the need for redress to employees outweighed any unfairness that joint and several liability for the full claim might give rise to between employers.

The ABI mesothelioma claims handling agreement gives guidelines for apportioning claims among employers and their insurers since this was not addressed by the House of Lords ruling. It states that the most equitable and pragmatic way to do this is firstly in proportion to the periods of culpable exposure to asbestos by employers and then in proportion to the periods of insurance coverage, subject always to the claim being met in full. The guidelines also set out who pays the claim to the employee, how to calculate and collect contributions from others involved and how to deal with cases involving insolvent insurers or solvent but uninsured employers. The overall aim is to gain quick agreement between employers and their insurers and thus keep overall claim handling costs to a minimum and get compensation to a claimant in a timely manner. A copy of the guidelines is shown in Appendix III. As the guidelines are relatively new, the ABI will review their operation in practice and in the light of legal developments on a regular basis.

Where a claim involves multiple employers, a co-ordinator is established who is responsible for the overall management of the claim. For each employer involved, the lead insurer is identified as the one with the largest proportion of a period of culpable exposure. The co-ordinator will usually be the lead insurer of the employer with the longest period of culpable exposure. The co-ordinator will settle the claim first and then seek to recover contributions from other lead insurers/participants. In turn the lead insurers can then recover contributions from other insurers/participants. Only if the co-ordinator is an insolvent insurer will the payment to the claimant be made up of payments from various participants. It should also be noted that where the FSCS is the sole participant and there is an FSCS shortfall, the payment to the claimant may not be made in full.

Under the guidelines any part of a period of employment falling within a ten year period prior to the diagnosis of mesothelioma does not count as a period of culpable exposure. There is also no weighting of the apportionment to reflect the dose or type of asbestos during any period of culpable exposure.

3.4 Chester Street

The Iron Trades Employers' Assurance Association was a UK Mutual established in 1880, specialising in Employers' Liability insurance. It was owned by, and operated for the benefit of, some of the UK's largest industrial companies including British Steel and the Central Electrical Generating Board. Many of these industrial companies had large asbestos exposures.

In 1997 the business was restructured with all pre-1990 liabilities being ring-fenced from ongoing operations. The ongoing business was then run by one of the subsidiaries, Iron Trades Insurance Company Limited, and the run-off of the pre-1990 liabilities was placed with the other subsidiary, Iron Trades Holdings Limited. Iron Trades Holdings Limited was renamed Chester Street Insurance Holdings Limited ("Chester Street").

In 1999, Chester Street had a provision for disease claims of £192m, most of which related to asbestos. This had reduced from £204m in 1998. The company had no significant reinsurance assets. The 1999 statutory return included a typical statement of uncertainty about the extent of the asbestos exposure with no definitive figures, and quoted: "There is very limited available data in respect of the number of employees of policyholders exposed to asbestos. The future costs arising from these claims cannot, therefore, be predicted with certainty. Accordingly the provision for claims outstanding in respect of asbestos-related claims relies on a considerable degree of judgement as to the number of claims which will emerge, the timing of the claims, and the amounts for which they will be settled".

In 2000 Iron Trades sold its ongoing business to QBE International Limited for £175m. The sale protected the income from the ongoing business from the looming asbestos liabilities of pre-1990 policies, and other sources of cash to pay rising asbestos claims. Later some creditors would argue that the ongoing business was sold too cheaply, citing an "internal evaluation" of £222.5m.

On 19 December 2000 Chester Street's directors proposed a Scheme of Arrangement under Section 425 of The Companies Act 1985. This allowed partial payment of liabilities, including claims. Chester Street chairman Benjamin Strickland said that a Scheme of arrangement is "cheaper [than liquidation]. There is more money left for claims". Of course, in the UK, any shortfall in claims payments under Employers' Liability policies written since 1972 is met by the FSCS. However this left a significant shortfall as much of the exposure related to pre-1972 periods of employment for which no PPB compensation was available (see section 3.1).

On 9 January 2001, before the Scheme was implemented, Chester Street was declared insolvent by its directors and was heading for provisional liquidation. It was reported to be facing about 12,000 claims, primarily asbestos-related. An actuarial study pointed to substantially more losses to arise from IBNR claims. Chester Street, however, avoided liquidation as the courts allowed them to activate the prepared scheme. This was backed by the company's creditors. The Scheme was approved by the High Court on 28 February 2001. Daniel Schwarzmann of PwC, the Joint Scheme Administrator, and the Creditors' Committee set an initial payment level of 5%.

Shortly after the Scheme was agreed, the TUC published a briefing paper entitled "Mesothelioma victims and Iron Trades Insurers". This paper states that "Mesothelioma cases are settling at a rate of about 600-700 a year at the moment, and an average claim of £50k - £100k plus fees is not uncommon. Given the scale of the asbestos problem there may be 10,000 to 15,000 cases of mesothelioma over the next 20 years relating to pre-1972 exposure, half of which were insured by Iron Trades".

The report said that the figures could be conservative, yet they still "point to a total compensation bill of about £1b falling due to Chester Street". However, in a later news release it upped the possible total, saying that Chester Street's "debts over the next 40 years may amount to as much as £4b".

The British Asbestos Newsletter claimed in its Spring 2001 issue that 12,000 claimants would be affected. The newsletter claims an actuarial report commissioned by the provisional liquidators estimates Chester Street's total liabilities, most of which relate to asbestos, at £3.75b over the next 40 years.

In its 2002 statutory accounts, Chester Street reported gross claims paid of £26m (£30k from reinsurers). It reported net incurred claims of £134.8m while its assets diminished to £168.2m and recorded a negative shareholder's equity of £1,330.2m. In answering questions regarding its asbestos liability, Chester Street reported notified outstanding claims of £114.7m, IBNR of £1,276m, and negative reserves of more than £1.3b.

Although some of Chester Street's post-1972 liabilities would have been picked up by the insurance industry, there was no compensation for pre-1972 Chester Street exposures. Also, some of the pre-1972 exposures should be shared with employers who did not purchase insurance; however many of the employers were insolvent or no longer existed. In May 2001 the ABI announced a negotiated plan to make good the shortfall between Chester Street's asbestos liabilities and the various sources available to pay claims. The arrangements were that claims against Chester Street by employees of public sector bodies will be met by the government, and those of private sector employees, when their employer no longer exists or is insolvent, by the UK insurance sector.

The breakdown of contributions under the ABI scheme is:

- FSCS (previously the PPB) will pay 90% of awards in respect of exposure prior to 1972 and settled before Chester Street's insolvency on 9 January 2001, and 100% of pre-insolvency post-1972 settlements.

- To cover settlements relating to pre-1972 exposures made on or after the insolvency, UK insurers through the ABI will directly fund compensation payments, expected to range between £4-5m.

- Future claims will be met through the FSCS paid for by the insurance industry.

In a letter to members, the ABI's General Insurance Council Management Committee said that the PPB had developed a "working estimate" of the cost of pre-1972 claims of £1b, which would be collected from industry via levy over a 20 year period.

Strict conditions must be met before a claim is paid under the ABI's plan. The claimant's condition must not have been apparent before 9 January 2001. The claimant's employer must be insolvent, and the claim must not relate to a period of exposure that took place when an industry was nationalised or state owned. In such cases the government is responsible for the claim. Claims falling under the ABI arrangements are negotiated and settled by Iron Trades Management Services (ITMS), which is owned by QBE.

On 7 January 2002, the FSCS announced a levy of £150m against general insurers, or 0.66% of leviable premium income. "The levy will be used to pay compensation for general insurance claims, including those against Independent Insurance and Chester Street" the FSCS said. Before the end of March 2002 the ABI's payments under their scheme had surpassed £1m, for 159 claimants at £6,603 per claim. The FSCS revealed in a 21 April 2002 statement that for Chester Street claims where damages have been agreed, 67% of outstanding claims involving insolvent policyholders had either been paid or acceptance documents delivered to solicitors, including 74% of claims agreed since 1 March 2002; that payments totalling over £3m had been made by the FSCS and the ABI; and that 83% of claims involving solvent policyholders had been paid or were with policyholders and awaiting payment.

In its 2002-03 Annual Report, published in August 2003, the FSCS revealed that it had made payments during the fiscal year totalling £12.8m in respect of Chester Street.

The impact of the Chester Street bankruptcy on some of its insureds was illustrated when William Baird plc, the textiles group, recorded a £7.8m provision for asbestos claims arising against former engineering subsidiaries. The reserve was intended to cover claims over the next 15 years, and was necessary because of the collapse of Chester Street, which had insured them.

3.5 Other claims handling protocols

On 8 December 2003 the “Pre-action disease and illness protocol” came into force. This applies to all types of disease, including asbestos-related diseases. This protocol applies to all disease cases regardless of value but does not apply to “group” or “class” actions.

The purpose of the protocol is to provide a code of good practice for parties to follow when litigation is a possibility, aiming to resolve disputes without recourse to litigation. The protocol follows the spirit of the personal injury and clinical negligence protocols.

The protocol provides for a potential claimant to request direct from the employer occupational health and personnel records prior to a claim. The employer generally has 40 days to provide the records. There is also provision for the claimant to seek further documents relating to liability at this stage.

When a decision is made to initiate a claim and as soon as sufficient information is available, the claimant must send the proposed defendant two copies of the letter of claim. The letter must set out a clear summary of the facts and main allegations of fault, details of the illness, the financial loss incurred by the claimant, notification of any conditional fee arrangement, a chronology of any other relevant facts and identify any relevant documents not already in the defendant’s possession. This will enable the defendant/insurer to fully investigate the claim. At this stage the claimant must also indicate whether a claim is being brought against any other defendant.

The defendant has 21 days to acknowledge and three months to respond in full unless the letter of claim lacks any particulars. If the defendant/insurer does not provide acknowledgement within the 21 days the claimant may issue proceedings. Within three months of the date of the acknowledgement letter the defendant should provide a fully reasoned answer and, if not admitting the claim in whole or part, provide explanations with supporting documentation.

As soon as practical the claimant should produce a schedule of special damages with supporting documentation.

It is up to the parties involved to assess the need for and gather expert evidence. The protocol recognises that in disease claims expert evidence plays a crucial role in dealing with issues such as knowledge, fault, causation, condition and prognosis.

4. SOCIO-ECONOMIC DEVELOPMENTS

4.1 Legal developments

There have been a number of Court cases in respect of asbestos-related diseases:

Court case	High Court	Court of Appeal	House of Lords
Lubbe v. Cape	12/1/98	29/11/99	20/7/00
Holtby v. Brigham	12/4/99	6/4/00	
Ballantine v. Newalls	5/98	15/6/00	
Jeromson v. Shell	18/2/00	2/2/01	
Babcock v. N.Grid	15/6/00	11/12/01	
Fairchild v. Glenhaven	1/2/01	11/12/01	16/5/02
T&N v. RSA	9/5/03	Postponed	
Phillips v. Syndicate 992	14/5/03		
Barker v. Saint Gobain	23/5/03	5/5/04	Appealing
Brett v. Beaven	7/11/03		

Cape and T&N were both major manufacturers of asbestos products in the UK. There are a considerable number of issues relating to both companies, so we have given them each a section of their own (sections 4.2 and 4.3).

As touched on in section 2.2, Holtby addressed the question of "divisibility" for asbestosis. Fairchild considered the apportionment of liability for mesothelioma; Phillips and Barker are variations of this issue again with respect to mesothelioma. Phillips considered how to treat "void" periods of cover (where defendants or their insurers are untraced or insolvent). Barker dealt with apportionment which includes periods of self-employment and the issue of contributory negligence (when self-employed).

Ballantine considered the deductibility of awards made under the pneumoconiosis compensation scheme from other awards for damages. Babcock considered sharing of liability between firms of contractors and those who employ them. Brett is an example of a pleural plaques case.

Jeromson considered whether a reasonable employer could and should have known that asbestos was dangerous in the 1950s. This case is an important landmark in determining the "date of knowledge" by which time a reasonable employer should have been aware of the dangers of asbestos and taken action to protect its employees. Further cases not described here, Owen v. IMI Yorkshire Copper Tube (1991), Margereson v. Roberts (1996) and Maguire v. Harland & Woolf (2004) have also addressed this issue.

These cases are described in the rest of the section, as well as a test case regarding pleural plaques, due to have its first hearing in November 2004.

Holtby v Brigham & Cowan (Hull) Ltd

The legal position regarding "divisible" illnesses (see section 2.2) was considered by this case. The Fairchild case (later in this section) considers the legal position in respect of compensation given to asbestos-related illnesses that are considered to be indivisible.

After leaving school in 1942 at the age of 15, Mr Holtby worked as a marine fitter for the defendant for 12 years. Thereafter he worked for a number of other employers doing similar work that exposed him to similar levels of asbestos dust until 1981. None of Holtby's employers took any special precautions to protect him from asbestos and he developed asbestosis. The issue before the court was whether the defendant was liable in respect of the whole resulting disability or only to the extent that it contributed towards the disease.

The judge found the defendant 75% liable, reducing liability by 25% to take account of the contribution other periods of employment had made to the disability. The judge's decision was based on that fact that asbestos dust has a cumulative effect and that "all asbestos exposure contributes to the development of the disease".

In upholding this decision, the Court of Appeal decided that as a matter of principle:

- A claimant must prove each defendant's liability, namely that his negligence had made a material contribution to his or her disability.

- The calculation of damages should depend on the length of time the claimant was employed by the negligent defendant relative to the overall period of exposure, in other words a discount would be applied if it was not possible to sue all the "guilty" exposures.

In this majority judgement, Lord Justice Stuart-Smith wrote: "The court must do the best it can to achieve justice, not only to the claimant but the defendant, and among defendants."

Ballantine v. Newalls Insulation

Robert Ballantine developed mesothelioma in 1997 and died in July 1998, following exposure in his teens to asbestos around the defendant's premises.

Mr Ballantine had been awarded £39,000 under the 1979 pneumoconiosis scheme (see section 4.7) in March 1998. In May 1998 he brought an action against Newalls who admitted liability and agreed damages of £144,000 but argued that the 1979 pneumoconiosis scheme payment should be deducted from the damages.

On 15 June 2000 the Court of Appeal held that the 1979 pneumoconiosis scheme payment should be deducted from the damages. The 1979 scheme conditions include that all relevant employers have ceased trading and no actions have been brought against anyone for damages. The claimant argued that the 1979 Act payment was not for the injury but to compensate for the loss of the chance to litigate. The Court of Appeal disagreed, considering the 1979 Act as providing compensation for illness so the entire payment should be deducted from damages.

Jeromson v. Shell Tankers

From 1957-1961 Shell Tankers employed Mr Jeromson as a maritime engineer. During the course of his employment he was exposed to asbestos while working in the engine rooms of ships. Mr Jeromson died, age 60, from mesothelioma. In February 2000 the Court concluded that the employer's actions had contributed to the death and awarded £157,794 to Mr Jeromson's widow.

The Merewether and Price Report (1930), the Asbestos Industry Regulations (1931) and Annual Reports of the Chief Inspector of Factories were used to support the conclusion that during the relevant period, a reasonable employer would and should have known that asbestos dust was dangerous. The 1947 Report included evidence of the association between asbestos and cancer of the lungs and the 1954 Report noted cases of lung cancer and asbestosis attributed to asbestos exposure.

The judge gave Shell Tankers permission to appeal on liability. The case went to the Court of Appeal in February 2001. The issue raised was whether the risk should have been identified, given that the link between asbestos and mesothelioma was not established until 1960 (until then the known risk was of lung disease).

However, common law negligence was established and the judge concluded that a prudent employer would have taken precautions or at the very least made inquiries about what precautions, if any, should be taken. The appeal was dismissed.

Babcock International v. National Grid

Babcock settled an action brought against them as employer of a welder who died as a result of mesothelioma. The exposure to asbestos occurred while the employee was working at the premises of CEGB (who became National Grid plc). The asbestos was in lagging which had been applied by a third party (from 1953 to 1956) employed by CEGB during construction of the premises. The third party could not be identified. Babcock brought the action to seek a contribution from the defendant on the grounds that they knew the lagging contained asbestos and were negligent in not taking steps to avert or minimise the risks of exposure.

The claim was dismissed on the grounds that it was reasonable for CEGB, when employing contractors, to expect those contractors to take care of their employees as regards the risks of exposure to asbestos associated with their typical working environments. It was held that CEGB did not owe a duty of care to the employees of Babcock. Furthermore, even if CEGB had owed a duty and had been in breach, Babcock would still have been 100% liable as their duty as employers could not be passed on to CEGB.

Fairchild v. Glenhaven

In this case, the House of Lords reversed a Court of Appeal decision. The Court of Appeal had ruled on six test cases where victims had been exposed to asbestos by more than one employer - any of which might have triggered the mesothelioma. In essence the Court of Appeal said that if it could not be proved exactly who was to blame, then no one could be found to blame. The Court of Appeal decision did seem fundamentally unfair to many people, including those in the insurance industry, and even the Court acknowledged that there was a "major injustice crying out to be righted either by statute or by an agreed insurance industry scheme".

Two main issues before the Court were:

- Could a victim of mesothelioma recover compensation for negligent exposure to asbestos dust where more than one employer was involved?
- Could compensation be recovered from an occupier of premises, where there had been exposure to asbestos dust?

On the first issue, the Court of Appeal held that because mesothelioma is caused when a single cell in the lung lining is damaged and undergoes malignant transformation, its cause is "indivisible" (see section 2.2). For this reason the claimant cannot rely on the balance of probability to identify when the exposure occurred. The Court declined to apportion liability between employers when there had been potential exposure in several employments. Thus, in the case of a claimant with potential exposure during more than one employment, the claim would fail.

The Court of Appeal then considered the extent of occupiers' liability under the 1957 Occupier's Liability Act. The Court ruled that there was a distinction between "occupancy liability" and "activity liability", the latter not being the concern of the 1957 Act. Where the complaint related only to the asbestos dust raised in the course of the contractors' activities on the premises, the occupier owed no common law duties of occupancy to the claimant.

The House of Lords decision was given on 16 May 2002 with the detailed ruling given on 20 June 2002. The detailed ruling made it clear that an employee can claim from any former employer, without having to prove which one caused the disease. The House of Lords deliberately side-stepped the issue of how a number of employers might sensibly share liability for a given case and effectively threw this issue back at the insurance industry to resolve.

The decision makes little difference to the total amount of compensation paid to mesothelioma victims (although it may lead to the share of costs changing between solvent and insolvent employers and their insurers) compared to the situation before the Court of Appeal decision in December 2001. However, it marks a change in attitude of the Courts and a change in approach to proof of causation. These changes may have wider ramifications in future for compensation claims. For example for other types of disease claim, perhaps ones not currently known about, future claimants may find it easier to claim against anyone who might have been partially responsible, without having to prove who was actually responsible.

The Fairchild judgement led to the ABI industry "sharing" agreement for mesothelioma claims (see section 3.3), similar to that for other diseases such as asbestosis (see section 3.2). Getting agreement from a number of insurers is often tricky, but the situation is exacerbated in this case because some of the sharing parties are the original employers (for pre-72 claims which they did not insure) and some of these companies are now insolvent.

T&N v Royal & SunAlliance and Lloyd's of London

Section 4.3 describes the history of T&N and the various insurances T&N purchased. In particular T&N purchased Employers' Liability insurance from Royal Insurance (now Royal & SunAlliance) from 1 October 1969 to 31 March 1977 and then from Syndicate 45 at Lloyd's until 30 April 1995. These policies contained a pneumoconiosis exclusion, known as asbestosis when it is caused by asbestos (see section 2.2).

The insurers argued that the exclusion also excluded other asbestos-related lung and gut diseases such as mesothelioma and cancer. In May 2003, the High Court rejected the insurers' claim. However, the insurers have further argued that they can rescind coverage in respect of these claims on the grounds that T&N did not fully disclose the extent of its asbestos operations. This issue, which is strenuously denied by T&N, is the subject of a separate court hearing. Further background to this case is given in section 4.3. At the time of writing (July 2004) we understand that the appeal by the insurers has been postponed while all parties try to reach a settlement. We understand that the settlement is conditional on the court approval of the relevant section of Federal Mogul's scheme of arrangement.

Phillips v. Syndicate 992

This case follows on from Fairchild v. Glenhaven and considers who is responsible for the damage caused during void periods of cover, that is, where defendants or their insurers are untraced or insolvent.

In this case it was accepted that the deceased was exposed to asbestos during his employment with the defendants' insured between 1955 and 1957 and later between 1959 and 1970, and had contracted mesothelioma as a consequence of this exposure. The employers were liquidated in 1979. Damages were judged to be £205,000, and the defendants (employers' insurers between 1959 and 1968) made an offer into court proportionate to their time-on-risk share of these damages. The claimant (the deceased's widow) sued the defendants under the Third Party (Rights Against Insurers) Act 1930 for the balance of £56,375.

Mr. Justice Eady gave his judgement in favour of the claimant in May 2003. Overall there were three (related) issues to consider:

(i) Did the standard rateable proportion clause of the policy expressly exclude liability for the period after the defendants' cover? The clause stipulated:

> "If at the time any claim arises under this policy there be any other insurance covering the same liability the Underwriters shall not be liable to pay or contribute more than their due proportion of any such claim and costs and expenses in connection therewith".

Justice Eady held that the purpose of the provision is to give the insurer the right to pay a "rateable proportion" in cases of double insurance, that is two or more policies covering the same risk at the same time. There is no basis in authority for treating it as embracing successive policies of insurance. Therefore the clause is held to have no wider application than an application of average clause has in a property claim.

It was also argued that the successive periods of insurance cover the same liability. The judge dismissed this argument on the basis that the clause was couched in time-specific terms, and that separate periods of insurance relate to different slices of a continuing breach of duty.

(ii) Underpinning the first is a more general issue of whether the rateable proportion clause should be implied to give the contract business efficacy. This came from Keene Corporation v Insurance Company of America where Judge Wald stated "….if the risk is to be shared only amongst the insurance companies (as opposed to uninsured periods), a manufacturing company that bought insurance only intermittently during the risk period would be as secure as those prudent companies that continually purchase insurance".

Judge Eady dismissed this argument holding that "it can hardly be suggested that the contract needs such a provision to make it workable". In terms of the risk undertaken, the judge held that the question is always whether the legal liability at the time it is established is such as to fall within the scope of the risk insured against. No-one can guarantee at the time that a contract of insurance is entered into, that during the term of the policy there will not be some development of the law that will render the risk less commercially attractive.

(iii) The third issue - that market practice provided guidance to the interpretation of the contract - was dismissed as the judge held that the evidence of market practice was inadmissible, as the contract was to be construed without reference to external factors. Further, he held that any inter-insurer agreements as to the handling of claims were inapplicable to the arrangements between insurer and insured.

Barker v. Saint Gobain Pipelines

This is another case clarifying how liability should be apportioned following the Fairchild ruling. Mr Barker had been negligently exposed to asbestos fibres during his eight years of employment with the defendants. Additionally he had another exposure of six weeks with a second employer and, importantly, intermittent exposure in the 1970s when he was a self-employed plasterer.

The following issues arose:

- The causation issue. Did the fact that he was exposed while self-employed mean that his claim does not fall within the Fairchild ruling?

- The apportionment issue. Should the court apportion liability between the two employers and his period of self-employment?

- The contributory negligence issue. Should the damages be reduced since precautions to avoid exposure were not taken while he was self-employed?

The judge identified the two employers as concurrent tort feasors, that is, apportionment was a matter of damages not causation, and each employer was jointly and severally responsible. Interestingly, in terms of contributory negligence, the court found the claimant 20% to blame as he had failed to take precautions to avoid exposure in the mid-1970s.

Leave was given to appeal to the House of Lords.

Brett v. Beaven & Sons Ltd

The claimant, a 73 year-old man, received £12,552 for the pleural plaques, anxiety and risks of future deterioration caused by asbestos exposure during his employment between 1945 and 1978.

It was acknowledged during the case that pleural plaques are asymptomless, that is, they have no effect on the claimant's health. The award for anxiety, which was £5,000, followed the trend of awards made in the US. The risk of pleural thickening and asbestosis was assessed at 2% and the risk of developing mesothelioma was assessed at 10%.

The claimant accepted a final award on a once and for all basis. This means if he goes on to develop an asbestos-related disease he will not be able to make a further claim and will have been considerably under-compensated.

The recorder commented that the JSB guidelines (see the end of this section) were not helpful in this instance as they did not deal with awards for asymptomatic pleural plaques and future risks. This is not altogether surprising as there appears to be no reason for an award to be granted where a claimant has suffered no damage and where there is no link between pleural plaques and the development of other asbestos-related diseases.

Pleural plaque test cases

Awards for pleural plaques (see section 2.2) are currently in the region of £5,000 for provisional damages and £15,000 for a full and final settlement (see section 6.2 and the example of Brett v. Beaven above). A provisional damage award means that the claimant can go back to Court if they go on to develop a further asbestos-related disease. A full and final settlement reflects the latter risk in the compensation awarded and the claimant may not return to Court whatever happens.

Most claimants will have periods of exposure that fall to different insurers and typically one insurer will handle the pleural plaque claim and ask for contributions from others at the time of settlement. Insurers have agreed that for the moment they will support whichever of the two courses of action the co-ordinator takes.

Insurers think these awards are high because in most cases pleural plaques cause no disability and no symptoms. Essentially it is the fear of developing a disease that is being compensated. Pleural plaques are thought only to develop from exposure to asbestos (though similar thickening to areas of the lungs can be caused by exposure to other substances). They can occur after a much lower dose of asbestos than is necessary to cause asbestosis. Pleural plaques do not develop into any of the other diseases: they are an independent condition (see for example the paper by Weiss, "Asbestosis: a marker of the increased risk of lung cancer" in Appendix I). A (rather extreme) analogy would be someone who was compensated for the risk of (and fear of) tripping over a loose paving slab just because they could demonstrate that they walked outside! There have been various estimates of the prevalence of pleural plaques in the population at large, from background environmental exposure to asbestos or possibly other substances. The estimates are between 24% and 74% of the general population. Some pathologists (Churg) have estimated that more than half of all male, urban, autopsies show pleural plaques.

Giving a full and final settlement seems particularly inappropriate. The vast majority of claimants effectively receive a "bonus" because they do not go on to develop any disease but a few who do go on to develop mesothelioma, for example, are vastly under-compensated. This seems fundamentally undesirable and inappropriate.

One of the problems in the US is that there have been a great number of unimpaired claimants with no actual disease. The "FAIR" Act (see section 8.5) in the US originally proposed, amongst other things, that symptomless benign conditions such as pleural plaques should not give rise to a cause of action. Paying compensation to unimpaired claimants has helped to make many companies and insurers insolvent in the US. It is undesirable for that to happen in the UK, not least because it deprives genuinely ill people of the compensation they deserve. Insurers are now starting to act on this issue because of the increased number of claimants coming through, for example due to the development of scan vans (see section 4.4).

The key issues that insurers would like the Courts to decide are:

(i) Is pleural plaques a compensatable condition?
(ii) Is it compensatable by provisional damages?
(iii) How much is it worth?

A number of companies (including Norwich Union, Zurich and Iron Trades) are in the process of putting together a series of cases (about a dozen) that are to be heard in a special High Court sitting, currently scheduled for November 2004, in an effort to get a definite answer to these questions. Other insurers are challenging the current awards on a case by case basis. As is normal in such test cases, the insurers concerned are putting a "stay" on similar cases pending resolution of the issues described above. The test cases are likely to be appealed to the Court of Appeal and the House of Lords, so a final decision may not be known for several years. Challenging an individual case will lead to higher costs but may result in a lower settlement whereas not challenging an award means the costs are lower but the indemnity payment is higher. It will be interesting to see whether other insurers follow the lead of Norwich Union and Zurich and put a halt (or at least a "stay") to paying out on pleural plaque claims while the questions around pleural plaques are resolved.

Insurers are hoping that pleural plaques will either be confirmed as a non-compensatable condition, or that the level of provisional damages might be reduced to around £1,000 and that the link with other diseases will be broken. So a claimant would receive a token award for pleural plaques but would be free to bring another claim (and receive the appropriate, rather more significant, compensation they deserve) in the future if they developed an asbestos-related disease. Such an outcome would stop the UK going the way of the US in respect of unimpaired claims, and ensure the funds available to provide compensation were targeted at those who suffer an actual, and very serious, disease.

JSB guidelines

As well as court cases to clarify the principles that should apply to different types of claim, there are published guidelines on the amount of claims. A working party of the Judicial Studies Board publishes the "Guidelines for the assessment of general damages in personal injury cases". It is designed to assist in the task of providing guidance on the level of damages being awarded by courts in England and Wales. It is not designed to provide the answer to the assessment of damages in any particular case, just a starting point. The guidelines hope to reflect the general level of current awards, and all judges involved in hearing personal injury cases will automatically receive a copy of this book.

The guidelines given in the 6th edition for damages for asbestos-related diseases are as follows:

Mesothelioma	£40,000-60,000
Lung cancer	£40,000-50,000
Asbestosis	£25,000-55,000
Pleural thickening	£20,000-40,000
Pleural plaques	£15,000-20,000

Note that these are for the basic award amounts and will not include any allowance for heads of damage such as:

- Loss of earnings.
- Loss of pension.
- Cost of care.
- Funeral benefits.

Note also that the amounts and heads of damages are different in Scotland. For instance in Scotland additional heads of damages are included in settlements, including loss of companionship for each direct relative including spouse, children and children in law.

4.2 Cape

Cape was a significant asbestos mining and processing company and has been the subject of an important asbestos-related legal judgement. As there is a lot to say about Cape, we have given it a section of its own.

The company

In 1893, Cape (formally "The Cape Asbestos Company Ltd") was incorporated in Britain to mine and process asbestos and sell asbestos-related products. Cape operated a blue asbestos (crocidolite) mine at Koegas and a mill at Prieska in the Northern Cape, South Africa until 1948. In 1925, Cape bought shares in Egnep Ltd. and Amosa Ltd. The companies operated a brown asbestos (amosite) mine and mill at Penge in Northern Transvaal. These companies' head office was in Cape Town. In 1940 a factory manufacturing asbestos products was opened in Benoni near Johannesburg. The factory was a wholly owned subsidiary of Cape.

In 1948, the corporate structure of Cape was changed. The mine at Koegas and the mill at Prieska were transferred to a newly formed South African company, Cape Blue Mines (Pty.) Ltd. Shares in Cape Blue Mines, Egnep and Amosa were transferred to Cape Asbestos South Africa (Pty.) Ltd a newly formed South African holding company with offices in Johannesburg. All the holding company's shares were owned by Cape. In 1979, shares in Cape Blue Mines, Egnep and Amosa were sold to an unrelated third party that subsequently sold them on. Cape continued to have an interest in South Africa until 1989. Since then, Cape has had no presence in South Africa.

Cape also carried out asbestos-related activities in other countries. From 1899, Cape operated a number of factories processing and manufacturing asbestos products in England. One factory was located in Barking, and was run by Cape from 1913 until 1962. Thereafter it was run by a wholly owned subsidiary until its closure in 1968. Asbestos products were also manufactured in Turin through a wholly owned subsidiary, Capamianto, from 1911 until 1968 with intermissions during the wars.

Since the late 1970s, the company has diversified and now provides a range of services including industrial scaffolding, insulation, fire protection, fabric maintenance and cleaning. Its client base is largely from the energy sector and includes BP and Esso. Today, Cape is an AIM listed company and is profitable and a market leader.

The issues

Cape closed its UK factory in Barking in 1968 due to the levels of asbestos disease suffered by its workforce, but continued to operate in South Africa.

In Britain, as we know from section 2.4, regulations controlling the use of asbestos were introduced in 1931. Long after the hazards of asbestos were known to it, Cape is alleged to have exploited lax standards of Health and Safety in South Africa.

Cape workers and those who lived in the communities around the Cape mines were exposed to high levels of asbestos, sometimes up to thirty times the legal limit in Britain. At Cape's Penge mine in the Northern Cape, young children were completely enclosed within large shipping bags, trampling down fluffy amosite asbestos which cascaded over their heads. Several of these children had asbestosis with cor pulmonale before the age of 12. Cor pulmonale is right-sided heart failure caused by high blood pressure. Almost any chronic lung disease causing low blood oxygen can lead to cor pulmonale. The mill at Prieska was in the middle of the town, close to the church and school. Unsurprisingly, the incidence of asbestos-related disease was very high in Prieska with whole families being affected.

When Cape withdrew from South Africa, it left behind an international legacy of death and disease. Those affected were:

- Asbestos miners and millers.
- Asbestos transporters.
- Stevedores loading/unloading ships.
- Ship workers.
- Workers at factories.
- People living in the vicinity of these operations.

What were the claimants seeking compensation for?

The claimants were not claiming for compensation because Cape was their employer or the occupier of the factories where the claimants worked; nor because Cape was the source of the contamination in the areas where the claimants lived. Rather, the claims were made against Cape because it was the parent company that allegedly knew that exposure to asbestos was damaging to health, yet failed to:

- Take proper steps to ensure that the appropriate working practices were implemented and followed.
- Ensure that adequate safety precautions were observed throughout the group.

Thus the defendant was in breach of its duty of care towards those working at or living near its factories. Some of the claimants were representatives of deceased victims.

History of claims against Cape

The first claims for compensation against Cape's South African activities were commenced in the English High Court in February 1997 by Mrs Lubbe and four other claimants. Mr Lubbe pursued his wife's claim when she died. At approximately the same time that the South African plaintiffs initiated proceedings, similar claims were logged on behalf of four Italian workers at Cape's Turin factory for exposure to asbestos and asbestos products.

Cape applied for stay of proceedings on the grounds that the litigation should take place in South Africa, that is on forum grounds.

Cape did not raise the same jurisdictional defence in the Italian claims, presumably because both the UK and Italy are signatories to the Brussels Convention, whereas South Africa is not.

In general, a stay will not be granted unless "there is some other tribunal, having competent jurisdiction, in which the action may be tried more suitably for the interests of all parties and for the ends of justice".

Evidence of negligence on behalf of the parent company would be documentary (for example minutes of meetings, reports by directors and employees on visits overseas) and would be found in the UK in the offices of the parent company. In contrast, evidence of claimants' personal injury (for example medical diagnosis, prognosis, causation and quantum) would be sourced in South Africa. The greater importance of the personal injury issues tipped the balance in favour of a South African trial and the stay was granted in January 1998, after an eight day hearing spread over six months.

The plaintiffs appealed, and in July 1998 the Court of Appeal reversed this decision. The Court arrived at this decision because:

- The "alleged breaches of……duty of care…….took place in England rather than South Africa".
- To grant the stay would therefore allow Cape to "forum shop in reverse", that is, the defendant could elect for the court that was more favourable to it.
- Prima facie, the "duty" owed by an English company should be determined by English law.

Cape then appealed to the House of Lords. After an oral hearing in December 1998, Cape's petition was dismissed.

In January 1999 two further actions involving 2,000 claims were commenced in England against Cape plc. by South African claimants exposed to asbestos in the same geographical regions of South Africa.

Cape applied to stay the 2,000 claims on forum grounds, again contending that the emergence of such a large group of claimants was a material change that warranted a different conclusion to that reached by the Court of Appeal in the original five cases. In addition, Cape sought to stay the original five cases as well on the grounds that the Court of Appeal had been misled about the true nature of the cases. The court granted a stay of all action for a number of reasons, including:

- To prepare such a large number of plaintiffs' cases would involve "a careful, detailed and cumbersome factual enquiry" that would have to take place in South Africa.
- Legal aid would be available to claimants to litigate in South Africa, although it was recognised that there could be difficulties and delays involved in obtaining it.

Both sides were given leave to appeal.

Legal aid was then revoked in South Africa for all personal injury claims. However, Cape offered money to a public interest law centre to fund the claimants' case against itself.

The claimants then took their cases to the Court of Appeal, but in November 1999, their cases were dismissed. One of the reasons given was that the South African lawyers would undertake the case on a no win, no fee basis.

Finally, the claimants appealed to the House of Lords, and the Republic of South Africa was given permission to intervene. In July 2000, in a unanimous, landmark decision in favour of the claimants, all five Law Lords decided that the case should be allowed to continue in the English High Court.

The decision was based on the following:

- There was no suggestion that public funds might exceptionally be made available to fund Court actions in South Africa.
- There was no guarantee that those attorneys in South Africa with expertise in this field had the means for, or would undertake the risk of, conducting the proceedings on a contingency fee basis.
- Even if the case were undertaken on a no win, no fee basis, this would not apply to the fees of expert witnesses.
- The defendant suggested that financial assistance for the plaintiffs might be forthcoming from the Legal Resources Centre, but this suggestion was authoritatively contradicted.
- The absence in South Africa of developed procedures for handling group actions increased the likelihood that decisions would be contested resulting in delays and increased costs.
- If the proceedings were stayed in favour of a South African forum, this would necessitate the plaintiffs having the means to obtain the professional representation and the expert evidence needed for their case to be justly decided. Otherwise justice would be denied to them.

These factors gave compelling ground for refusing to stay the proceedings.

Why this judgement is significant

The judgement is significant because it means that the Courts of England can take account of the ability of claimants to sue in their own country when deciding whether or not the Court of that country is the preferred tribunal.

This raises the issue that if claimants can establish that a UK parent company owes a duty to the employees of its foreign subsidiary, underwriters and actuaries should review their risk assessments (and reserves) for such companies.

There are a number of UK companies with subsidiaries in the developing world where access to justice is more difficult. While class actions of this size are relatively rare, England could become a popular venue for any group litigation.

Most of the world's asbestos mining takes place in Canada, South Africa, Zimbabwe, USA, Russia, Australia and Brazil (see section 4.8). Assuming each country's operations will have been damaging to health at some time, claims could come from any of these countries. However, Canada, Australia and USA each have domestic courts that could deal with claims of this nature. It is unlikely that there is a UK proprietary interest in Russia. However, access to local justice in Brazil and Zimbabwe is less certain. If there is a UK parent company, claims could come here from these countries.

Another risk arises from exports by British companies. Since 1989, 90% of the world consumption of asbestos has been in the form of construction materials such as cladding and roofing. While North American and western European demand for these products has fallen over the last 15 years, demand in the Far East and Eastern Europe has risen. Could UK manufacturers, producers and exporters of these products be facing claims from those in countries where there is little or no access to justice?

Compensating the claimants

An out of Court settlement, amounting to £21m, was agreed in December 2001. However, Cape failed to honour it. On 13 March 2003, Cape agreed to a compensation settlement of £7.5m for the 7,500 South Africans whose lives have been devastated by Cape's asbestos activities. The settlement was made in conjunction with another settlement by Gencor Ltd., a South African company that took over many of Cape's operations when it left South Africa in 1979. Gencor undertook to pay an additional £3.21m to Cape claimants who were also exposed to Gencor's operations.

Remember Alice

While most of this section relates to Cape's South African asbestos activities, Cape's UK activities and the dangers of asbestos achieved particular prominence in the 1982 Yorkshire TV programme "Alice – a fight for life". Alice was employed by Cape for three months when she was seventeen. In her forties she contracted mesothelioma. The programme discussed the dangers of asbestos and Alice's claim for compensation. Alice died shortly after the programme was made.

4.3 Turner & Newall ("T&N")

Introduction

As we will see, no review of UK asbestos exposures is complete without reference to T&N, so we have also given it a section all to itself. In this section we have drawn heavily on, and indeed in places reproduced more or less verbatim, a number of excellent articles by Laurie Kazan-Allen (who has kindly given this paper a quick review), particularly "T&N Ltd" and other articles available from the International Ban Asbestos Secretariat ("IBAS"). We have also drawn on articles contained in the British Asbestos Newsletter publications, edited by Laurie Kazan-Allen - see the bibliography in Appendix I for further details and a link to the IBAS / British Asbestos Newsletter Web sites.

T&N's insurance history is long and complex, with many aspects of its asbestos liabilities still under dispute. It involves various market players, numerous policies as well as self-insurance, all set against a background of shifting legislation. Since the mid-1980s, the estimates placed on T&N's asbestos-related liabilities have grown with each evaluation and it is still impossible to quantify the ultimate liability with any degree of certainty.

Although "asbestosis" is used loosely in some literature to refer to any number of asbestos-related diseases, in our paper the stricter definition applies, namely "lung fibrosis caused by the inhalation of asbestos fibres" (see section 2.2). This point is particularly important given some of the legal wranglings over exactly what may be included in or excluded from various T&N insurances.

US "discovery" law and modern technology mean that there is a huge amount of archive material relating to T&N. In 1995, Chase Manhattan sued T&N for the cost of removing asbestos from its New York offices. The Bank's lawyers microfilmed over a million records from T&N's Manchester headquarters. This astonishing wealth of information is the basis for much of the current understanding of T&N's history. Chase in fact lost their Court case, after T&N's own discovery process revealed that Chase were well aware of the presence of asbestos and regarded it as safe. Chase's defeat is not entirely surprising, as property damage cases don't involve personal injury claims of sick workers to sway a jury, rather the renovation costs being borne by a wealthy institution. As an observer remarked at the time "…. It appears that the Chase lawyers had overestimated the sympathy among working class jurors for a $305b bank." (V. Titunik in The American Lawyer, May 1996). Ironically, Chase also lost out financially following T&N / Federal Moguls's Chapter 11 Administration, which might not have arisen had the wealth of historic T&N documents not been put into the public domain.

The beginning

Turner and Newall Ltd was created in 1920 by the merger of established UK family concerns experienced in the manufacture of asbestos and magnesia products; it became a public company in 1925. The objective of the union was "to create an organisation for the mining, manufacture and distribution of asbestos and allied products, wherein overlapping and waste effort would be minimised, and research and development work could be carried out on a scale commensurate with the magnitude of its operations". The interests of the founding companies were complementary and all asbestos-related:

(i) Turner Brothers Asbestos Co. Ltd ("TBA") manufactured textile and related products from chrysotile (white asbestos) for use in transportation, construction and heavy industry.

(ii) J.W.Roberts Ltd ("JWR") manufactured textile and related products mainly from crocidolite (blue asbestos).

(iii) Newalls Insulation Co. Ltd ("NIC") specialised in the installation of insulation systems for industrial applications.

(iv) The Washington Chemical Co. Ltd. manufactured a range of magnesia products, some incorporating asbestos fibre, including one known as "85% Magnesia" which was used by NIC.

In 1920 T&N's head office, with a staff of two, was located on the Rochdale premises of TBA. By 1933, the group's rapid expansion required a larger staff and T&N purchased additional office accommodation at Rochdale. In October 1949, T&N's head office was re-located to Fountain Street, Manchester.

T&N: the "asbestos giant"

Turner & Newall became the largest asbestos company in the UK; it owned mines in Canada, Rhodesia, South Africa and Swaziland, asbestos factories in India, as well as subsidiaries in North America and Europe. The company was involved in all stages of asbestos processing at home and abroad. According to a government report: "from the time of its formation in 1920 T&N had steadily strengthened its position as the leading, indeed the dominant, producer of both fibres and asbestos products. Smaller manufacturers... certainly existed, but after 1928 none was comparable in size or range of interests to T&N". By the late 1930s, ten thousand people worked in all stages of asbestos processing at T&N's asbestos mines, factories and subsidiaries at home and overseas. In 1939 T&N controlled 20% of the world's asbestos market. By 1950, T&N had achieved a virtual monopoly position in the UK asbestos industry; in 1955 T&N's market share of the sales of asbestos cement products was 75% and of friction materials 50%. Hence T&N is a major feature of any discussion of UK asbestos.

The company was responsible for 60% (by value) of all the asbestos products supplied in the UK. For a time, its sales had overtaken those of the US asbestos giant, Johns-Manville: “while Johns-Manville had sales of US$304.1m in 1959, T&N had sales of US$450m the previous year” (see Laurie Kazan-Allen’s various splendid T&N articles. Details of these and other articles can be found in Appendix I).

From the start, T&N pursued a policy of growth through acquisition. In 1925 for example, T&N acquired virtually all the share capital of Ferodo Limited, the leading UK manufacturer of brake linings, clutch facings and other friction materials. On rare occasions new facilities were commissioned: for example the construction in 1949 of TBA’s factory in Hindley Green, South Lancashire and the construction of Ferodo’s factory in Caernarvon, N.Wales in 1960. In the main, however, T&N’s expansion followed corporate purchases and mergers.

The commercial exploitation of asbestos in building materials, automotive parts and insulation products was at the heart of the company’s success. Unfortunately, it was also the root of the company’s problems as workers, customers and individuals living or working in close proximity to its factories were placed at risk of contracting asbestos-related diseases by exposure to high concentrations of airborne fibres.

Between 1989 and 1995, T&N embarked on a programme to reduce its dependence on asbestos-related activities under the guidance of its new chairman, Colin Hope. By the end of the period, T&N had relinquished its asbestos cement and mining interests in India and Africa and the company appeared to be on the way to recovery.

However, the asbestos spectre worried UK investors. To reassure the City, T&N took out an extra £500m layer of insurance cover for asbestos liabilities in 1996. In early 1998, an unconditional takeover bid of £1.5b was accepted by the T&N Board. T&N’s asbestos liabilities didn’t seem to concern its new owner, the American multinational Federal-Mogul Corporation (“FM”); its General Counsel said “We are pleased with T&N’s innovative efforts to manage this serious problem and intend to build on those efforts in the future”.

FM was soon to regret this purchase. In October 2000, FM’s expansionist Chairman and Chief Executive, Richard Snell resigned abruptly amid warnings of poor third-quarter performance. The company’s stock plunged to US$3.25 from a high of US$72 in July 1998. It was predicted that loan agreements would not be honoured and that “bankruptcy is no longer a remote risk”. With asbestos-related payments of $351.4 million in 2000 (the bulk of which was in respect of the T&N companies), the asbestos legacy had started to undermine FM’s very existence (see Federal-Mogul’s SEC filings – web site reference in Appendix I).

Even after decades of asbestos litigation, new threats have still been emerging in recent years. During 1999, Owens-Illinois, Inc., a key asbestos producer in the US, alleged that T&N had participated "in a scheme to defraud and a conspiracy with other asbestos fibre suppliers to create and protect a demand for asbestos through the suppression and misrepresentation of information concerning health risks to users of finished insulation products containing asbestos". On August 24, 1999, a default judgement of $1.63b was entered against T&N; this judgement was set aside in December of the same year by a federal judge at a preliminary injunction hearing. Ultimately the case was settled privately between T&N and Owens-Illinois; although the terms of the agreement were confidential, it is speculated that the amount paid by T&N to extricate itself from this case was relatively small.

In the US, asbestos has driven many defendant corporations into bankruptcy; this trend continued during 2000 with Pittsburgh-Corning, Babcock & Wilcox, Owens Corning, Fibreboard Corporation and Armstrong World Industries Inc. seeking protection under Chapter 11 of the Bankruptcy Code. On January 5, 2001, G-I Holdings Inc., owner of GAF Corp., followed citing a "sharp, unforeseen increase in the number of claims… the dramatic escalation in settlement demands and the inability of the tort system to resolve such claims in a fair and orderly manner". As asbestos claimants have fewer deep pockets to access, those defendants which remain are faced with increasing claims.

The constant stream of asbestos claims was unsettling for FM shareholders and stock analysts. It was hoped that $550m obtained in short-term loans in January 2001 would go some way towards reassuring creditors, suppliers, employees and investors. That was before a report by The National Econometric Research Company estimated that FM/T&N is facing $900m of asbestos claims, excluding the possibility of punitive damages, in the next four years: $350m in 2001, $250m in 2002, $150m in each of 2003 and 2004. While FM maintained that insurance should cover the bulk of the claims, it announced other measures to reduce the final bill, such as the introduction of an "asbestos management strategy to focus payments only on the impaired and malignant individuals who have been exposed to our subsidiaries' products. We believe this will result in a long-term phasedown of our asbestos payments. We are also working toward a legislative solution for our continuing situation".

On 1 October 2001, largely due to the explosion in asbestos claims against T&N and its former subsidiaries, FM was forced to seek financial protection from its creditors by filing for voluntary Chapter 11 reorganisation in the US and administration in the UK under the Insolvency Act of 1986. As of the Petition Date, T&N was a defendant in approximately 263,000 pending personal injury claims resulting from exposure to asbestos or asbestos-containing products (of which 91,000 related to the UK operations – see Federal-Mogul's SEC filings).

The administration process

One result of the Chapter 11 and administration orders is that all legal actions against members of the FM Group are frozen. As the T&N purse remains closed by court order, claimants have been looking to T&N's insurers for compensation. Establishing which insurers issued policies when, for which subsidiaries and with which exclusions over a period stretching from the 1920s to date is, however, a non-trivial task. More information is becoming known as Kroll Buchler Phillips, T&N's administrators, and Denton Wilde Sapte, their solicitors, examine T&N's records. However, since the insurance coverage is subject to a number of legal disputes (see section 4.1 and later in this section) much of the detail is still uncertain.

At the meeting of T&N's creditors in London on 11 February 2002, Simon Freakley, head of the court-appointed team of administrators, explained that the rights of all non-secured creditors are equal; thus, an asbestos claimant has the same right as a trade creditor. Among the asbestos claimants, someone whose exposure was "environmental" has the same rights as someone who had been employed by one of the T&N subsidiaries. At the time it was too early to predict the detail of the global reorganisation.

Simon Freakley admitted that because of the sheer magnitude of the work required, the reorganisation is bound to take a "number of years". This is why, he said, his team are trying to see what the position is with the insurance policies. In addition, the administrators have been speaking to representatives in various departments of the government, including the Treasury, to see what might be available from government compensation schemes.

The administrators can set aside the administration order for specific activities. It is possible that as the insurance position becomes clearer, applications by solicitors for this order to be set aside so that asbestos claims might be brought against insurers could be viewed sympathetically.

Insurance history: asbestosis becomes a scheduled disease

Research conducted by Dr. Merewether in 1930 resulted in the designation of asbestosis as a scheduled disease under the terms of the Workmen's Compensation Acts ("WCA") (see section 4.7). This meant that workmen suffering from asbestosis could make a claim against their employers for periodical and lump sum payments as provided in the Acts. When rumours of this development reached T&N at Rochdale, enquiries about coverage for asbestosis claims were made with the Midland Employers' Mutual Assurance Ltd., the insurance company which had written T&N's workmen's compensation policies since the 1920 merger. One of T&N's directors informed the other group companies: "We are at present negotiating with the group WCA insurers, the Midland Employers' Mutual Assurance Ltd., with a view to the protection of unit companies affected, by an endorsement of their policies to cover this disease".

The Asbestosis Fund

The Midland's premium for cover in respect of asbestos-related claims proved to be unacceptable to the T&N Board and a decision was taken that the group would carry the risk itself. The Asbestosis Fund, a private insurance scheme, was set up to handle all of T&N's asbestos-related claims not covered by insurance. T&N engaged Commercial Union to administer the Fund (but not to underwrite it) and to manage the claims. The standard practice was to pay workers half their previous wage as a form of weekly pension, and a gratuity on death. Compensation of T&N's asbestos workers, among other subjects, is dealt with in detail by Dr Geoffrey Tweedale in his book Magic Mineral to Killer Dust: Turner & Newall and the Asbestos Hazard (see Bibliography in Appendix I).

Initially, each unit company contributed a sum to the Asbestosis Fund equal to 7.5% of its employees' wages. The Fund started accumulating a surplus and less than two years into its operation the contributions were halved. In 1937, the contributions were reduced further to 2.5% (although the rate for JWR was increased to 5% to reflect its relatively higher incidence of asbestos-related disease) and fluctuated around that level for a number of years.

From 1948, when the National Insurance Acts came into force, the State relieved individual employers of their liability to pay compensation for scheduled asbestos-related diseases. Instead, state benefits were paid from an Industrial Injuries Fund to which every employer and employee contributed weekly (see section 4.7). T&N was still responsible however for pre-1948 claims and the Asbestosis Fund continued to oversee the compensation process for this group of injured workers. Tables 5.3 and 5.4 from Geoffrey Tweedale's book show that between 1931 and 1948 compensation payments from the Asbestosis Fund amounted to £57,476 in respect of 140 registered cases (an additional £15,690 was spent by the company on workers' medical examinations) and the Fund had a surplus of £14,772 at the end the period. The company's post-tax profits for the same period were £14.7m. In 1948, The Midland indicated that they would be prepared to cover the excluded asbestos-related claims for an annual premium of £1,000. Once again, the T&N Group decided to carry on self-insuring. This is probably the most expensive mistake T&N ever made!

The Asbestosis Fund accumulated a surplus of £47,200 by 1961 and was eventually wound up, leaving the unit companies to bear the cost of common law asbestos-related claims themselves.

Employers' Liability cover

T&N purchased Employers' Liability insurance from:

- Royal Insurance (later Royal & Sun Alliance) for the period from 1 October 1969 to 31 March 1977.
- Lloyd's of London Brian Smith Syndicate 45 from 1 April 1977 to 30 April 1995.

Both insurers' policies contained exclusionary wording in respect of asbestos-related claims; a situation which remained unchanged despite the introduction of compulsory comprehensive Employers' Liability insurance in 1972.

According to minutes from the Turner and Newall Board Meeting of 10 February 1977: "When the Employers' Liability (Compulsory Insurance) Act came into force we found ourselves in some difficulty. The present situation is that our insurers (The Royal Insurance Company Ltd.) provide the certificates required by the Act, but the clause in the policy excluding asbestosis liability still remains. Insurers have now indicated that they are not prepared to continue, and we are now, through Hogg Robinson, seeking another insurer. The Royal were concerned because since 1972 they have been carrying a risk, by reason of having issued the certificates, which is specifically excluded from the policy, and furthermore that it is a continuing risk for claims which may take up to twenty years to arise".

Prior to its insolvency, T&N paid all its asbestos-related claims directly without any recourse to insurance and in 1979 it established a captive in Guernsey, Curzon Insurance Limited, to cover the otherwise uninsured asbestos liabilities. These and other actions appeared to confirm T&N's undertaking to carry its own asbestos claims.

Following T&N's administration, the legality of these exclusions was called into question. The specific wording of the exclusions was also considered. Although T&N's administrators are unable to locate a copy of the Royal policy, the Record of Employers' Liability insurance, as provided by the Royal, states that the policy: "does not apply to or include liability in respect of pneumoconiosis or pneumoconiosis accompanied by tuberculosis". The policy defines "pneumoconiosis" as "fibrosis of the lungs due to asbestos dust and includes the conditions of the lungs known as dust reticulation".

In May 2003, the High Court concluded that although it is illegal to limit the scope of compulsory Employer's Liability cover, the exclusion constituted an agreement by T&N to reimburse its insurers for any asbestos-related claims. Hence, while the insurers are liable for all claims arising under the policies, with effect from 1972 when the Employer's Liability cover became mandatory, they have the right of recovery against T&N in respect of claims related to asbestos. Both insurers are appealing this decision. We understand that (at the time of writing, July 2004) the appeal has been adjourned while all parties try to reach a settlement.

The administrators' report also mentioned Employers' Liability policies issued by the Midland Employers' Mutual Assurance Limited from "at least 1931 until 1 October 1969". As copies and information on these policies could not be located by the administrators, they were unable to confirm whether there had been asbestos exclusions. An unpublished manuscript by Barrie N Barker on T&N's insurance history sheds some light on this subject. Barker quotes from the minutes of a T&N Board meeting in 1950: "our present policies with the Midland Employers' (sic) covered Common Law claims brought against us by our employees, such claims being based on negligence and/or breach of statutory duty, but Common Law claims in respect of asbestosis are still excluded from these policies". Barker also writes: "It has been conceded that T&N are not entitled to an indemnity in respect of asbestosis claims (from the Midland) because claims in respect of asbestosis are specifically excluded by the endorsement to the Employers' Liability policy… claims in respect of carcinoma are not excluded by the wording of the endorsement…"

T&N received an undisclosed sum of money from the Eagle Star Insurance Co. Ltd. (which had absorbed the Midland) to settle "all past and future occupational disease claims" in 1990. The terms of this settlement were confidential. The lack of detailed information about the Midland policy is particularly frustrating because so many of the current claims relate to asbestos exposure which occurred between the mid-1940s and 1970. Following an application by one of the plaintiff lawyers, the High Court judge ordered the administrators to disclose the document entitled: Deed of Acknowledgement, Discharge and Indemnity. Although the specific terms of this dense document cannot be divulged, it seems unlikely that the legal basis of this agreement can be undone.

Asbestos Liability cover: the Curzon policy

The offshore Curzon asbestos policy has generated much interest since T&N went into administration. At that time, it was known that a £500m asbestos liability insurance policy had been taken out by T&N in 1996 with Curzon, T&N's captive insurance vehicle. Under the terms of the policy, the insurance would be triggered only when the aggregate cost of claims made or brought after 30 June 1996, where the exposure occurred prior to that date, exceeded £690m. According to the documents released in February 2002 by the administrators: "this insurance applies to Asbestos Claims made or brought anywhere in the world at any time after the Inception Date of this Policy". The term of policy CZ7/96 ASB/096 is from "1 July 1996 without time limitation". Claims under US workers' compensation statutes are specifically excluded; however US and UK product and public liability claims and Employers' Liability claims by UK employees are not.

According to information provided by the administrators: "the FM Group recorded an insurance recoverable asset under the T&N (Curzon) policy of $577 million in the fourth quarter of 2000". This seems to confirm other statements by the administrators in which they said that the money from the Curzon policy could not be ring-fenced and used exclusively for UK claimants.

The future of Federal-Mogul

On 30 January 2003 FM announced it had entered into a letter of intent to acquire Honeywell's Bendix friction materials business. Consummation of the acquisition was conditional upon Honeywell receiving a bankruptcy court-issued permanent injunction shielding it from all current and future asbestos liabilities related to Honeywell's worldwide friction materials business. However, the deal collapsed after the parties failed to agree on the terms.

FM's plan to exit bankruptcy includes the establishment of a global scheme of arrangement (backed by a trust) for the benefit of present and future asbestos injury claimants, releasing the company from its obligations in respect of these claims. There are no details available at present regarding how such a scheme might work but any proposal will have to be approved by the Court as well as FM's creditors by means of a vote (including the asbestos injury claimants).

FM Chairman, Frank Macher, stated in a January 2003 press release: "We expect that we will emerge from Chapter 11 later this year with a much stronger balance sheet and with a full resolution of the company's asbestos liability issues… The plan will eliminate over US$2.5b of interest-bearing indebtedness, remove the taint of asbestos liabilities from the company, and give customers, suppliers and other stakeholders the confidence they need in the long-term health and success of Federal-Mogul".

His comments are strangely reminiscent of those made by T&N chairman and chief executive, Colin Hope in 1996. He described the sale of T&N's construction and asbestos mining operations in Zimbabwe as a landmark deal which "leaves T&N as a straightforward automotive business and gets rid of its (asbestos) past". When the 1995 financial results were released soon thereafter, amid claims of "solid and sustained progress in all areas", Hope announced: "I think we are coming over the hill. We have made provisions for asbestos-related charges of another £40m to £50m for 1996. By 1997, asbestos costs should begin to decline". Hmmm….

Even as the working party paper is going to press, T&N has hit the headlines again for the wrong reasons, following news that up to 40,000 T&N workers may lose part of their pension contributions. The T&N pension scheme was frozen by FM administrators on 22 July 2004, with a shortfall of £875m.

4.4 Scan vans

Several firms of solicitors actively create and maintain databases of employers and which insurance companies insured them for which periods of time. These databases are far-reaching going back several decades. These firms actively seek out potential claimants in order to target potentially responsible insurers for compensation. Claimants are identified through TV advertising, local press and the Citizens Advice Bureaux amongst other means. They are subject to a detailed questionnaire and interview. After interview, appropriate potential claimants are booked in for X-ray scans in mobile vans to try to detect scarring on the chest wall, an indicator of exposure to asbestos.

One law firm, Robinson and Murphy, specialising in asbestos-related claims, advertises its services on Google, as do many others. The firm states that it has been dealing with asbestos compensation claims for many years and its personnel have successfully concluded thousands of cases. It is based in Newcastle-upon-Tyne where many asbestos-related claims have arisen over the years from the shipbuilding, ship-repairing and heavy engineering industries.

One North East firm of solicitors is known to have recently hired an X-ray scan van for two days in order to arrange "scan-and-shopping" days out. Potential pleural plaque claimants were identified through targeted advertising, and then bussed in to Gateshead town centre with their wives. Whilst the claimants were being X-rayed in the van for shadows on their lungs, their wives had a day trip to the Metro shopping centre.

Eversheds, the solicitors, claim to have the largest team of corporate criminal defence lawyers in the UK, which are spread over several locations. A partner at their Newcastle-upon-Tyne practice recently stated that the average amount paid out for pleural plaques is £12,000. He said half the amount of money Eversheds' clients pay out for asbestos claims is related to pleural plaques.

Solicitors Irwin Mitchell, a leading firm of personal injury lawyers, is another which seeks to obtain compensation for asbestos-related disease claimants on a no-win no-fee basis. Their promotional material notes that the company managed to obtain the highest damages award for a mesothelioma case in the UK (£4.37m), and the highest damages award for someone suffering from asbestosis (£750,000).

Many "claim farming" companies have also entered this area. One, FreeClaim IDC, which provides people with litigation funding packages and legal expenses insurance, works with a company using scan vans. Its managing director claims the scan vans will lead to more compensation claims but also benefit members of the public who are not diagnosed with asbestos-related problems. They claim that treatment physicians and doctors say it can be a very good way to capture health information to enable early intervention, which may in some cases not be related to any asbestos disease at all. The practice is no doubt of benefit to FreeClaim IDC as well.

As noted in section 8.3 on US developments, the main reason behind the surge in asbestos claims in the US has been the growth in the number of unimpaired claimants (those who have no actual illness or medical impairment). These now account for up to three-quarters of all US claims. Part of the FAIR Act proposals (see section 8.5) were to stop unimpaired claimants drawing on the compensation pot, ensuring compensation could go to those suffering an actual disease.

As noted in section 4.1, some UK insurers are now taking action to check whether pleural plaques are compensatable and if so on what basis and what a fair level of compensation might be.

4.5 UK companies and organisations affected by asbestos

Many UK companies and organisations have been financially affected by the discovery of asbestos on their premises. For small to medium size private companies, the impact of this can be very serious, even as extreme as forcing insolvency. Fortunately, this has only occurred relatively rarely to date as most cases of discovery of asbestos have arisen in the public sector. For Government, Local Authority and Nationalised bodies, the costs would normally to be met through budgetary adjustments or grants. Nevertheless, such unplanned costs can mean that other areas of operation have their levels of funding reduced. Also, much management time is taken up dealing with the health and safety and financial issues which inevitably arise.

There have been many examples of asbestos-related incidents reported in the local and national UK press over the years. Below are some recent cases of UK organisations affected by asbestos-related incidents.

Health fear for asbestos vandals (June 2004)

Youths who smashed asbestos sheeting at a factory in Gloucestershire are being urged to see a GP. Police fear that those involved in the incident, at Sundeala in Cam, may have breathed in harmful fibres. A number of youths smashed several sheets and threw others into the nearby river Cam.

Local police sergeant Keith Harrington said: “The vandalism took place in an enclosed area so there is a chance the offenders breathed in fibres”.

The factory, which makes pin boards, notice boards and display boards, has had the sheeting made safe.

Asbestos find halts hospital improvements (May 2004)

A £470,000 modernisation plan at Ripon Community Hospital was been stopped after asbestos was found in the walls. It had been thought all traces of asbestos had been removed from the 19th century building.

The local health authority said it was disappointed by the delay, but remained confident the wards will still reopen before October, as originally planned.

School closed for a month (April 2004)

Silverhill Primary in Mickleover was closed for over a month after fears children and staff may have been breathing in dangerous asbestos particles. The building had to be almost completely gutted with all the floors, ceilings and carpets being replaced.

Derby City Council said the decontamination had been a very expensive operation. The cost was quoted as being around £500,000.

Egg box factory forced to close (March 2004)

Blue asbestos was found at the Omni-Pac egg box factory in October 2003. The factory, in Great Yarmouth, was due to restart production in April 2004 after closing its doors on 27 October 2003 to address the problem of asbestos removal.

However, in late March 2004, a company statement said production would not resume as it became apparent that the clean-up operations were more complex and would take longer to resolve than foreseen. The firm, which employed 200, said the length of the clean-up operation and a loss of customers forced the decision.

Omni-Pac ran into problems when the HSE was alerted to a possible asbestos problem. Inspectors found that blue asbestos in lagging materials at the factory had been disturbed, making it a potential health risk.

Council starts a £1m scheme to remove asbestos (March 2004)

Milton Keynes started a £1m scheme to remove asbestos from 20 per cent of its housing stock in March 2004. Interestingly, a consultancy firm, which claims to have saved other local authorities millions of pounds when faced with similar problems, criticised the project, stating that there were much more cost efficient ways of dealing with the problem. However, their consultancy services were not commissioned.

Asbestos contaminated beach re-opened after cleanup (January 2004)

A Blue Flag beach in Poole, Dorset, was forced to close in January 2004 after 3,500 tonnes of asbestos-contaminated rubble that was dumped was found to contain traces of white asbestos.

The rubble was dumped on the 250m stretch of beach by building contractors, as part of a council programme to tackle beach erosion. An inquiry was set up to investigate whether the asbestos was illegally put there. The clean-up operation by Poole Borough Council was estimated to have cost £35,000.

Asbestos removal closes tube station (December 2003)

Brixton Tube station was shut for three weeks in December 2003 while asbestos was removed. The asbestos, which was found during work to add another escalator and lifts to Brixton, had to be removed before work could continue. London Underground stated that the asbestos was safe in its then current state. It was carrying out regular tests on the station's air and said that there had never been a risk to passengers or staff.

Asbestos fears in prisons (October 2003)

Prisoners could take legal action against the Government over the high level of asbestos in UK jails, the Liberal Democrats warned in October 2003. Of the 138 prisons in England and Wales, 129 were found to contain the asbestos particles according to the party. There were reported to be five legal cases in progress involving claims from officers at Parkhurst on the Isle of Wight, Haslar in Hampshire, Wormwood Scrubs and Swansea prisons at the time. Also, three prison officers from Gloucester, Lancaster and Bristol have settled claims in the last three years. Unless the Government takes action, the party believes it could be leaving itself open to possible future legal claims from former inmates, as well as prison officers. Out of court payments were made in each case.

Home Office ministers have said the jails are safe providing the material is not "disturbed" or "damaged". Home Office minister, Fiona MacTaggart commented that asbestos is only a "risk" to health if fibres are released into the air and breathed in. She added the Home Office has complied with current regulations ensuring "the safety of staff, contractors, inmates or visitors from asbestos".

Asbestos removed from Clarence House before Prince Charles moved in (August 2003)

The Prince of Wales moved into Clarence House on the anniversary of the late Queen Mother's birth in August 2003. The major renovation project, by Charles' interior designer Robert Kime, cost £4.5m. As part of this renovation, asbestos was removed, plumbing updated and rewiring carried out at the home, which had not been painted for five decades. The bill was picked up by taxpayers from cash set aside for palace maintenance, plus about £1.6m of Charles' own money was used to decorate two rooms for his companion Camilla Parker Bowles. Money well spent, no doubt.

4.6 The Helsinki Criteria

There was an International Expert meeting on asbestos, asbestosis and cancer in Helsinki on 20-22 January 1997 to discuss disorders of the lung and pleura in association with asbestos, and to agree upon state-of-the-art criteria for their diagnosis and attribution with respect to asbestos. The output from the meeting was a paper entitled "Asbestos, asbestosis, and cancer: the Helsinki criteria for diagnosis and attribution". The group decided to name this document "The Helsinki Criteria".

The meeting considered all the asbestos-related diseases, but it has had particular significance with respect to asbestos-related lung cancer claims. The paper outlines a set of criteria that can be used in order to identify those cases of lung cancer that could be attributed to asbestos inhalation.

The criteria are one or more of the following:

- The presence of asbestosis.
- A count of 5,000-15,000 asbestos bodies per gram of dry lung tissue.
- An uncoated fibre burden of 2 million amphibole fibres more than 0.005mm in length.
- One million amphibole asbestos fibres more than 0.001mm in length.
- An estimated cumulative exposure to asbestos of 25 fibre years or more.
- An occupational history of one years heavy exposure or 5-10 years moderate exposure and a 10 year time lag at least between the exposure and the onset of cancer.

The definition in terms of fibre years of exposure is included as it is probably a better indicator of lung cancer risk from chrysotile (white asbestos). Chrysotile fibres do not accumulate within the lung tissue to the same extent as amphiboles (for example blue, brown asbestos) because of faster clearance rates (see section 2.5).

What is the potential impact of the Helsinki Criteria?

Previous UK case law set out that the claimant has to prove on the balance of probabilities that asbestos was the cause of his lung cancer. In other words, that the asbestos dust at least doubled the risk that he would suffer from lung cancer. At this time, it was held by some respiratory physicians that asbestosis would need to be present and if it wasn't then the lung cancer was likely to be attributable to another cause, for example smoking. This was based on the view that the presence of asbestosis was evidence of significant exposure and if absent would indicate that exposure had been light and hence unlikely to have caused the cancer. As a result of the Helsinki Criteria it has been increasingly accepted by the medical profession that fibrosis/asbestosis of the lung is not a prerequisite for the attribution of lung cancer to asbestos exposure.

The Helsinki Criteria has been widely adopted in France, Belgium, Denmark, Norway, Sweden, and Finland, and have been accepted by the courts in Australia.

In the UK the prerequisite of asbestosis has now been rejected by the medical profession. Where there is evidence of asbestos exposure it is common for medical experts to attribute lung cancer to this. The extent of the exposure is still a factor in the deliberations on causation however. Where there is evidence of only mild occupational exposure and a history of heavy smoking then a medical expert may well conclude that, on the balance of probabilities, smoking was the cause although they would still maintain that the asbestos exposure was a contributory factor.

There has been no precedent set for the use of the Helsinki Criteria in the UK per se. It is a reference material used by respiratory physicians to assist them in forming their opinion and universally accepted as being of merit. In cases where there is satisfactory evidence of occupational exposure, medical evidence is crucial. If the medical experts agree that asbestos exposure is the likely cause then the claim has to be settled and is not capable of challenge. There are no cases going to trial on the basis of a dispute over the interpretation or use of the Helsinki Criteria.

Medical experts will make reference to the Helsinki Criteria, as they will to other relevant research material. Over time the view that fibrosis should always be present has dissipated and this can be attributed to the more widespread use of the Helsinki Criteria.

The impact of the Helsinki Criteria to date is the elimination of the previous causation arguments on cases where fibrosis was not present. Hence there is a potential for there to be an increase in the level of lung cancer claims attributed to asbestos exposure, and therefore in the number of compensation claims arising.

As well as increases in the number of lung cancer claims due to clarity of medical definition, there is scope for there to be "legal" reasons for increases in future. Claimants' solicitors may target lung cancer sufferers to establish if they have a history of occupational asbestos exposures resulting in a potential increase in the number of claims received.

4.7 DWP compensation

Background

The first Workmen's Compensation Act was passed in 1897 and made no reference to industrial diseases. Six industrial diseases were added by the 1906 Compensation Act (none of them asbestos-related), which empowered the Home Secretary to add to the schedule of diseases for which compensation was available. Other diseases were added until by 1948 compensation was available for 41 diseases. Asbestosis was added to the schedule in 1931 following the government-commissioned Merewether report. The Workmen's Compensation scheme was replaced by the Industrial Injuries scheme in 1948. Further lump sum compensation for certain dust-related diseases was introduced in 1979.

Types of compensation

The main benefit is a regular income from the Industrial Injuries scheme. This scheme was established by the National Insurance (Industrial Injuries) Act of 1946 and came into effect in 1948.

The second benefit is a lump sum payable under the Pneumoconiosis etc. (Workers Compensation) scheme 1979. Generally claimants should be receiving benefit under the Industrial Injuries scheme before they can receive compensation from the Pneumoconiosis scheme.

The two types of government compensation are described further below.

Industrial Injuries scheme

If your job involved working with asbestos or being exposed to asbestos after 4 July 1948 you can claim Industrial Injuries Disablement Benefit ("IIDB"). The IIDB is payable to those who suffer a disability caused by a work-related disease or accident accepted by the DWP. These diseases are called prescribed diseases and for asbestos-related conditions include:

(i) Pneumoconiosis (which includes asbestosis).
(ii) Mesothelioma.
(iii) Primary carcinoma of the lung where there is accompanying evidence of one or both of the following:
    (a) asbestosis.
    (b) diffuse pleural thickening.
(iv) Diffuse pleural thickening.

Interestingly pleural plaques are not compensatable under the scheme. The benefit is only payable for people who were employed or classed as employed by the DWP and is not available for the self-employed.

The scale of payment depends on the amount of disablement. A maximum payment of £116.80 per week is available. In addition a number of other benefits can also be claimed such as a constant attendance allowance.

If exposure to asbestos was in work prior to the 5 July 1948 then payment will be made under the Workers' Compensation scheme.

Pneumoconiosis etc.(Workers' Compensation) scheme 1979

In 1979 the Labour government introduced an Act to provide for lump sum payments to be made from public funds to sufferers from certain dust-related diseases. In outline, a lump sum payment may be made to the sufferer or, when the sufferer has died, to their dependants, where there is no realistic chance of obtaining civil compensation (for example because the employer who caused the disease has ceased trading).

Since the Act came into force there have been 17,565 applications to 31 March 2003 of which approximately 67 per cent were successful. In the early years of the scheme the majority of unsuccessful claims failed because a relevant employer was still in business and there was therefore the opportunity to claim compensation through the courts. As time has passed the numbers failing on those grounds have, as would be expected, been reducing. In the year to 31 March 2003, 2,099 claims were made. Of the 716 that were rejected, only 131 (18 per cent) were refused because there was an employer to sue. Today the majority of claims are initially rejected because IIDB has not been awarded, or has yet to be claimed, which is a precondition.

Sufferers of certain industrial diseases (or if the sufferer has died, a dependant) caused by dust, irrespective of industry, are entitled to apply for compensation. Former coal industry workers that suffer from pneumoconiosis are covered by a separate scheme administered on behalf of the Department of Trade and Industry by AON.

There are a number of conditions that apply to the Pneumoconiosis scheme:

(i) Sufferers should normally be in receipt of IIDB in respect of one of the prescribed diseases. Dependants can claim IIDB posthumously but there are time limits for making posthumous claims.

(ii) The employers who caused or contributed towards the disease must have ceased to carry on business, or if they are still trading, there must not be a realistic chance of obtaining damages from those employers.

(iii) The sufferer or dependants must not have brought any action for damages in relation to the disease or received an out of court settlement. In the event that a person is able subsequently to take a claim in court, any award would be reduced by their payment under the Pneumoconiosis scheme.

A test case, Ballantine (see section 4.1) recently (June 2000) concluded that payments under the 1979 Pneumoconiosis scheme should be deducted from any other damages awarded.

Compensation payments for sufferers from asbestos and other dust-related diseases has recently increased (1 April 2004) by 5.4% bringing the maximum payment under the scheme to around £60,000. The minimum payment is about £2,100. Roughly 70% of payments are made to those suffering from mesothelioma.

Responsibility for the administration of the Pneumoconiosis scheme transferred to the Department for Work and Pensions from the Department of the Environment, Transport and the Regions in September 2002. Some statistics showing the number of claims notified and paid under the scheme are shown in section 5.9.

4.8 Worldwide use of asbestos

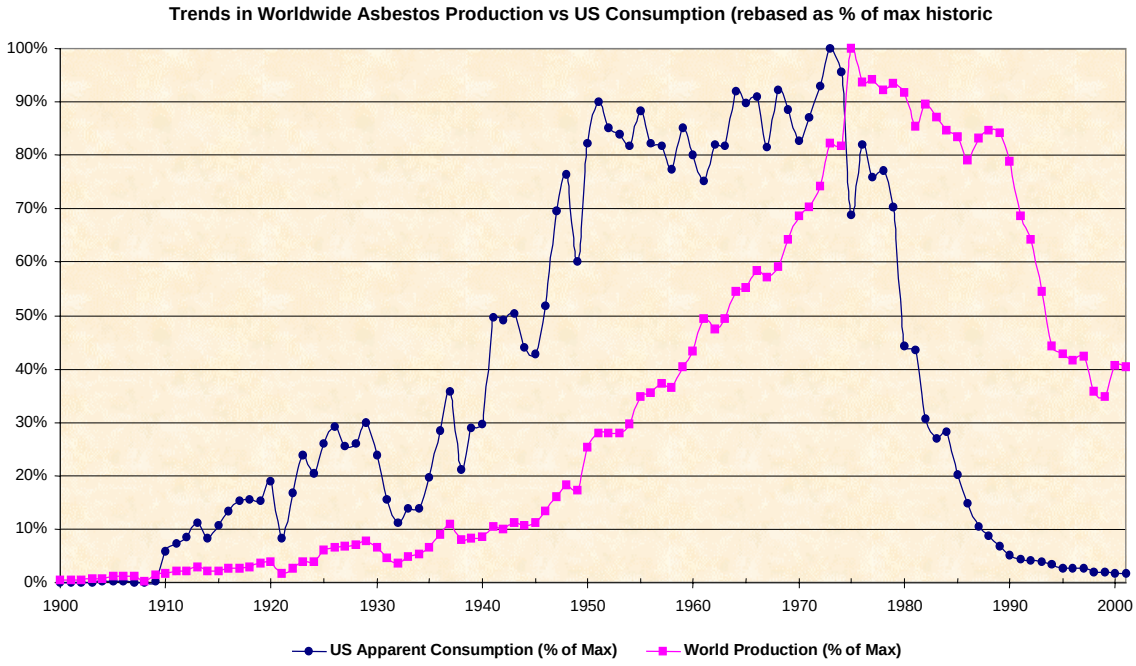
Summary

In this section we look at the production and consumption of asbestos around the world in the twentieth century. The following abstract is quoted from Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000 by Robert L. Virta:

“The United States has produced about 3.28 million metric tons of asbestos fibre and used approximately 31 million tons between 1900 and 2000. About half of this amount was used since 1960. Cumulative world production during that same time period was about 173 million tons. Assuming that unusually large stocks are not maintained and that world consumption roughly equals production, over half of the world production and consumption occurred since 1976. The United States and western European nations were the largest consumers of asbestos during the first two-thirds of the 20th century. They were surpassed by the collective production and consumption of States within the former Soviet Union by the 1970s. With the onset of the health issues concerning asbestos in the late 1960s and early 1970s, world production and consumption began to decline after 1975. In 2000, world consumption, estimated to be 1.48 million tons, was only 31% that of 1980. Countries in Asia, South America, and the former Soviet Union remain the largest users of asbestos. More specifically, Brazil, China, India, Japan, Russia, and Thailand are the only countries that consumed more than 60,000 tons of asbestos in 2000. These six countries accounted for more than 80% of the world’s apparent consumption in 2000”.

In much of this section, we have drawn heavily on a number of papers by Robert Virta (see the Bibliography in Appendix I). Note that throughout this paper, production and consumption statistics are expressed in terms of metric tons unless stated otherwise.

The graph below illustrates the changes in the level of world asbestos production over the last century set against US consumption over the same period. Each year's production/consumption is expressed as a proportion of the peak level.



Source: U.S. Geological Survey Open-File Report 01-006

World production and trade

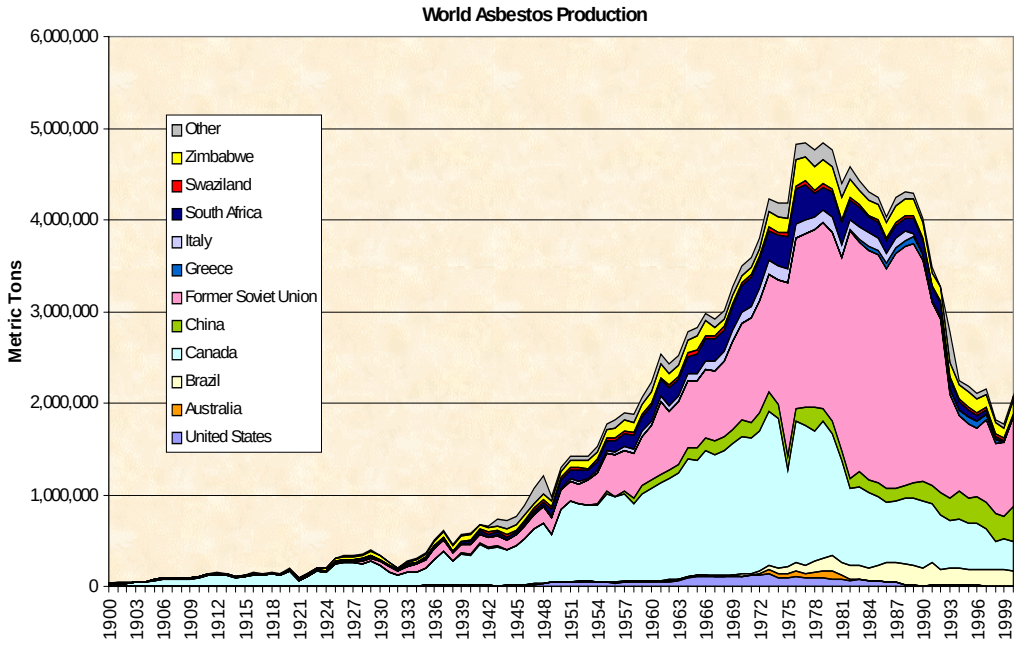
The largest commercially active asbestos deposits are currently situated in Canada, Russia (collectively grouped with the other States of the former Soviet Union and henceforth referred to as the "FSU") and South Africa.

The early 1930s marked a brief period of stagnation in world asbestos production, largely attributable to reduced consumption associated with the economic depression in the United States. With a few exceptions, world production grew steadily throughout the twentieth century, fuelled by industrialisation, expanding economies and a growing population. World production peaked in 1975. Growing opposition to the use of asbestos in the early 1970s and liability to compensate those suffering from asbestos-related diseases eventually became a major issue for producers and manufacturers, prompting a reluctant shift to asbestos substitutes. It is thought that these events coincided with a natural maturing of the world asbestos market, exacerbating the effect on the industry as described by Virta in the extracts below:

“These factors resulted in a dramatic decline in the use of asbestos in the industrialised countries, a movement toward increasingly strict exposure limits for occupational settings, new consumer and environmental regulations, and, by the early 2000s, full or partial bans on the use of asbestos in 16 countries, including Argentina, Austria, Belgium, Chile, Denmark, Finland, France, Germany, Italy, the Netherlands, Norway, Poland, Saudi Arabia, Sweden, Switzerland, and the United Kingdom. However, some 60 countries still favour the controlled use approach regarding chrysotile asbestos” (Virta 2003, Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000 aka “Virta 2003”).

“Canada was the dominant producer during the first half of the century. By 1980, the former Soviet Union had become, and still remains, the largest producing region. Brazil, China, South Africa, and Zimbabwe also rose from relative obscurity to become major asbestos producers. Current production has declined in all major producing countries except China due to the opposition to the use of asbestos. Brazil, Canada, China, the former Soviet Union republics of Russia and Kazakhstan, and Zimbabwe now account for more than 90% of the world production. Most of China's production, as well as the limited production of many other countries, is used in local industrial applications. Essentially all production is now chrysotile. Production of amosite and crocidolite ceased in the mid-1990s. Small amounts of actinolite asbestos, anthophyllite asbestos, and tremolite asbestos probably are produced for local use in a few countries such as India, Pakistan, and Turkey” (Virta 2002, Asbestos: Geology, Mineralogy, Mining, and Uses, aka “Virta 2002”).

The worldwide production of asbestos from 1900 until 2000 split by the main market participants is summarised in the graph below:



Source: U.S. Bureau of Mines and U.S. Geological Survey Minerals Yearbook chapter on asbestos, 1900 to 2001

The involvement of the main asbestos producers round the world over the last hundred years or so is summarised below.

United States

- Most of the asbestos mined in the United States was chrysotile.
- Highly dependent on imports to meet local asbestos demand (imports supplied more than 88% of its needs during the 20th century).
- Production peaked at about 136,000 tons in 1973 (representing 3% of the world's asbestos production).
- Consumption peaked in the same year at about 801,000 tons.
- U.S. consumed about 18% of the world's asbestos production between 1900 and 2000.
- Last asbestos mine closed in 2002.
- Current consumption less than 1% of world production.

Canada

- Chrysotile mining commenced in the late 1800s.
- World's leading producer throughout the first half of the 20th century until fast-growing competition from developing economies reduced its share of the world market.
- Major exporter of asbestos fibre (roughly 77% of production has been exported since 1900, with exports exceeding 80% since 1960).
- Highly dependent on US market which absorbed as much as 83% of Canadian production in some early years.
- Production peaked in the 1970s in sync with the US.
- Diversified export base as US demand waned (by 1990 countries like Japan, Taiwan, Spain, UK, India and Sri Lanka overtook the US as its customers).
- Recent levels at around 15% of world production.
- The Canadian government continues to support the asbestos industry and has been blocking efforts by a UN committee to restrict chrysotile trade.

Brazil

- Relative newcomer in the asbestos industry with chrysotile production taking off in the late 1960s.
- Production peaked in 1991 at 237,000 tons.
- Current production levels of around 170,000 tons per annum appears to have been stable since 1995.
- Market deals primarily with the manufacture of asbestos-cement products.
- Started exporting asbestos in the 1980s, mostly to Argentina, India and Mexico.

Greece

- Asbestos may have been used as early as the 1st century according to some historical sources.
- No significant production prior to the 1980s.
- In contrast to trends in the developed nations, production increased during the 1980s and early 1990s to peak at 80,000 tons in 1996.
- Production dropped sharply thereafter and mining ceased in 1998.

Italy

- Second largest producer of asbestos in Europe (behind the FSU).
- Asbestos was discovered relatively early (mid 19th century).
- Production peaked at 165,000 tons in 1976 and ceased in 1992 as legislation banning the use of asbestos was passed.
- Generally exported less than half of its production, mostly to the European and Asian markets.

South Africa

- Third largest producer of the 20th century in aggregate (after the FSU and Canada).
- Unique in its ability to produce not only chrysotile but also the rarer varieties, amosite and crocidolite, as well as small quantities of tremolite and anthophylite.
- Long history of production with rapid growth following World War II, aided by reconstruction efforts and growing economies.
- Mining increased from 41,000 tons in 1948 to its peak of 380,000 tons in 1977.
- Demand for amosite and crocidolite declined ahead of chrysotile as studies identified these types of asbestos as more dangerous.
- Amosite production peaked in 1973 at 106,000 tons and accounted for the largest share of production between 1938 and 1955; mining ceased around 1992.
- Crocidolite production peaked in 1977 at 201,000 tons, dominating production from 1956 to 1982; mining ended in 1997.
- Chrysotile's turn came after 1982; production peaked in 1989 at about 115,000 tons.
- A net exporter of asbestos to nations throughout the world including the UK and US who were significant importers of its fibre in the 1950s, and more recently, Japan.
- Exports peaked around 1975 at 339,000 tons.
- The number of potential markets is reducing as partial or total bans on asbestos use become increasingly commonplace.

Swaziland

- Relatively small, export-dependent producer of chrysotile.
- Havelock mine opened in 1939.
- Peak production of 42,000 tons in 1976.
- Production continues with levels of 11,000 tons in 2000.

Zimbabwe (former Southern Rhodesia)

- Renowned for its production of low-iron, long fibre chrysotile.
- Mining began in early 1900s.
- It was the world's second largest producer during the 1920s (after Canada) until the FSU overtook it in 1930, followed by South Africa in 1950.
- Production continued to increase despite political instability and economic sanctions imposed by the United Nations from 1966 to 1979.
- Production peaked at 281,000 tons in 1976.
- Despite a worldwide downturn in asbestos consumption, markets for Zimbabwe remained strong until at least 2001.
- Highly dependent on exports – UK was its leading importer until the mid-1950s, later replaced by the US. By the 1980s, Southeast Asia was a major market for Zimbabwean fibre.

China

- Asbestos was first used as far back as 2,000 years ago to make fire insulation, asbestos paper, and fire pots (by mixing lime with asbestos).
- Mining operations situated mostly in the Szechuan province.
- Commercial production did not begin in earnest until the late 1950s.
- With production of around 80,000 tons, it was a moderate size producer by 1960; in 1973 production reached 209,000 tons.
- Following a period of decline during the 1970s, production started increasing again to reach a peak of about 370,000 tons in 2000.
- With the decline in world markets, the increases in production must have been largely absorbed by the local manufacturing industry.
- Relatively low exports, mostly to other Asian countries.
- Increase in imports during the 1990s, mostly from Russia.

FSU

- Chrysotile deposits were first discovered in the Ural Mountains around 1720.
- Mining on a commercial scale began in the early 1800s.
- Production stopped in 1918 due to a little local difficulty (Russian revolution).
- Both a major asbestos producer and consumer, the industry is relatively independent of foreign markets.
- In 1975, the FSU surpassed Canada as the world's leading producer.
- Main mining sites: Urals, later joined by Kazakhstan.
- Production peaked in 1982 at about 2.7 million tons.
- Dissolution of the Soviet Republic in 1991 had a negative impact on industry in general.
- Continues to be the leading world producer of chrysotile with more than 900,000 tons of production annually.

Other producing countries

- Finland is a small specialist producer, it was the world's primary source for anthophylite asbestos from about 1919 to 1975.
- Australia began producing crocidolite in the early 1900s reaching a peak level of 92,000 tons in 1962. Production stopped in 1983.
- India is a source of anthophylite and tremolite asbestos as well as chrysotile; production began around 1917 and reached its highest level in 1993 at 44,100 tons.

Update on recent production levels

The U.S. Geological Survey Minerals Yearbook 2002 by Robert L. Virta contains revised production figures for the five years to 2002:

Asbestos: World Production, by Country[1, 2] (metric tons)

Country[3]	1998	1999	2000	2001	2002[e]
Argentina	309	259	254	250[e]	250
Brazil	198,332[r]	188,386[r]	209,332[r]	209,300[r]	209,300[4]
Bulgaria[e]	300	350	350	350	300
Canada	309,000	337,000	307,000[r]	272,000[r]	272,000[p]
China[e]	314,000	247,000	320,000[r]	360,000	360,000
Colombia, crude ore	128,446	61,125	59,249	96,140	62,785[4]
Egypt[e]	700	1,000	2,000	2,000	2,000
Greece[e]	50,000	--	--[4]	--	--
India[e]	18,751[4]	20,000	21,000	21,000	19,000
Iran[e]	2,258[4]	2,000	2,000	2,000[r]	1,500
Japan[e]	18,000	18,000	18,000	18,000	18,000
Kazakhstan	155,400	139,300	233,200	271,300[r]	291,100[4]
Russia[e]	600,000	675,000	750,000	750,000	750,000
Serbia and Montenegro	633	361	563	194[r]	200
South Africa	27,195	18,836	18,782	13,393[r]	10,000
Swaziland	27,693	22,912	12,690[r]	--[r]	--
United States (sold or used by producers)	5,760	7,190	5,260	5,260	2,720[4]
Zimbabwe	123,295	115,000	152,000[r]	136,327[r]	130,000
Total	1,980,000[r]	1,850,000[r]	2,110,000[r]	2,160,000[r]	2,130,000

Notes: e = Estimated p = Preliminary r = Revised "--" means Zero

1. World totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

2. Marketable fibre production. Table includes data available through April 8, 2003.

3. In addition to the countries listed, Afghanistan, North Korea, Romania, and Slovakia also produce asbestos, but output is not officially reported, and available general information is inadequate for the formulation of reliable estimates of output levels.

4. Reported figure.

Industrial Applications

The characteristics of asbestos make it valuable in a broad variety of industrial applications. The main asbestos properties of interest to manufacturers are:

- Thermal, electrical, and sound insulation.
- Inflammability.
- Matrix reinforcement (cement, plastic, and resins).
- Adsorption capacity (filtration, liquid sterilisation).
- Wear and friction properties (friction materials).
- Chemical inertia (except in acids).

Applications in just about any industrial sector are possible. The main markets are asbestos-cement products, roof coatings, brake pads and shoes, and clutches (see Virta 2002). Various day-to-day uses of asbestos are also referred to in section 2.1.

Recent restrictions on the use of asbestos have forced manufacturers to either abandon some applications or continue under strictly regulated conditions. The largest losses were in asbestos-cement pipe and sheet, coatings and compounds, flooring, and insulation.

The table overleaf (from Virta 2003) summarises the end uses (in thousands of metric tonnes) of asbestos in the US over the period from 1965 to 2000. Roofing compounds currently account for about 62% of asbestos usage, followed by gaskets (22%), and friction products (11%). Small amounts are also used to manufacture some insulation products and woven and plastic products.

	Asbestos cement pipe	Asbestos cement sheet	Coatings and compounds	Flooring products	Friction products	Electrical insulation	Thermal insulation	Packing and gaskets	Paper products	Plastics	Roofing products	Textiles	Other[1]	Unknown[2]	Total[3]
1965[e]	137	50	(4)	181	64	22	(5)	22	15	(4)	72	15	144	--	721
1966[e]	139	51	(4)	183	65	22	(5)	22	14	(4)	73	15	147	--	730
1967[e]	122	46	(4)	162	59	20	(5)	20	13	(4)	64	13	132	--	650
1968[e]	141	52	(4)	185	67	23	(5)	23	15	(4)	74	15	148	--	741
1969[e]	135	50	(4)	178	64	22	(5)	22	14	(4)	72	14	140	--	711
1970[e]	126	46	(4)	167	60	20	(5)	20	14	(4)	66	14	133	--	666
1971[e]	131	48	(4)	173	62	21	(5)	21	14	(4)	69	13	137	--	689
1972	140	52	(4)	183	66	22	(5)	22	15	(4)	73	14	147	--	733
1973	151	58	(4)	198	72	23	(5)	24	16	(4)	79	16	158	--	795
1974	202	86	(4)	139	73	13	(5)	26	57	(4)	69	18	85	--	768
1975	139	40	(4)	123	60	6	(5)	15	60	(4)	42	5	62	--	552
1976	127	21	(4)	104	58	8	(5)	18	28	(4)	231	6	59	--	659
1977	115	27	36	150	57	17	4	28	7	8	70	10	143	--	672
1978	106	25	33	138	53	15	4	25	7	7	64	9	133	--	619
1979	96	22	30	125	48	14	3	23	6	7	58	8	121	--	561
1980	42	23	11	70	52	6	3	12	1	2	24	2	111	--	359
1981	42	20	13	67	51	6	1	19	2	1	16	2	109	--	349
1982	38	11	25	49	53	--	1	14	2	--	7	1	46	--	247
1983	26	10	23	45	48	--	1	12	2	1	6	1	42	--	217
1984	37	12	22	46	48	(6)	2	13	2	1	7	2	33	--	226
1985	28	7	23	7	34	(6)	(6)	6	17	(6)	26	1	5	7	162
1986	20	5	17	5	26	(6)	(6)	5	13	(6)	20	(6)	4	4	120
1987	11	4	3	--	21	(6)	--	10	5	1	23	1	2	4	84
1988	12	4	4	(6)	15	(6)	(6)	10	1	(6)	20	(6)	(6)	5	71
1989	8	3	4	--	12	--	--	4	1	1	18	(6)	1	4	55
1990	5	2	2	--	9	--	--	3	(6)	(6)	13	--	1	7	41
1991	4	2	1	--	10	--	--	3	(6)	(6)	15	--	1	1	35
1992	2	(6)	1	--	10	--	--	3	(6)	(6)	16	--	1	(6)	33
1993	1	--	1	--	10	--	--	3	(6)	(6)	16	--	1	(6)	32
1994	--	--	(6)	--	9	--	--	3	(6)	(6)	13	--	1	(6)	27
1995	--	--	(6)	--	7	--	--	3	(6)	(6)	11	--	1	(6)	22
1996	--	--	(6)	--	7	--	--	3	(6)	(6)	11	--	1	(6)	22
1997	--	--	(6)	--	6	--	--	4	(6)	(6)	10	--	1	(6)	21
1998	--	--	(6)	--	3	--	--	2	1	(6)	9	--	1	--	16
1999	--	--	(6)	--	2	--	--	3	--	(6)	10	--	1	--	16
2000	--	--	(6)	--	2	--	(6)	3	--	(6)	9	--	1	--	15
Total[7]	2,280	776	248	2,680	1,360	279	19	467	339	29	1,480	193	2,250	32	12,400

Notes:
e = Estimated.
Numbers in parentheses refer to notes.
"--" means Zero.
1 "Other" includes known end uses not falling into specified end-use categories.
2 Undetermined end uses.
3 May not add to total due to independent rounding.
4 Included with "Other."
5 Included with "Electrical insulation."
6 Less than 1/2 unit.

World consumption

World consumption patterns have been shaped over time by factors such as technological progress, availability of asbestos either domestically or through imports, political changes, world conflicts, and more recently, regulatory bans on its use brought about by the discovery of asbestos-related disease. Liability to compensate injured parties has virtually wiped out the asbestos industry in developed countries. By tracking apparent consumption (production plus imports minus exports), a general idea of the changes that have occurred in the worldwide use of asbestos over time is possible.

Estimating consumption is more difficult than production. Manufacturing from consumer stocks, sales from producer stocks, and consumer and producer stocks that have been held over from year to year distort the results since the calculation does not typically account for additions and subtractions from stocks. Overcapacity, particularly after the asbestos health issue was raised, resulted in a significant share of production going into stocks for some countries in some years.

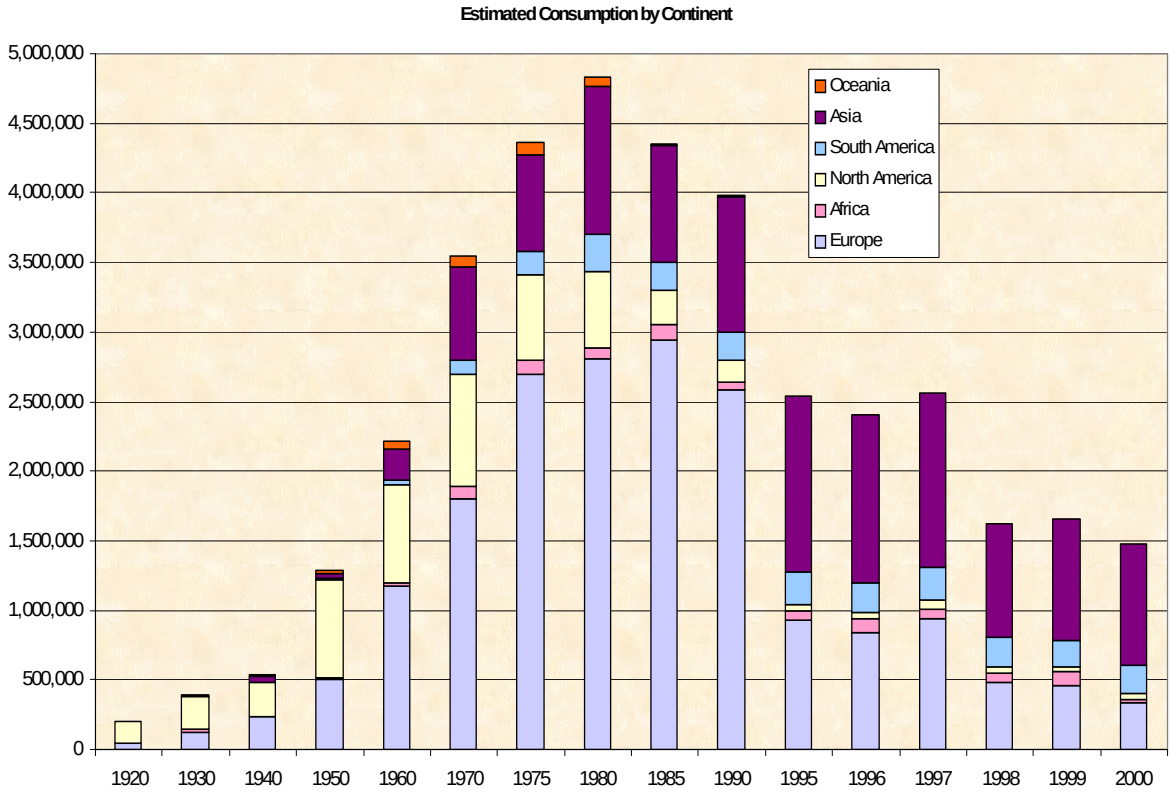
The table and graph overleaf show estimates of consumption by major geographical area from 1920-2000. As noted in section 7, estimates of consumption can be used as a proxy for “exposure” to asbestos in any high-level models of the likely development of asbestos-related diseases. Estimates of US imports and consumption are included as guide to the profile of asbestos exposure in the UK in our high level model of asbestos exposures, described in section 7.3.

Estimated Consumption by Continent[1] (metric tons)

Year	Europe	Africa	North America	South America	Asia	Oceania	Total
1920	40,900	3,530	152,000	1,160	6,810	841	205,000
1930	128,000	14,800	234,000	340	11,600	83	389,000
1940	230,000	1,420	253,000	1,080	38,300	15,600	540,000
1950	507,000	9,600	707,000	11,700	25,400	22,100	1,280,000
1960	1,170,000	28,600	703,000	38,100	222,000	48,700	2,210,000
1970	1,800,000	90,300	808,000	99,200	669,000	77,600	3,540,000
1975	2,700,000	96,100	617,000	162,000	702,000	85,700	4,360,000
1980	2,810,000	73,900	554,000	267,000	1,060,000	71,400	4,840,000
1985	2,940,000	112,000	249,000	200,000	835,000	13,500	4,350,000
1990	2,580,000	63,100	151,000	206,000	975,000	1,710	3,980,000
1995	928,000	62,600	53,200	236,000	1,260,000	1,490	2,540,000
1996	835,000	99,400	53,000	214,000	1,200,000	1,370	2,410,000
1997	939,000	69,900	67,200	231,000	1,250,000	1,560	2,560,000
1998	479,000	70,800	38,000	222,000	816,000	1,470	1,630,000
1999	456,000	106,000	28,600	187,000	873,000	1,320	1,650,000
2000	341,000	20,500	35,800	207,000	871,000	1,250	1,480,000

1. Data are rounded to no more than three significant digits; may not add to totals shown.

Source: Robert L. Virta, 2003, Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000, U.S. Geological Survey Open-File Report 03-83



A further summary of recent consumption/production is shown in Appendix II. Some background to the consumption by major area is given in the sections below.

North America

United States was the largest consumer of asbestos for much of the early 20th century. Its rapidly rising population created an unparalleled demand for construction of housing, public buildings, and roads. From 1920 through to the 1960s, the US accounted for 30% to 83% of world apparent consumption for the 10-year intervals examined. It wasn't until the 1960s that the United States was replaced by the FSU as the leading consuming country. The next nearest competitor was Japan.

A number of other North American countries consumed relatively small amounts of asbestos (a few thousand tons annually). Canada was primarily an exporter. Although its calculated apparent consumption in 1980 was 106,000 tons, this was more likely a case of over-supply as world markets declined and a large part of production went into stocks rather than commerce. Consumption of around 45,000 tons annually probably would have been the norm from 1940 to 1970 and less after the 1980s. Consumption in Mexico reached a high of 79,000 tons in 1980 but declined thereafter. El Salvador and Panama were the only other North American countries indicating consumption in 2000.

Europe

Europe was the next region to develop an asbestos manufacturing industry, lagging behind the US. The United Kingdom, which had to import all its asbestos, became a major European consumer through the first half of the 20th century, soon to be followed by Belgium, Luxembourg and Germany. These three were the major suppliers of asbestos products throughout Europe and Asia. By 1950, demand in the FSU exceeded that of the United Kingdom and that of the United States by 1970 thanks mainly to large construction demands.

Between 1950 and 1960 the asbestos industry in Europe experienced its greatest expansion, increasing to 1.17 million tons from 507,000 tons in 1950. The largest gains were in the FSU, UK and West Germany. Much of the growth in consumption in the late 1940s and a large portion of the 1950s can be attributed to the massive reconstruction efforts in Europe following World War II. Europe lagged behind the developments in the US where the asbestos health issues already affected markets by the mid-1970s. Demand in the large European countries, with the exception of the FSU, started declining after 1980. The 1990s brought further problems for the asbestos manufacturing industry as the FSU was restructured and the European Union voted to ban the use of asbestos. By 2000, consumption reached an estimated 341,000 tons. Several important consumers of asbestos in Europe are Azerbaijan, Belarus, Croatia, Hungary, Kazakhstan, Kyrgyzstan, Portugal, Romania, Russia (the biggest) and Spain.

Asia (including the Middle East)

Growth in the Asian asbestos manufacturing markets lagged behind that of Europe and the United States. Less initial industrial development in the early 20th century and slower population growth were the most likely reasons. It wasn't until the 1950s that a serious manufacturing industry developed. Estimated consumption increased dramatically in the following decade (from only 25,400 tons in 1950 to 222,000 tons in 1960). China and Japan accounted for the bulk of this increase.

Japan was the most consistent large user of asbestos from 1920 to 1970. Estimated consumption in Asia increased to 1.06 million tons in 1980. By this time, more Asian countries were manufacturing asbestos products and considerable gains were made not only in Japan but also in China, India, South Korea, Saudi Arabia (a one-time occurrence) and Thailand.

The 1980s brought about a shift as estimated consumption declined in Japan and China, but increased in India, Indonesia, Iran, South Korea and Thailand. Despite this, Asian consumption reached a peak of 1.26m tons in 1995, an increase mostly attributable to China. By 2000, estimated consumption had declined to 871,000 tons, Japan, South Korea and Iran experiencing the largest declines. In 2000, China accounted for 50% of the apparent asbestos consumption in Asia, mostly used domestically. Thailand was the next largest consumer with 15% of the market, followed by Japan with 12% and India with 8%. Consumption in most Asian countries has continued to decline up to 2000, the exceptions being China, India, Indonesia and Thailand.

Africa

Consumption in Africa was low throughout the early 20th century and slow to decline in the 1990s. Most African nations exported the bulk of their fibre to foreign markets. In the 1920s, it is thought that Egypt, Madagascar, Zimbabwe and South Africa had small manufacturing industries. Little changed until the 1950s at which stage eleven countries were involved in asbestos manufacturing. Algeria, the Belgian Congo, Egypt, Morocco, Swaziland and Zimbabwe were the largest consumers.

Estimated consumption increased more than three-fold during the 1960s and four more countries became involved in the manufacturing of asbestos products. Nigeria, followed by Zambia, experienced the largest increases in consumption. After the 1970s, consumption in most African countries began to decline with the exception of Algeria where consumption appeared to grow until about 1985. South Africa and Zimbabwe are currently the largest consumers of asbestos in Africa.

South America

South America's asbestos industry did not attain significance in the world markets until the 1960s. Despite growing local production, the continent remained largely dependent on imports (about 65% of its apparent consumption in 1960). By 1970, Argentina, Brazil, Colombia, and Venezuela had the most active asbestos manufacturing industries in South America. Brazilian production expanded in the following decade to make it the dominant South American producer and consumer of asbestos. In 1980, Brazil accounted for about 73% of the continent's asbestos usage of 267,000 tons. Consumption in most South American countries declined after 1980. That of Brazil, however, still exceeded 180,000 tons in 2000.

Oceania (Australia & New Zealand)

Consumption rose gradually since the 1950s peaking at 85,700 tons in 1975. Australia accounted for 73,200 tons of this total. However, production and consumption declined rapidly due to public opposition. By 1990, New Zealand had stopped using asbestos and in 2000, Australia's consumption was only 1,250 tons.

Data Issues

The statistics in the preceding sections were largely taken from the 2003, U.S. Geological Survey publication: Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000 by Robert L. Virta (Open-File Report 03-83). In his research, the author had to collect information from a wide variety of often conflicting sources. As a result, the data suffers from a number of inconsistencies that would be impossible to eliminate without retrieving the original survey data on which the published figures were based. World production figures are occasionally revised without publishing revised data for individual countries. As a result, the sum of production of individual countries is not always equal to world production. Another problem is that the data are a mix of ore production, fibre production and fibre sold or used. Also, data were not always available for all countries for all years; where estimates were made in publications, it was usually not clear what was the basis for these estimates. Although it is important to be aware of these limitations, the data are sufficiently reliable to examine the trends in asbestos production and consumption worldwide as well as for individual countries.

4.9 Worldwide regulations regarding asbestos

Europe

Bans are already in place in Austria, Belgium, Denmark, Finland, France, Germany, Italy, Netherlands, Sweden, Spain and Luxembourg. In 1999, the European Union passed legislation which prohibits the introduction of new applications of asbestos cement materials, friction products, seals and gaskets with effect from 1 January 2005 in all its member states. The restrictions will apply to chrysotile; amosite and crocidolite having previously been banned. The removal of asbestos in situ is not required (see British Asbestos Newsletter 1999, No 35, web site in Appendix I).

United Kingdom

The main UK regulations, from 1901 to the present day, are described in section 2.4. The main points of note are that amosite (brown asbestos) and crocidolite (blue asbestos) were banned in 1987 and chrysotile (white asbestos) was banned from 24 November 1999.

Australia

On 31 December 2003, Australian legislators implemented laws prohibiting the import, use and sale of products containing chrysotile, (other forms of asbestos having been banned previously). The comprehensive prohibitions forbid the new use of automotive materials such as asbestos-containing brake pads and gaskets; although the removal of existing asbestos-containing materials is currently not mandatory, replacement parts must be asbestos-free. Stockpiles of asbestos products must be disposed of safely in line with state and territory regulations (see “Australia Ends Asbestos Use” by Laurie Kazan-Allen).

North America

In both the US and Canada, the use of asbestos products is still legal within the limits set by regulation. The status of asbestos products in the US (in 2002) is (according to the Asbestos Institute, see web reference in Appendix I) as set out below:

Prohibited	Authorised
Corrugated paper	Corrugated asbestos cement sheet
Commercial paper	Flat asbestos cement sheet
Flooring felt	Vinyl asbestos floor tile
Rollboard	Asbestos cement pipes
Speciality paper	Asbestos cement shingles
New uses of asbestos	Friction material
	Brake lining
	Clutch facing
	Disc brake pads
	Asbestos clothing
	Automatic transmission component
	Roofing felt
	Roof coating
	Non-roof coatings
	Millboard
	Pipeline wrap
	Acetylene cylinder filler
	Asbestos diaphragms
	High-grade electrical paper
	Packings
	Sealant tape
	Brake blocks
	Missile liners
	Arc shutes
	Battery separators
	Reinforced plastic
	Textile products
	Gaskets

A list of the countries (from the IBAS web site, see web reference in Appendix I) that introduced full or partial bans on asbestos (in chronological order) is shown below:

- Iceland (1983 - with exceptions, updated in 1996)
- Norway (1984 - with exceptions, revised in 1991)
- El Salvador (mid-1980s)
- Denmark (1986 - with exceptions)
- Sweden (1986 - with exceptions)
- Hungary (1988 - banning amphiboles only)
- Switzerland (1989 - with exceptions)
- Austria (1990 - with exceptions)
- Netherlands (1991 - with exceptions)
- Finland (1992 coming into force in 1993 - with exceptions)
- Italy (1992 - with some exceptions until 1994)
- Germany (1993 - with some minor exemptions until 2011)
- Croatia (1993 - banning crocidolite and amosite only)
- Japan (1995 - banning crocidolite and amosite only)
- Kuwait (1995)
- France (1996 - with exceptions)
- Slovenia (1996 - banning production of asbestos-cement products)
- Poland (1997)
- Monaco (1997 - prohibiting the use of asbestos in all building materials)
- Belgium (1998 - with exceptions)
- Saudi Arabia (1998)
- Lithuania (1998 - first laws to restrict asbestos use; ban expected by 2004)
- United Kingdom (1999 - with minor exemptions)
- Ireland (2000 - with exceptions)
- Brazil (2000/2001 - four most populous states, representing 70% of the national asbestos market, ban asbestos as well as many towns and cities)
- Latvia (2001 - with exemption for asbestos products already installed provided they are labelled)
- Chile (2001)
- Argentina (2001 - with some exceptions until 2003)
- Spain (2002)
- Luxembourg (2002)
- Slovak Republic (2002 - expected to adopt EU directives)
- New Zealand (2002 - ban on import of raw asbestos, import of asbestos-containing materials and second-hand asbestos products not included)
- Uruguay (2002)
- Australia (2003 - with some exemptions)

Japan announced its intention to impose a more comprehensive asbestos ban with effect from 1 October 2004 (according to Gopal Krishna in a January 2004 article “White asbestos: Silent killer”) while Croatia and Hungary are expected to ban chrysotile from 2005.

Other News

Resistance from the remaining asbestos producers blocked international efforts to greatly restrict exports of chrysotile at a conference held in Geneva on 5 December 2003 (see the Asbestos Network at www.asbestosnetwork.com). By the terms of the Rotterdam Convention, exporters trading in a list of hazardous substances must obtain advance government clearance from an importing country. European Union members had called a conference to extend the list to include chrysotile. The vote had to be unanimous for any change to take place.

The following countries voted to keep chrysotile off the toxics list:

- Canada
- Columbia
- China
- India
- Indonesia
- Russia
- South Africa
- Ukraine
- Zimbabwe

Some final observations

The asbestos industry is more than 100 years old. Although the concerns were raised in Britain in the early part of the 20th century, it was not until the late 1950s and early 1960s that a firm, widely accepted correlation between exposure to asbestos fibres and respiratory diseases was firmly established.

To its credit, the asbestos industry has taken a plethora of materials to substitute for asbestos in manufacturing. Many of these substitutes are sub-standard by comparison to asbestos, or were not available or practical to use until the late 20th century. Asbestos solved many health and safety issues (reducing fire risks), improved energy conservation (thermal insulation) and proved itself to be a valuable construction material that helped to further the development of society. Its use continues today in many parts of the world because of a need for inexpensive and durable products that require simple technology to make and avoid the need for large capital investment. The less stringent health and safety controls prevalent in the third world are another reason why the asbestos industry appears to be migrating there.

Despite its continued use, the overall trend in asbestos consumption is downward, declining to about 1.48m tons in 2000 from an estimated 4.84m tons twenty years earlier. “Where low-level asbestos manufacturing industries remain, they appear mainly to be remnants of a past industrial capacity. In a few countries though, consumption has increased, possibly owing to the loss of foreign sources for some asbestos products. It is doubtful if the industries in any of these countries will expand much beyond their current capacity given the negative atmosphere regarding the use of asbestos worldwide and the greater availability of asbestos substitutes (many of whose potential long-term health risks, ironically, are unknown).” (from Virta 2003).

4.10 Asbestos compensation around Europe

Introduction

In this section we provide an overview of the current situation around Europe in terms of compensation for asbestos-related diseases. We consider which diseases are compensated, who pays the compensation and the impact on the insurance industry. The UK environment has already been considered in sections 3 and 4. The countries considered in this section are France, Germany, Italy, the Netherlands and Spain.

France

Historically, compensation in respect of asbestos-related diseases was automatically paid by the Social Security system on a no-fault basis. This compensation covered loss of income and medical expenses only.

On 28 February 2002 there was a landmark ruling by the Supreme Court of Appeal against several large companies which made it easier for employees to invoke an “inexcusable fault” against their former employers who failed to provide them with a safe workplace. In its ruling the court stated that as part of a contract of employment, the employer has an obligation to provide a safe workplace for its employees, especially in relation to the products manufactured or used by the company. A failure under this obligation is considered an inexcusable fault when the employer was aware or should have been aware of the danger to which the employees were exposed, and did not take necessary precautionary measures.

Following the ruling, it is now much easier for people with asbestos-related diseases to sue their employers through the court system and they are potentially now able to obtain compensation for pain and suffering and punitive damages as well as loss of income and medical expenses.

In April 2002, the Fonds d'Indemnisation des Victims de l'Amiante ("FIVA") was established funded by the Ministry of Employment and the Social Security. FIVA will pay compensation to suffers of asbestos-related diseases in respect of the same types of damages (loss of income, pain and suffering and punitive damages) as the court system on a no-fault basis. This saves the injured party from the inevitable delays of the court system. Any compensation paid by FIVA is in addition to that paid by the Social Security, but if the claimant accepts compensation from FIVA they cannot also sue their employer. FIVA also has subrogation rights against the employers concerned. There is currently great controversy, as the amounts being awarded by FIVA are much lower than those received in court settlements.

Germany

The situation in Germany is fairly straightforward. To date compensation in respect of asbestos-related diseases has been paid by the occupational health system and the insurance industry has yet to become involved. Currently only loss of income and medical costs are compensated and there are no awards for pain and suffering or punitive damages. There is of course potential for private sector involvement in the future.

Italy

In Italy, Employers' Liability insurance is provided by the social security scheme, INAIL. Historically, INAIL only provided compensation in respect of loss of income and medical expenses. However, for cases reported on or after 23 February 2000, INAIL also provides compensation in respect of pain and suffering. INAIL has subrogation rights to recover any compensation paid from the relevant employers, although to date it does not appear to have exercised these rights in many cases. In these cases the employer may be able to make a claim under its "RCO" insurance policy. For pre-2000 claims the RCO policy only covers pain and suffering awards. RCO cover is not compulsory, but has become more common since the 1970s when the concept of pain and suffering was introduced into the Italian legal system (the mind boggles). This concept was reinforced during the 2-2 draw between Denmark and Sweden which eliminated Italy from Euro 2004.

The Italian legal system does not allow for the US equivalent of punitive damages; however, higher than normal compensation, referred to as moral damages, is sometimes granted in cases where the responsibility of the defendant has implications under criminal law.

As well as obtaining compensation from INAIL, the claimant can also sue the employer for pain and suffering (pre-2000 cases) and moral damages.

The key issue for the insurance industry is the willingness of the social security system to continue to bear the majority of the compensation costs for asbestos-related diseases.

The Netherlands

In the Netherlands people suffering from mesothelioma may be able to obtain compensation from either the Institute of Asbestos Victims or the Government Asbestos Institute. To be eligible for compensation claimants need to meet certain criteria.

Those mesothelioma cases that do not fulfil the criteria and sufferers of other asbestos-related diseases can sue their former employers through the court system. The employers will then endeavour to recover any compensation paid from their insurers. The courts currently apply a 30 year statute of limitations to such claims. However in certain cases, which meet a number of strict criteria, the Supreme Court has ruled that it may be unreasonable to apply the 30 year statute and the limit should be extended.

Spain

In Spain compensation to date has been met by the Social Security system. Only very recently at the time of writing (early 2004) was there a court case which accepted the link between exposure to asbestos and the resulting diseases. As a result, the court ruled that the claimant should receive higher than normal compensation from the Social Security system. This ruling has increased the possibility of private sector, and hence insurance involvement, in the future.

The impact on the insurance industry

From the sections above it is clear that the involvement of the insurance industry in European asbestos exposures varies from country to country. Despite recent increases in legal activity surrounding asbestos diseases across Europe, it is fair to say that to date there has only been sporadic involvement from the insurance industry (outside the UK). Consequently this means that a number of key insurance considerations still need to be addressed in many of these countries. These include:

- The types of insurance cover that will respond.
- The policies that will be triggered.
- How the losses will be allocated across the triggered policies.
- How exclusions will be handled.
- How uninsured periods will be handled (either due to intent or because the insurer is now insolvent).
- How any reinsurance coverages will then apply.

The impact of European asbestos exposures on the insurance industry is likely to differ from that of US exposures and to a lesser extent from that of UK exposures, due to differences in the legal systems and in the diseases that are compensated and by whom. Section 8 provides an update on the US experience and observations on some of the differences between the US and the rest of the world. If present trends continue and these differences continue to narrow, with an increase in the proportion of the costs that is paid by the private sector, then European asbestos exposures are likely to pose a significant problem to some parts of the insurance industry.

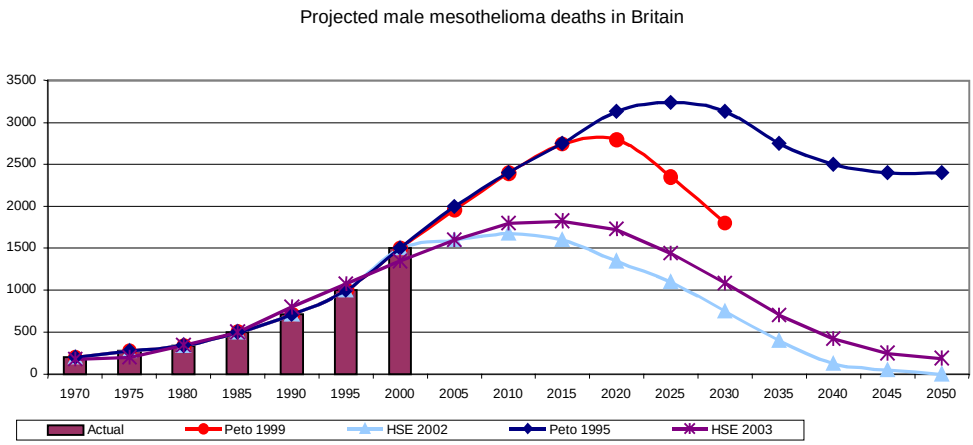
5. PREVIOUS CLAIM PROJECTIONS AND AVAILABLE DATA

5.1 The main projections of British mesothelioma deaths

There have been a number of papers projecting British mesothelioma deaths in recent years. These include:

- "Continuing increase in mesothelioma mortality in Britain", Professor Peto, John Hodgson et al (1995).
- "The European mesothelioma epidemic", Peto et al (1999).
- HSE updates (in 2002 and 2003).

The latest (at the time of writing) Health & Safety Executive ("HSE") update is "Mesothelioma mortality in Great Britain Estimating the Future Burden" (published December 2003) and is available from the HSE web site (see Appendix I.4). The projections have reduced over this period as shown below:



The headline soundbites from each of the main papers are:

"… a peak of annual male mesothelioma deaths in about the year 2020 of between 2,700 and 3,300 deaths." (Peto1995)

"…, with about [2,800] deaths per year in Britain, …." (Peto 1999, [adjusting the pleural cancer figure of 1,750 by 160% to give the number of mesothelioma deaths, as described in the paper])

"The latest projections suggest that male deaths from mesothelioma may peak around 2011, at about 1,700 deaths per year" (HSE update 2002)

" … annual total number of mesothelioma deaths to males aged 20-89 in great Britain will peak at a level of 1,650-2,100 deaths during the period 2011 to 2015." (HSE 2003)

These papers are described in the following sections.

5.2 Continuing increase in mesothelioma mortality in Britain, Peto et al (1995)

Overview of the paper

This is a seminal paper on UK mesothelioma, used by many commentators (until superseded) as a base from which to infer company or industry-wide estimates of future claim numbers and costs.

Since 1968, the HSE has maintained a register of deaths in England, Wales and Scotland for which mesothelioma was recorded on the death certificate. Professor Peto et al used this data to construct death rates since 1968 and male death rates for men born in five-year periods since 1893.

To give a feel for the order of magnitude of the numbers, a summary of the base data from the paper is reproduced below:

Year	25-34	35-44	45-54	55-64	65-74	75-84	85+	Total
1968-71	5	28	83	215	139	45	9	524
1972-76	12	35	198	345	322	84	12	1,008
1977-81	7	68	265	529	562	242	18	1,691
1982-86	6	87	318	830	829	434	43	2,547
1987-91	5	107	471	1,133	1,341	705	82	3,844

The data was analysed using a Poisson regression model, where:

death rate = age factor (age bands 1,2, ..) x birth cohort factor (cohorts 1,2, ..)

The age bands are 25-29, 30-34 and so on. The birth cohorts are 1893-98, 1898-1903 and so on. Clearly this gives a series of age-specific death rates for a given period.

The conclusion was that death rates increase for birth cohorts from 1893 to 1948 and then start to fall. The overall lifetime risk of dying from mesothelioma for males born in 1943-48, 1948-53 and 1953-58 are 1.3%, 1.0% and 0.6% respectively. This rise then fall is strongly linked to the peak years of importing/using asbestos in the UK, during the 1960s and 1970s. Combining all birth cohorts and using population data and actuarial mortality tables one could project future numbers of deaths. This exercise resulted in a peak number of male deaths of between 2,700 and 3,300 a year in about 2020.

Main uncertainties in the model / projections

There is considerable uncertainty about whether there is a "diagnostic" trend implicit in the base data, that is, a trend in the proportion of mesothelioma deaths that are actually recorded as such, rather than appearing on a death certificate under a different cause. Peto suspected that there was a diagnostic trend, by comparison with the emergence of mesothelioma deaths in the US and Australia. In these countries, mesothelioma rates were roughly equal to (time since first exposure)$^{3.2/3.5}$, for US/Australia respectively. The UK rate implies a power factor of more than 4, but adding a "diagnostic" factor of 20% per year yields a power factor of 3.2 which is more consistent with the US and Australian experience. If one uses this model and assumes there are no further diagnostic increases from 1995, the number of male mesothelioma deaths increases more slowly and peaks at about 1,300 deaths per year in 2010. This scenario was deemed possible but extreme, so is probably the minimum number of deaths likely to emerge.

A further uncertainty is that as one projects forward, one has to assume birth cohort factors for cohorts with no observations at all currently. Deaths after 2020 are dominated by men born after 1958, for example, for whom there is no data in the HSE statistics to 1995. The range of 2,700 to 3,300 quoted above corresponds to assuming that this cohort either has negligible risk (2,700 deaths per year in 2020 then dropping rapidly to nothing), or 50% of the risk of the 1943-48 cohort (3,300 deaths and declining more slowly). The extent to which men born since 1958 are likely to die from mesothelioma depends on the extent to which Health & Safety regulations reduced the exposure to asbestos (see section 2.4). It also depends on the extent to which there is an underlying "background" level of mesothelioma-related deaths not linked to occupational exposures.

Occupations at risk

The HSE data lets one estimate different mortality rates for different occupations (see section 5.9). The highest risk occupations are metal-plate workers (which includes shipbuilders) and vehicle body builders. These two occupations account for 3% of all mesothelioma deaths and are broadly seven and six times more likely to die from mesothelioma than the population at large. The next three occupations most at risk are plumbers, carpenters and electricians. 25% of all mesothelioma deaths are in construction or related trades.

5.3 The European mesothelioma epidemic, Peto et al (1999)

Overview of the paper

This paper built on the work done in 1995 and extended it to include a study across Europe of mesothelioma trends in other countries. The headline figures for Britain are a peak in the number of male mesothelioma deaths of around 2,800 per year in 2020.

Differences between the 1999 and 1995 papers

For this paper, deaths from pleural cancers (not mesothelioma per se) were extracted from the World Health Organisation database from 1970-1992, for countries with a male population of at least 3m. The age cohorts used were from 40-44 to 80-84 (recognising that there are very few asbestos-related deaths at younger ages). A similar Poisson model to that described for the 1995 paper was used. With only one observation for the 1945-50 birth cohort, the 1950 and 1945 birth cohorts were assumed to have identical rates.

Trends in pleural cancer rates correspond closely to the trends in mesothelioma, with mesothelioma being assumed in the paper to have a mortality rate 162% of the pleural cancer rate – this ratio being far higher in Britain than the rest of Europe (for which the ratio was assumed to be 110%). The 1999 paper does not include possible deaths from men born after 1955, for whom exposure in the 1980s and 1990s may still have some impact. Sections 2.4 and 2.5 describe the various regulations regarding asbestos, and some of the (several!) current opinions about the possible link between types of asbestos and types of asbestos-related disease. The bottom line is that it is far from clear which type of asbestos is the main cause of mesothelioma and hence how much impact various regulations have had on the exposure to mesothelioma in the 1980s and 1990s.

5.4 HSE 2003 paper

The 1995 paper, described in section 5.2, was produced by the HSE and the Institute of Cancer Research. One of the underlying assumptions in the 1995 model was that the ratio of death rates at different ages is identical across all birth cohorts. While the underlying mesothelioma register data fitted this pattern quite well up until the 1980s, the data in the 1990s suggested that this was no longer the case. John Hodgson at the HSE was a co-author with Professor Peto of the 1995 paper. The inadequacy of the original model inspired John and his team at the HSE to develop a revised model, which was used for the regulatory assessment of the latest Control of Asbestos at Work regulations (see section 2.4).

As part of our exercise to derive insurance industry costs of asbestos claims, we have reproduced the HSE2003 projections, with assistance from the HSE. The details of the model are described in section 7.2 (as are details of how to obtain the working party's spreadsheet replication of the model), so we have not repeated them here. The headline conclusion from the HSE2003 paper is that mesothelioma deaths in Great Britain will peak at around 1,950-2,450 deaths per year, some time between 2011 and 2015.

5.5 Radical surgery for mesothelioma, Peto et al (2004)

This paper was published in January 2004 in the British Medical Journal. It does not contain any revised projections of UK mesothelioma deaths but does include a proposal to perform a trial of radical surgery for mesothelioma.

The prognosis for mesothelioma sufferers is poor, with median survival from diagnosis being under a year. Radical surgery has only been performed infrequently and in particular circumstances. The associated survival figures are up to 48% after five years. A trial is suggested to consider the effectiveness of radical surgery. The paper also suggests the best way to diagnose mesothelioma and, if the tumour is inoperable, the approach to disease management. Again a study is suggested to consider options for dealing with the disease.

More recently (May 2004) the arthritis drug, Celebrex, has hit the headlines as potential treatment for mesothelioma. In an Italian experiment, reported in the Journal of Cancer, Celebrex stopped mesothelioma cells growing.

5.6 EL premium data as a proxy for exposure

Sometimes it is useful for companies to validate their own "bottom up" projections of asbestos costs with a "top down" pro-rata estimate of UK/industry-wide asbestos costs. This is of course tricky and very imprecise for various reasons, but at least gives a comparative view as a reality check.

The reasons why such a top down approach may be flawed are many and varied. Clearly different companies will have had very different types of exposure within their EL book. Consider two companies that each wrote £10m of EL premium in 1970; one may have written almost entirely heavy industries dealing extensively with asbestos, another may have insured largely office workers. Even insurers with similar types of exposure may have varying experience, depending on the precise nature of the work undertaken by their Insureds and the safety practices adopted. A single Insured might be a major source of asbestos claims. Additionally insurers will have varying reinsurance arrangements. A number of major UK insurers have taken out significant reinsurance of their asbestos exposures, so their Net position may be very different from their Gross. Hence any pro-rating of industry-wide figures is fraught with difficulties and uncertainties.

That's the provisos, reliances and limitations over with…. We have summarised data from the FSA returns to give an indication of each insurer's involvement in the UK EL market. This data only goes back to 1981, so the main period of interest, the 1960s and 1970s is missing. However the involvement in the early 1980s probably gives a useful indication of a company's appetite to be involved in EL insurance.

The EL market share data is summarised in Appendix IV.1. The data has been extracted from Thesys and FSA databases back to 1981 where available. The Lloyd's data was available from 1993 and this has been extrapolated back to 1981 using market size. The data has been grouped by current parents/current companies. We have then looked at the largest participants in the market over the period and grouped the smaller participants as "Other".

The EL market share percentage figures are pretty stable over time (with the exception of companies that have gone into run-off). This gives some comfort that extending the percentages before 1981 might be a sensible proxy. The main market shares are as follows:

	Average for	
Company	1981-2003	1981-89
Zurich	21%	22%
Aviva	15%	15%
Lloyd's	14%	13%
AXA	10%	11%
RSA	11%	9%
Others	14%	8%
Chester Street	2%	5%
NFU	4%	4%
Municipal Mutual	2%	4%
Allianz	3%	3%
Builders Accident	1%	2%
Prudential	1%	2%
Independent	2%	1%

A further indication of participation in the EL market pre-1981 is various insurers' participation in the "British Electric" Pool. This Pool (official name the Associated Insurers (British Electric) Pool) was set up in 1949 to insure the Central Electricity Generating Board for EL and PL risks. Policies were incepted from 1950 until 1977, after which it entered into run-off. The capacity provided to the Pool gives an indication of insurers' appetite for EL insurance in the 1950s, 1960s and 1970s. A summary of insurers' participation in this Pool over the years is shown in Appendix IV.2.

The (very) rough percentage shares of the main insurers participating in this pool are:

Company	Approximate % share
Zurich	3%
Aviva	16%
AXA	10%
NFU	0%
Municipal Mutual	1%
RSA	32%
Prudential	3%
Chester Street	1%

Just to re-emphasise the point made previously, both sets of percentage shares above give only the broadest indication of exposure to UK asbestos claims. The figures above relate solely to the British Electric Pool which, in the scale of things, has relatively modest asbestos exposures. We've also had to construct, as best we can, the overall share based on various legacy companies. But the figures give some indication of involvement in the EL market from 1949-79. Some firms, such as Iron Trades/Chester Street, for example, have a disproportionate share of the overall UK asbestos exposure by virtue of the industries they insured.

5.7 ABI data

The following data has kindly been supplied by the ABI and shows the proportion of the number of EL claims notifications that are attributable to occupational diseases and within this, the proportion of occupational disease claims notifications that are asbestos-related.

Year of Notification	% of EL claims notifications that are occupational diseases	% of EL occupational disease claims notifications that are asbestos-related
1991		2.4
1992		2.4
1993		3.0
1994		3.8
1995		4.8
1996	46.2	7.5
1997	30.0	3.7
1998	26.6	10.7
1999	20.0	15.5
2000	23.0	13.4
2001	21.1	16.1
2002	23.3	15.9
2003	25.4	15.7

For the years 1988 to 1990 the proportion of EL claims notifications that are occupational diseases ranges form 46% to 50.5% and the proportion of occupational disease notifications that are asbestos-related ranges from 2.1% to 2.6%.

It should be noted that as companies are often unable to split claims between those they handle and those they are contributing to, the above table will probably include some multiple counting of claims. Subject to this caveat, however, there is a clear increase in the proportion of disease claims notified that are asbestos-related in the last few years.

In terms of business written in the UK by insurance companies authorised in the UK, the data in the above table is estimated to cover 85% of the general insurance market prior to 1999 and 91% thereafter.

5.8 DWP data

The government compensation available for asbestos claimants is described in section 4.7, namely the Industrial Injuries scheme and the Pneumoconiosis scheme. Statistics are available for the Pneumoconiosis scheme and are described below.

The number of people who benefit from the scheme appears to be rising rapidly. From the figures that we have, in 1986 only 61 payments were made. Ten years later, in 1996, there were 453 payments and last year (2002/3) there were 1,258. The rapid rise is probably because the number of deaths from mesothelioma is also rising rapidly.

From the time when the 1979 Act came into force until January 2004, almost 13,000 people have been paid at a total cost of approximately £134m. (As at 31 March 2003 the figures were 12,000 people and £120m of compensation). In the year to 31 March 2003, 2,099 claims were received, of which 1,258 were paid. The amount paid in total exceeded £19.5m. On average, sufferers received £14,402 and dependants £6,891. The payments are in addition to the Industrial Injuries Disablement Benefit (see section 4.7).

Pneumoconiosis - Workers' Compensation Act applications and payments

Year(s)	Applications Received	Payments made
1979–83	5,610	4,293
1983–84	150	133
1984–85	100	55
1985–86	115	75
1986–87	95	61
1987–88	111	67
1988–89	123	55
1989–90	168	105
1990–91	195	147
1991–92	244	149
1992–93	227	162
1993–94	303	202
1994–95	371	307
1995–96	917	363
1996–97	550	453
1997–98	757	391
1998–99	1,012	651
1999–00	1,199	799
2000–01	1,352	928
2001–02	1,867	1,132
2002–03	2,099	1,258

5.9 HSE data

As well as their headline projections of future numbers of mesothelioma claims, the HSE publishes informative studies giving further breakdowns by occupation and geographical region. Some of their latest studies are summarised below.

Mesothelioma mortality by occupation

Mesothelioma mortality statistics for different occupations in England and Wales are published by the Health & Safety Executive ("HSE"). The most recent HSE study, "Mesothelioma Occupation Statistics: for male deaths aged 16-74 in England and Wales 1979-1995 (excluding 1981)", was published in December 2001.

The HSE has calculated Proportional Mortality Ratios ("PMRs") in respect of mesothelioma for the main homogeneous occupation groups. The PMR for an occupation is the male mesothelioma mortality rate for that occupation expressed relative to the average male mesothelioma mortality rate for the total England and Wales population. For example, an occupation with a PMR of 2 would have a mortality rate of twice the national average, whereas a PMR of 0.5 would represent a mortality rate of only half the national average.

The following table summarises the occupations with the highest male PMRs:

Occupation Group	PMR
Metal plate workers	6.71
Vehicle body workers	6.45
Plumbers and gas fitters	4.57
Carpenters	3.59
Electricians	2.84
Construction workers	2.52
Production fitters	2.22
Electrical plant operators	2.66
Boiler operators	2.41
Sheet metal workers	2.10
Welders	2.00

It can be seen from the table above that all of the occupations most at risk from mesothelioma mortality are manual industrial occupations or trade crafts rather than professional or white-collar occupations. Metal plate workers, vehicle body workers, plumbers and gas fitters are the highest risk occupation groups.

The industries commonly identified with the highest levels of historic asbestos products use, and hence workforce exposure to asbestos, are shipbuilding, railway carriage building, installation and maintenance of insulation/lagging in buildings and plant, construction and energy. These industries are all characterised by a large proportion of the total workforce being employed in the high-risk occupations listed in the table above.

Occupational PMRs in respect of females are not available from the HSE.

Mesothelioma mortality by geographical region

The HSE also publish mesothelioma mortality statistics for the different geographical regions of Great Britain. The most recent HSE study, "Mesothelioma Area Statistics: Counties (Including Local Authorities) and Unitary Authorities in Great Britain 1986-2000", was published in October 2003.

The HSE has calculated Standardised Mortality Ratios ("SMRs") in respect of mesothelioma for the different geographical regions. The SMR for a region is the mesothelioma mortality rate for that region expressed relative to the average mesothelioma mortality rate for the total population of Great Britain, and is expressed as follows:

$$\frac{\text{Regional mesothelioma mortality rate}}{\text{Total Great Britain mesothelioma mortality rate}} \times 100$$

For example, a region with an SMR of 200 would have a mortality rate of twice the national average, whereas a SMR of 50 would represent a mortality rate of only half the national average. The British average SMR is 100. The data is a bit skimpy, so one should not take the resultant SMRs as the last word in geographical susceptibility. They will also be distorted as people have moved around the country. However the ratios are broadly indicative of geographical variation.

The following table shows the male SMRs for the main regions of Great Britain:

Ranking	Region	SMR
1	North East	178
2	Scotland	124
3	South East	118
4=	North West	99
4=	South West	99
4=	London	99
7	East	97
8	Yorkshire&Humberside	94
9	East Midlands	74
10=	West Midlands	65
10=	Wales	65

A large part of the variation in the mesothelioma mortality experience of the different regions of Great Britain can be explained by the geographical concentration of different industries and occupations.

The two regions with the highest SMRs, the North East and Scotland, were both characterised by a large concentration of employment in the shipbuilding and related industries in the period of highest asbestos usage, between the 1940s and 1970s. A large part of the workforce in these industries is employed in metal working, welding and fitting which, as noted previously, were the highest risk occupations.

Particular mesothelioma black spots within these regions were West Dumbartonshire (SMR of 626), Inverclyde (271), Renfrewshire (254) and Glasgow (212) in Scotland; and Tyne & Wear (256), Hartlepool (249) and Sunderland (229) in the North East. Shipbuilding activity was common to all these areas.

The shipbuilding areas of Barrow-in-Furness and the Wirral in the North West also have SMRs significantly in excess of the national average (SMRs of 550 and 169 respectively).

South East England also has a significantly higher than average SMR. This appears mainly to be the result of a concentration of large naval and merchant dockyards on the South Coast and Medway, and a concentration of factories using raw asbestos materials in Essex.

Significant exposure to asbestos in dockyards is likely to have resulted from the handling of asbestos imports and re-fitting work on naval and other ships. The major dockyard areas with the highest SMRs are Portsmouth (SMR of 363), Southampton (313), Medway (275), Gosport (258) and Havant (239). All of these are in the South and South East of England.

The dockyard areas of Plymouth, Cardon and Scilly in the South West also have SMRs significantly in excess of the national average (368, 173 and 144 respectively).

Other mesothelioma blackspots in the South East are Barking & Dagenham (SMR of 298), Castle Point (192), Thurrock (185) and Havering (178). All of these areas had a number of large factories using raw asbestos.

Although not especially concentrated in any particular region, areas where the railway industry was an important source of employment have also experienced higher mesothelioma mortality than the national average. This is likely to be the result of a significant proportion of the workforce employed in vehicle carriage building, track work and repairs, and the use of asbestos as a heat resistor in engine stock and station property. The areas with major concentrations of employment in the railways were Eastleigh in the South East (SMR of 296), Crewe & Nantwich in the North West (239), Swindon in the South West (163) and Doncaster and Leeds in Yorkshire & Humberside (both 133).

The total number of female deaths from mesothelioma in the period 1986 to 2000 was only 15% of the total number of male mesothelioma deaths (2,331 female deaths compared to 15,156 male deaths). Therefore, conclusions drawn from a regional analysis of female mortality will be subject to greater uncertainty.

The general conclusion that can be drawn from the incidence of female mesothelioma mortality is that the regional variation is not as great as it is for males. Female SMRs are slightly lower than male SMRs in the highest-risk regions of the North East, Scotland and the South East, but are significantly higher in London, the East, East Midlands and Yorkshire & Humberside.

6. OUR SURVEY SAYS ….

6.1 Introduction

We asked fifteen companies (active or insolvent) whether they would be prepared to share their asbestos data with us. Eleven responded with data and answers to a short questionnaire about that data. **Their help is very much appreciated and has contributed to what we hope is a very useful exercise.**

We also asked a wide range of people (including consultants and other interested parties) about the methods they use to project future asbestos claims. **We are also very grateful for their time in completing this part of the questionnaire.**

The responses to the data survey are described in section 6.2 and some analysis of this data is given in section 6.3. Section 6.4 summarises the responses to the questionnaire about reserving methods. We have merged the survey data with the models we have developed in section 7 to help arrive at some market-wide estimates of future asbestos liabilities.

6.2 Questionnaire about the data

Data was sent to the Institute of Actuaries in order to keep the responses anonymous. However a number of the companies, at some stage in the process, gave an indication of whether or not they were likely to respond. From those indications, we believe the responses cover about 80% of the market (that is the data accounts for 80% of the total number of asbestos claims being made at the moment). Where we have given estimates of total market figures based on the survey data then we have arrived at them by grossing up the working party data from 80% to 100%.

Once the data had been received by the Institute we then reviewed the "shape" of that data (that is, which years had data submitted and at what level of detail) without actually seeing any of the numbers involved. Based on our observations we worked out how best to aggregate that data (this is described in section 6.3). Staff at the Institute performed the aggregation and sent the results to the working party. This meant that no individual on the working party was able to see the data for any individual company. **We are very grateful to Peter Stirling for his help in this process.** All the data submitted to the Institute was destroyed subsequently and the Institute staff were asked to sign confidentiality agreements.

We asked for data relating to UK Employers' Liability policies but also said that General Liability policies should be included if the data was available. To avoid double-counting we asked only for data on claims that were either direct or a reinsurance of a captive insurer.

A copy of the survey and accompanying e-mail is shown in Appendix V. In the rest of this section we will go through each of the main questions that we asked.

What years of exposure do you have data for?

We asked this to make sure that we did not aggregate unsuitable data sets. For example, if one company had exposure only in the 1960s it would not make sense to aggregate it with a company that only had exposure in the 1980s as the data would be likely to exhibit very different trends.

Nine out of the eleven companies answered this question and they had reasonably similar exposure:

- It either began in the 1940s or had no particular start date. There is not much difference between the two as exposure before 1940 will now be generating very few claims.

- Exposure for a number of companies ended in the early 1990s. Aggregating data for these companies with those with ongoing exposure should not be a problem. The vast majority of claims will come from exposure pre-1990 (indeed pre-1980) when regulations governing the use of asbestos were less strict and people were less aware of the health risks.

We also checked that each company only recorded one claim for each period that a claimant was exposed at the insured firm. All companies confirmed that this was the case.

In summary the working party decided that we were happy to aggregate the data for all of the companies.

Can you identify all asbestos-related claims in your data?

Ten companies said “Yes” and one company said “No”. It is comforting that nearly all the respondents could identify all the asbestos claims although there is an issue of self-selection here! Four companies indicated that they could only do so for certain years, ranging from 1978 to 1996. Although 1996 seems relatively late, the company involved will now have almost ten years worth of data and trends before that time are probably of limited use anyway.

Do you hold a field showing disease type (that is whether the claim is for pleural plaques, pleural thickening, asbestosis, mesothelioma or asbestos-related lung cancer)?

Seven companies said "Yes", four said "No". Clearly the answers to this question were more evenly split. Three of the companies that said they could split the data could only do so from 1996, 1997 and 2000. Different trends are expected for the different claim types so in order to project the ultimate claims it would seem sensible to have this split available. It may take a good deal of effort or even be impossible for companies to go back in time to get the split (for example by looking at the paper claim files, some of which may have been destroyed) but it may take very little effort to begin collecting it. The most important part of the split is the one between mesothelioma and non-mesothelioma claims.

Do you record electronically how the claimant was exposed to asbestos (for example which industry they worked in)?

Four companies said "Yes", seven said "No". This piece of information would be available on the claim file in most cases but in most cases is not being recorded on the claim system. In fact, it could probably be derived from the insured in most cases and that piece of information probably is available electronically. While not essential for doing claim projections it may add an extra level of sophistication. There may be different trends for different industries. Recording it would also give the opportunity to monitor trends for different industries.

Do you record electronically where in the country the claimant was exposed to asbestos?

Three companies said "Yes", eight said "No". One fewer company records this fact than the industry in which the claimant worked. It is a similar piece of information, not essential for the projections but potentially useful for monitoring trends.

Do you record electronically the age of the claimant?

Six companies said "Yes", five said "No". Again this is a piece of information that in most cases will be available on the claim file but half of the companies surveyed do not record it electronically. It is potentially useful for projecting average costs since the loss of earnings part of a claim will depend on the age of the claimant (as described in our modelling of average mesothelioma claims costs in section 7.4). Monitoring the age of claimants would give a better understanding of how this element of the claim might move in the future. Also as noted in section 7.2, the age of mesothelioma claimants, particularly those aged over 80, is a key pointer for the likely future number of claims.

Do you record electronically the sex of the claimant?

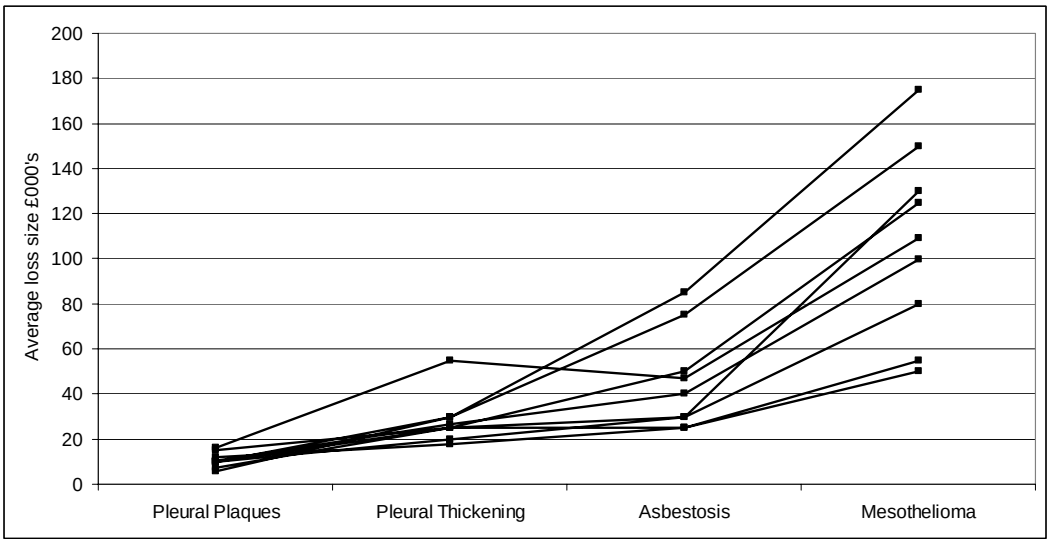
Six companies said "Yes", five said "No". Data for female claimants may exhibit different characteristics from that for males. For instance, average costs may be different. Some of the claims from females may come from casual exposure, for example where housewives washed overalls for their husbands who worked with asbestos. Loss of earnings will also be different for those people. The mix of disease type will also be different as their total exposure to asbestos will have been lower than if they had worked with it all day. Using this piece of information may lead to more accurate projections although as the majority of claims are from males, the overall difference may not be significant.

What do you think are typical settlement values for each type of disease (at the 100% level rather than company share) excluding costs?

Nine of the respondents answered this question although only five of them gave an average cost for asbestos-related lung cancer. The table below shows the lowest and highest figures and an average across companies:

Disease Type	Lowest	Average	Highest
Pleural Plaques	£5,500	£10,741	£16,000
Pleural Thickening	£17,500	£28,241	£55,000
Asbestosis	£25,000	£45,222	£85,000
Mesothelioma	£50,000	£108,222	£175,000
Lung Cancer	£45,000	£115,000	£175,000

There is a big range for each of the disease types. The highest figures are typically 3 to 3.5 times the size of the lowest figures. This seems an enormous difference for something that is essentially factual in nature. Such a range raises the question as to whether some companies use deliberately high figures (for example to reserve cautiously) or low figures. Alternatively some companies may have inadvertently submitted their company share averages, rather than the 100% level. The following graph links the data for each company:



Generally speaking a company with a high asbestosis average cost also has a high mesothelioma average cost. This is not true to quite the same extent for pleural thickening and definitely does not hold true for pleural plaques. In fact, the companies with the three highest mesothelioma estimates are those with the three lowest pleural plaque estimates. This suggests that differences may not be down to deliberate over-reserving alone.

Let us suppose for the moment that the average costs above are the actual ones in practice. Suppose also that we combine the figures using the following proportions:

Disease	
Pleural Plaques	40%
Pleural Thickening	10%
Asbestosis	25%
Mesothelioma	25%

Then the combined weighted average costs for each company become:

Company	Combined Average Cost
1	£25,250
2	£26,550
3	£33,500
4	£41,934
5	£45,500
6	£50,900
7	£52,250
8	£61,450
9	£72,000
Average	£45,482

This has narrowed the multiple of lowest to highest slightly but there is still a big range. If these figures are being used to calculate the ultimate claims then four of the companies may be under-reserving, three of them seriously (by between 25% and 45%) and four of them over-reserving (by between 10% and 60%).

Of course, there may be good reasons why there are different average costs being selected but this should at least challenge companies to look again at their assumptions and why they have chosen them.

Summary

All but one of the companies that responded were able to identify all their asbestos claims although there may be an element of self-selection in this.

Only two out of the eleven respondents collect all of the following pieces of information electronically:

- Disease type.
- How the claimant was exposed to asbestos.
- Where the claimant was exposed to asbestos.
- The age of the claimant.
- The sex of the claimant.

By starting to collect these pieces of information companies could improve the sophistication of their projections and could better monitor the data for emerging trends. By far the most important factor is disease type as the different diseases are expected to show significantly different patterns.

A summary of all the responses is given below:

	Number who said	
Question	Yes	No
Can you identify…asbestos-related claims..?	10	1
Do you hold a field showing disease-type..?	7	4
Do you record…which industry worked in..?	4	7
Do you record…country…claimant…exposed..?	3	8
Do you record…age of claimant?	6	5
Do you record…sex of claimant?	6	5

6.3 Results from analysing the data

Data aggregation

We asked for three sets of data, each split by disease type and year of notification:

- Number of claims notified.
- Number of claims settled at nil cost.
- The company share of the gross (of outward reinsurance) incurred cost.

Seven out of the eleven companies provided some information on nil claims and seven (not the same seven) provided some information on costs. Seven of the companies were able to split the number of notified claims for at least some of the years.

The variety of responses and the fact that we could not look at the actual data made it difficult to aggregate the data without losing some of the underlying trends. The first thing we did was to aggregate the overall number of notified claims for each year. The earliest date that we had data from was 1960 and the latest was 1996. We filled in missing data by using the trend for companies that we had data for. For example, there were ten companies that told us the number of notified claims for 1995 and 1996. If they had X claims notified in 1996 and Y claims in 1995, then we filled in the number of claims for the other company in 1995 as:

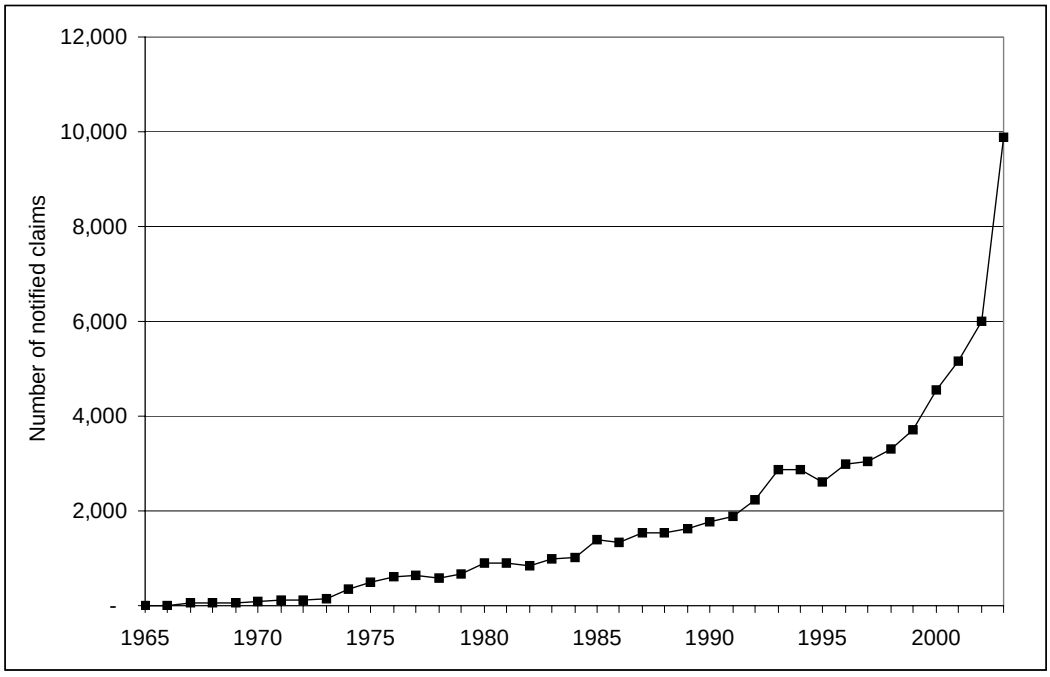
Number of claims in 1995 = Number notified in 1996 *Y/X.

So, the overall number of claims is accurate for 1996 to 2003. The further back in time the fewer companies the trend is based on.

To get a split of claims by disease type we calculated the proportion of claims for each disease type for the companies that had supplied the data. We have then assumed that this proportion holds true for the companies that did not supply the split of data. We took a similar approach to nil claims and average costs.

Overall number of claims notified each year

The results based on eleven companies for 1960-2003 are shown below:



A number of observations based on the graph are:

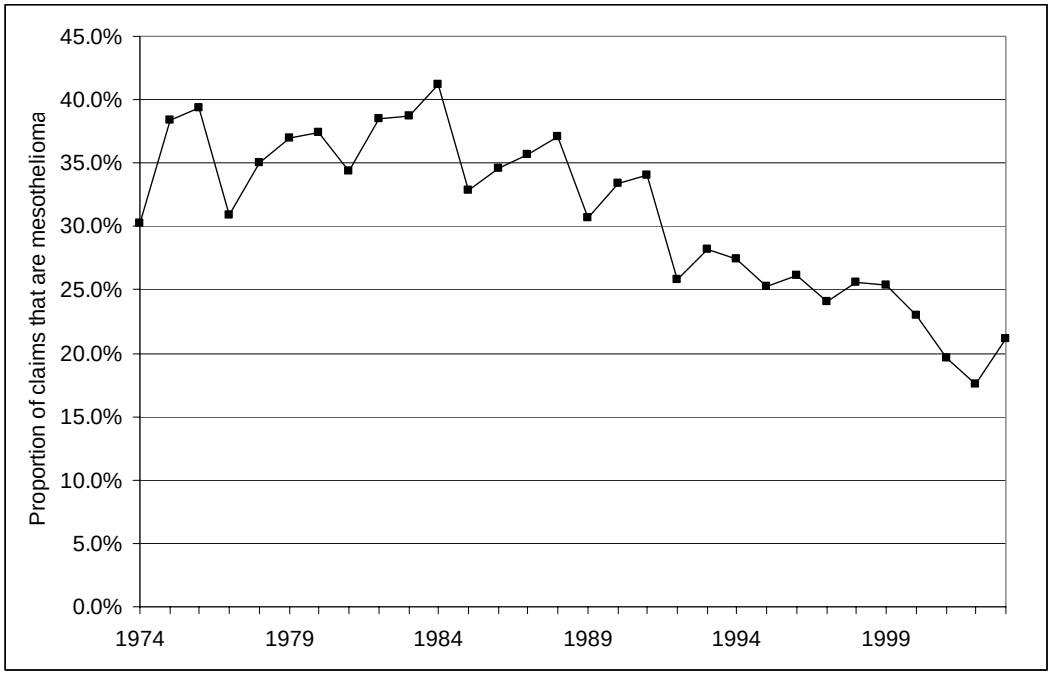
- The number of notified claims increased pretty much linearly between 1974 and 1991.
- There was then a small blip up in the figures for 1993 and 1994.
- Since 1997 the rate of claim notifications has accelerated.
- The number of notifications in 2003 was 65% up on the number notified in 2002.
- There were 9,898 claims notified in 2003.
- Grossing up to the overall market this would be 12,372 notifications in 2003.

These figures for the UK are tiny compared to the hundreds of thousands of claims that have been notified in recent years in the US. However, when allowing for the difference in the size of the population it may not be so different from the number of claims being notified, say, five years ago.

The large increase in the number of notifications in 2003 may be being driven by the factors that we have considered elsewhere in the paper (such as scan vans and an increasing number of pleural plaque claims for unimpaired lives, see sections 4.1 and 4.4). The Fairchild case may also have lead to a delay.

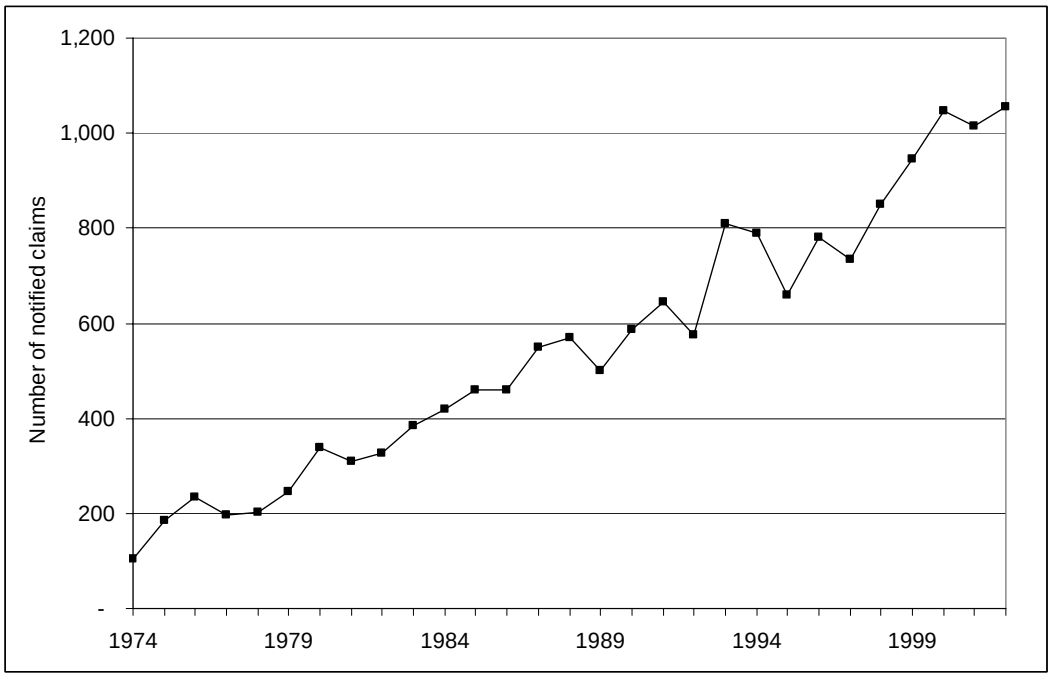
Number of mesothelioma claims notified each year

The results are based on seven companies. The graph below shows the proportion of claims that are mesothelioma claims each year for these companies:



The proportion of notifications that are mesothelioma claims hovered around 35% from 1974 to the early 1980s. Since then it has declined pretty much linearly to around 20% today. We can apply these percentages to the overall number of claims. We have excluded 2003 from this analysis because of the uncertainties surrounding the large increase in the number of claims. The large increase in the proportion of mesothelioma claims for 2003 may have been for companies that did not give us a split of the data between disease types. Therefore it would be unwise to assume that the proportion derived for 2003 holds true across the board.

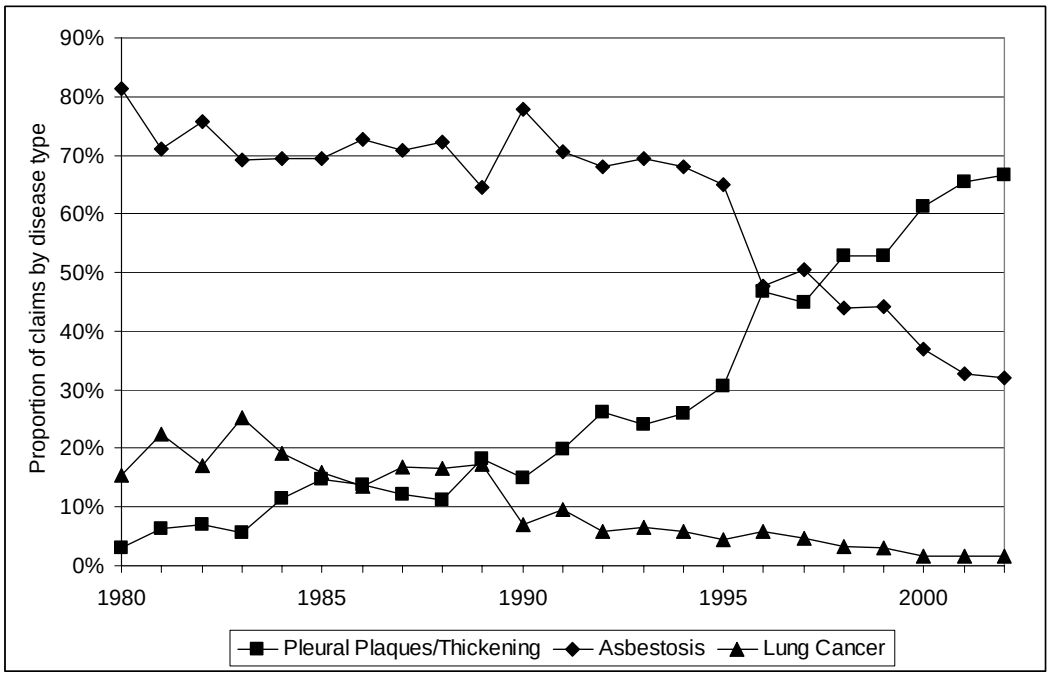
Although the proportion of claims that are mesothelioma has been dropping, the actual number has increased in a reasonably linear fashion, as shown below. As these are by far the most expensive sort of claim it is comforting that we have not seen any great increase in the number of them.



We will return to these numbers later and compare them with other data sources.

Number of non-mesothelioma claims notified each year

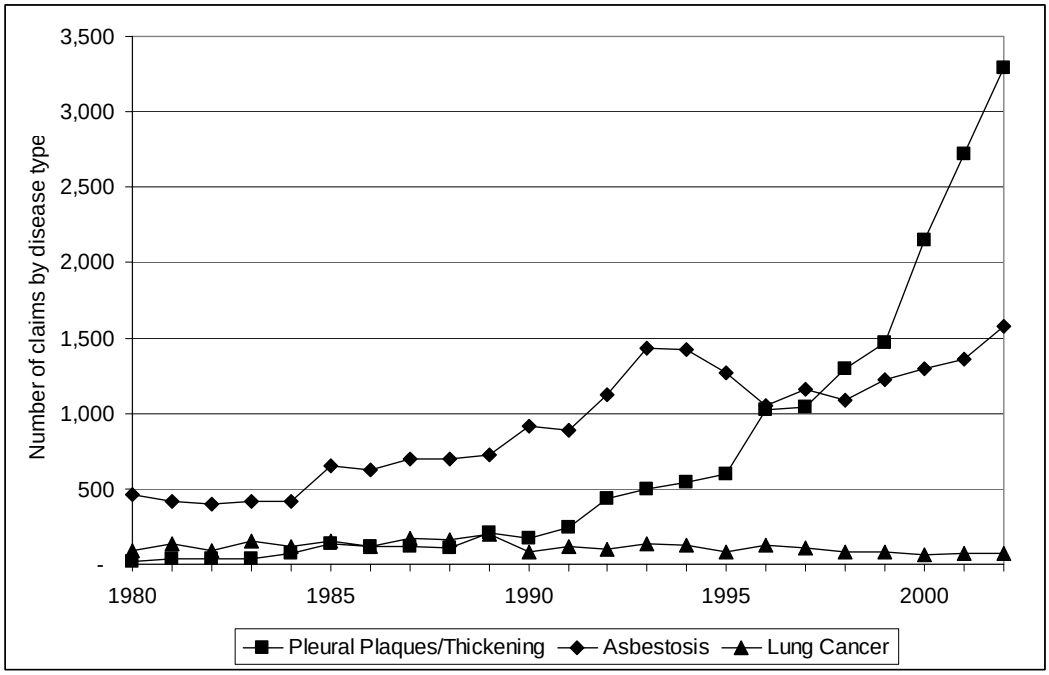
The results are based on six companies. The graph below shows how the non-mesothelioma claims are split between pleural plaques/thickening, asbestosis and lung cancer in each year. Some companies only provided data for pleural plaques and pleural thickening combined and so we have chosen to present the data that way. A rough estimate is that currently about 90% of pleural claims being notified would be pleural plaques. Only a couple of the companies provided data on lung cancer claims. For the reasons outlined in the mesothelioma analysis, we have excluded 2003 again.



This shows some interesting features:

- There is a discontinuity between 1995 and 1996. This may be due to a couple of companies being introduced into the analysis at that point, or because they only contributed a split of data for that point onwards.
- The proportion of claims due to asbestosis stayed relatively stable over much of the eighties and early nineties. It then declined rapidly from around 70% of claims down to 30%.
- The proportion of claims due to asbestos-related lung cancer has gradually declined from around 20% to less than 2%.
- The proportion of claims dues to pleural plaques/thickening has increased throughout the period.

We can then apply these proportions to the number of non-mesothelioma claims to give the following numbers for each claim type:



The number of lung cancer claims has been relatively static at around 100 per year.

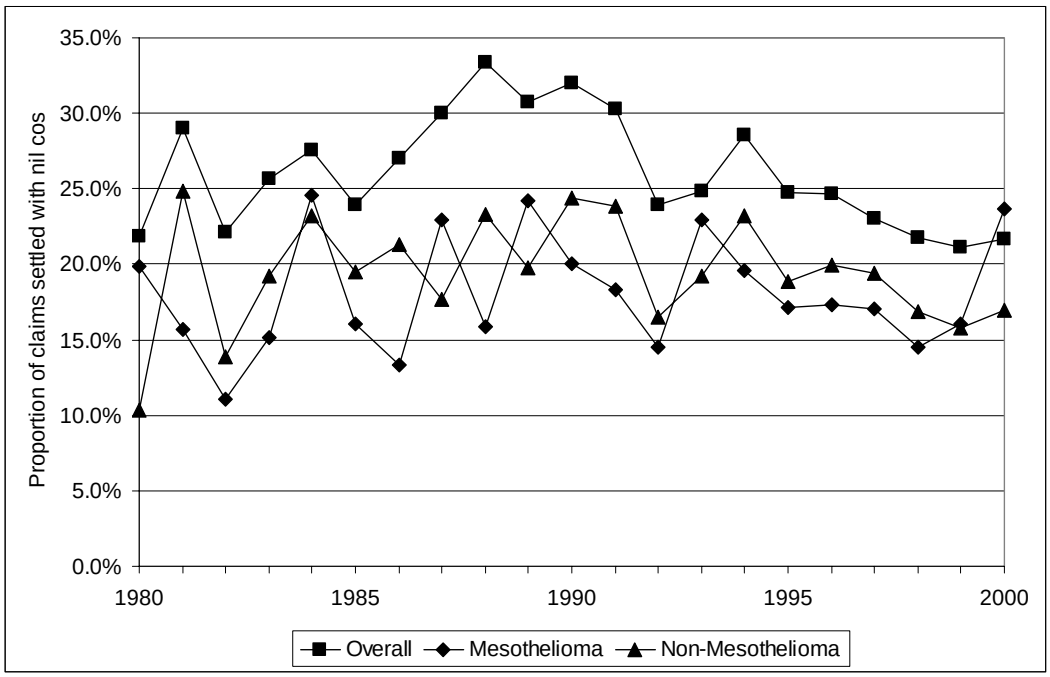
When the decreasing proportion of asbestosis claims is applied to the overall numbers, we find that the actual number of asbestosis claims has not really shown any particular trend over the 1990s. The number has been between 1,000 and 1,500 per year (and indeed started to dip down in the mid-1990s).

The major movement has been in the number of pleural plaques/thickening claims. They have rocketed from around 200 per year at the start of the 1990s to over 3,300 in 2002. This is a huge increase and suggests that it is pleural plaques/thickening claims that are responsible for the 65% increase in the number of claims between 2002 and 2003.

Getting to the bottom of the reason for this increase will be difficult without more detailed data by disease type. It is possible that certain industries or even firms are being targeted by aggressive solicitors or scan vans (see section 4.3 on a pleural plaques test case and section 4.4 on scan vans).

Number of claims settled at zero cost each year

The overall results are based on six companies and the mesothelioma/non-mesothelioma split is based on three. The graph below shows the proportion of claims that are settled for zero cost. We have cut this off at 2000, working on the basis that most claims are probably settled after three or four years.

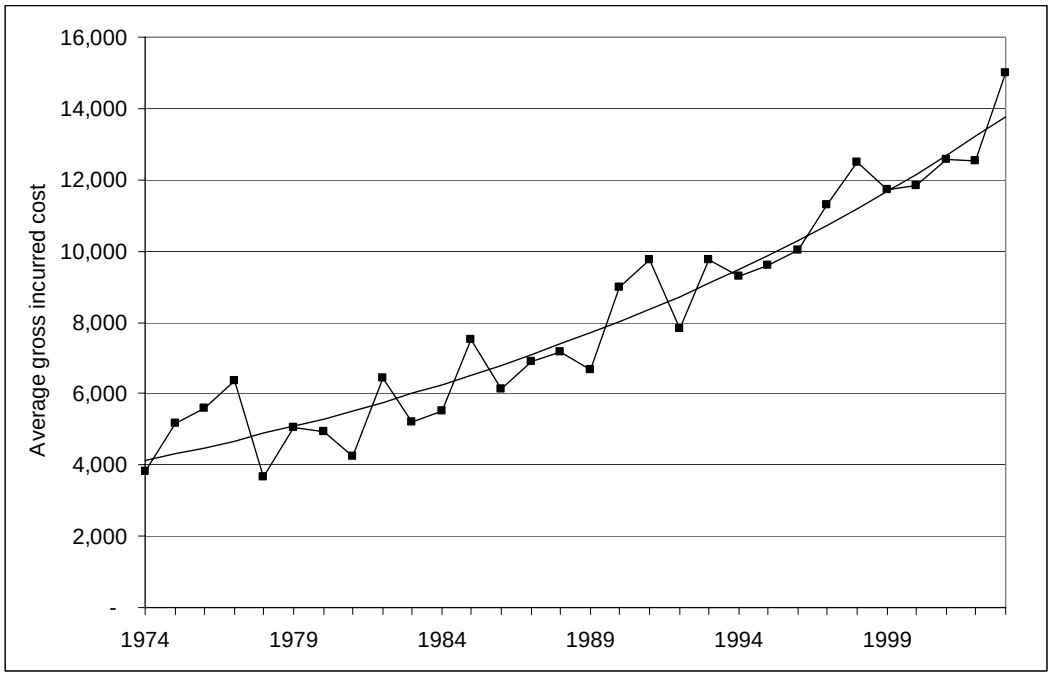


The overall proportion of claims settling with a zero cost has mostly been within the 15% to 30% range although it has been declining over the 1990s. This may well change significantly following the large number of pleural plaques/thickening notifications in the last few years, as more of these may be rejected than other claim types.

The proportions are reasonably similar for mesothelioma and non-mesothelioma claims. The proportions for both are below the overall figures though, which suggests that the proportion of claims settling at zero is higher for those companies that have not submitted a breakdown between disease types.

Overall average cost figures

The results are based on seven companies. The graph below shows the average incurred cost per notified claim. The averages have been calculated using the number of notified claims rather than the number of non-zero claims:

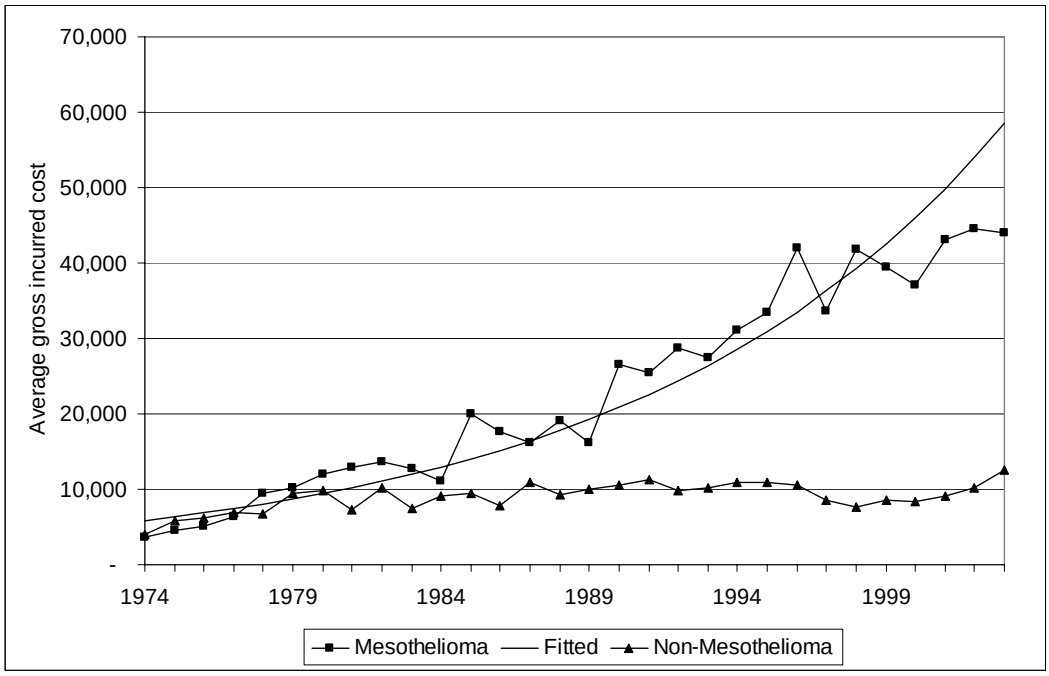


The average claims cost has increased from around £4,000 in 1974 to around £14,000 in 2003. The more recent years' data may be distorted because they will mostly be reserves rather than payments and their accuracy will depend on the reserving policy of the companies that submitted data. For example, if 20% of claims end up being nil claims but initially are reserved at some value then this will push up the average cost initially.

We have fitted an exponential curve to the data and it appears to give a very good fit. The parameters of the curve imply annual inflation in the average cost of 4.2%. This seems low over such a long period of time but it is not obvious how the average cost will change. For instance the average cost of a claim may decrease over time as the average age of the claimants increases (because they would have a lower "future care" element).

Average cost figures split by disease type

The results are based on a small number of companies so should be treated with some caution. The graph below shows the average costs of mesothelioma and non-mesothelioma claims:



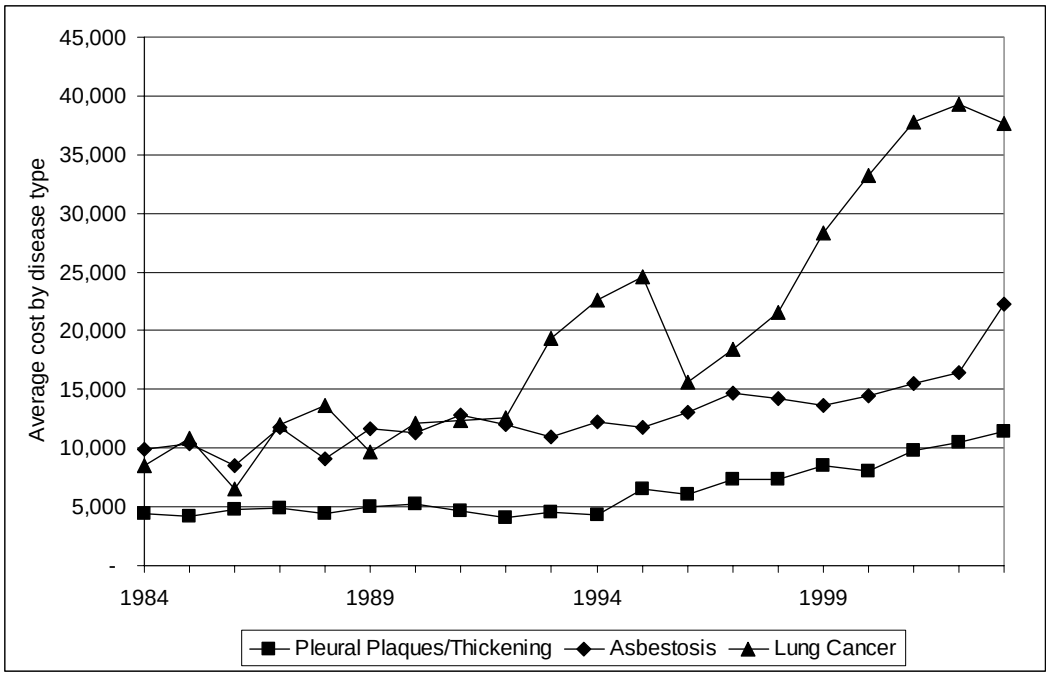
We have fitted an exponential curve to the average cost of the mesothelioma claims and it looks to give a reasonable fit other than for the last four years. This suggests a couple of possibilities:

- There may be some under-reserving of claims on these recent years.
- There may have been a change in the trend of average costs.

A combination of the two factors may be most likely as the graph suggests that the rate of increase in the average cost has been slowing over the past ten years. As noted previously, we might expect underlying mesothelioma costs to start to decrease, as the average age of claimants will become older (with lower compensation amounts for loss of earning or future care). This may explain the levelling off in average mesothelioma costs.

The rate of inflation given by the fitted line is 8% over 30 years. Over the last 10 and 15 years it has been 5% and 6% respectively. In section 7 we have included details of some quantification of the underlying deflation of mesothelioma claims.

The average cost of a non-mesothelioma claim has stayed surprisingly static over the last twenty years. It is therefore necessary to examine the averages by disease type to see what is going on:



The pleural plaques/thickening average cost was stable at £5,000 for the ten years from 1984 to 1994. It has then increased almost linearly in the ten years since.

The asbestos-related lung cancer average cost has increased substantially over the period. They have moved in a similar way to the mesothelioma average and in fact if an exponential curve is fitted, then the implied rate of inflation is very similar. Similar comments as for mesothelioma about older claimants causing average costs to plateau apply to lung cancer cases.

Fitting an exponential curve to the asbestosis average cost also gives a reasonable fit and implies inflation of only 3.3%. It is probably sensible to ignore the 2003 figure at this stage as it will consist mostly of reserves rather than actual payments and it looks significantly out of line with the trend.

The flat average cost of the non-mesothelioma claims can be explained by the combination of the increasing proportion of pleural plaques/thickening claims and the fact that they have the lowest average cost.

This analysis allows us to select a current average cost for each type of claim. The following table summarises the working party's selections:

Disease type	Current average cost
Pleural plaques/thickening	£11,000
Asbestosis	£17,000
Lung cancer	£38,000
Mesothelioma	£50,000

For mesothelioma claims we have selected a figure mid-way between the actual data and the fitted line.

We can then compare these figures to those that the companies thought were the average costs of each disease type. To do this we firstly need to gross up the averages so that they are the average cost of non-zero claims. The following table shows the proportion of claims we have assumed are zero claims for each disease type:

Disease type	Proportion of claims settled at nil cost	Grossed up average cost
Pleural plaques/thickening	20%	£13,750
Asbestosis	20%	£21,250
Lung cancer	20%	£47,500
Mesothelioma	20%	£62,500

The gross incurred cost figures supplied will include legal expenses and we need to strip them out in order to compare them with the settlement values that each company gave. The following table shows the percentage of the gross incurred cost that we have assumed is legal costs for each disease type:

Disease Type	Proportion of average cost that is legal costs	Average settlement value
Pleural plaques/thickening	30%	£9,625
Asbestosis	15%	£18,063
Lung cancer	15%	£40,375
Mesothelioma	15%	£53,125

We now have figures that can be compared to the average settlement values that the companies supplied. We have combined the pleural plaques and pleural thickening figures from earlier by assuming that 90% of pleural claims are pleural plaques:

Disease type	Average settlement value per company	Average 100% settlement value	Multiple
Pleural plaques/thickening	£9,625	£12,491	1.3
Asbestosis	£18,062	£45,222	2.5
Lung cancer	£40,375	£115,000	2.8
Mesothelioma	£53,125	£108,222	2.0

The only difference between the two sets of figures should be that the figures supplied earlier were the 100% settlement amounts but the figures we have derived will be the average company share of those settlements. A reasonable proportion of people who make asbestos-related claims would have periods of employment with asbestos exposure at more than one company. A separate claim would then be made to the insurer of each of these companies. So we would expect the average company share to be lower than the 100% settlement amounts.

A multiple of 2.5 suggests that on average each claimant has a claim with 2.5 companies. This multiple is fairly consistent across the non-pleural diseases. For some reason it is a lot lower on pleural plaques/thickening and this suggests a different characteristic to those claims. It may be that a substantial proportion of the very high numbers of claims in 2003 are being made against one insurer only and this is pushing the average cost up. However, this does not fit well with the graph of average costs, since it does not show a particularly large jump in the average cost in 2003.

So, other than a slight question mark we can conclude that the average cost figures we have derived do not look unreasonable compared to the 100% settlement values.

In section 7 we combine the inferred average costs with our projections of claim numbers to produce some industry-wide costs.

6.4 Questionnaire about reserving/projection methods

A copy of the survey and accompanying e-mail is given in Appendix V. In the rest of this section we summarise the responses that we had to our methodology survey.

Policy and exposure data

A number of companies commented that as their asbestos claims are all Employers' Liability, policy data is not relevant since cover was for 100% signed lines without exclusions and unlimited from the ground up. Half the other companies claimed to have data on signed lines, exclusions, limits and deductibles, while half have only partial data depending on the age of the policy.

We had asked whether companies maintain a list of policies not yet hit by UK asbestos claims but at risk, because of a suggestion that companies without such a list might need greater percentage additions to their estimates for modelled policies. About a quarter claimed to maintain such a list, but only identified such policies when carrying out an exposure exercise.

With regard to exposure data, half the companies do not try to obtain this. Of those that do, the less ambitious content themselves with collecting for the main insureds just employee numbers and proportions at risk or employee numbers and wage roll, or with just using some exposure data as a check on their results. The more ambitious aim for full employee details where possible (dates exposed, age, type of occupation), and supplementary information such as location and industry market share, or volumes of asbestos products used by year and by asbestos type.

Claims data

All but two companies split claims data between mesothelioma and non-mesothelioma. Of these about one third go no further, though half of these say they could do so from the data available. For the rest, the splits of non-mesothelioma vary between a simple two-way split between malignant and non-malignant to a four-way split between asbestosis, lung cancer, pleural plaques and pleural thickening. Many companies fall between these, with one of the various possible three-way splits. Further details of the types of data available to those who responded to the data survey are given in section 6.2.

Reserving methods

All but one of the replying companies reserve by projecting future claim numbers and average claims cost separately, the details appearing in the two sections below. Half of them use benchmarking as a reasonableness check on their results (and occasionally for other uses such as management information). A quarter make no use of benchmarking at all, while the remainder use it as a last resort for small assureds (when using exposure-based methods for major assureds) or for small portfolios. The one company that does not project numbers and costs separately uses benchmarking as its main method.

The main benchmarks used are IBNR to outstanding and survival ratios, with one company also looking at paid and incurred as proportions of ultimate, and another looking at market shares. Sources of external benchmarks are other companies (where published), consultants, auditors and rating agencies, though some companies benchmark internally, for example small portfolios against bigger.

Frequency projection

The majority of companies use curve fitting for their aggregate data. Of the other four, three use exposure projection, though only two of these apply this separately to the major assureds, while the other applies it to aggregate data. The two that use exposure projection for their major assureds have still to project future numbers for other assureds: one does this by curve fitting, the other by extrapolation and benchmarking from the results for the major assureds. Finally, the remaining company fits a GLM model to historical frequencies by various factors and uses this to project future claims.

Of the companies using curve fitting and analysing mesothelioma separately from non-mesothelioma, all but one use HSE curves to fit their mesothelioma numbers, though half are still using the 2001 HSE curve while the other half have moved on to the 2003 curve. The exception claims to fit a curve “by eye”. For the two companies that work on combined data the HSE curves would not be suitable, so one fits a curve of its own invention while the other fits a normal curve.

Most companies begin their curves at the recent annual average, though two start below this point. One of these believes there has been a “blip up” in recent years while the other is trying to get its normal curve to fit. The consequence of the widespread use of HSE curves is that most companies project mesothelioma as peaking somewhere in the range 2010-2015 (indeed every one of these years was mentioned by at least one company!).

Where companies quoted a peak for non-mesothelioma, views varied from those that consider the peak has already passed, to years in the range 2004-2007. Only one company attempted to refine this by suggesting that the peak has perhaps already passed for asbestosis, but that for lung cancer and pleural plaque it may be as late as 2010 depending on the maturity of the exposure for the insured concerned.

Somewhat optimistically we had asked what ratios are being projected for future filings to either the current annual average or total past filings, hoping that companies using curve fitting would translate their projected future numbers into such ratios. However only the two companies that work on combined data answered both parts (and there was only one other answer to each part) and their figures were too different to be considered credible.

Average cost

The responses fell into two groups: those which excluded zero or expenses-only claims and quoted full court awards, and those which included zero or expenses-only claims and quoted just the company's share of the award. The latter formed the majority.

For the first group, average mesothelioma awards are £100,000, lung cancer awards are broadly £75,000 - £100,000, asbestosis awards are around £40,000 to £50,000, while pleural awards are around £20,000.

The second group varied more widely because the size of the company's share varies. Suggested average claim sizes for mesothelioma ranged from £40,000 to £90,000 (remember this includes zero or expenses claims, so the £90,000 is likely to be equivalent to the £100,000 from the first group). Average claims sizes for non-mesothelioma are in the range of £15,000 to £20,000.

These estimates are broadly consistent with the averages from our data survey (section 6.3) and the costs chosen in our model (section 7).

We had asked what impact companies expect from the Fairchild judgement, intending this to refer to the whole saga, but unfortunately some companies took the question as referring to just the most recent decision and replied that it made no difference as they had been expecting the House of Lords to reverse the decision. Some other companies also replied that it made no difference, without giving a reason, and may have taken the question the same way. Of those that clearly took the question as intended, three expect it to lead to increased costs, though one of these thinks this will be the result of increased frequency due to the publicity surrounding the case.

The most common assumed rate of inflation is 5%. We had omitted to ask whether this is before or after any adjustment for increasing claimant age, though two companies helpfully pointed out that it is before such allowance (which for one of them is 2½%). Other rates mentioned were 4%, 7%, national average earnings as a starting point, and the risk-free interest rate.

Desirable reserving methods

As a release from the shackles of their actual data and methods, we had invited respondents to say what methods they would like to use if they had the data. Only three took up the opportunity. One of the curve fitters would like to use exposure methods. Another would be happy to consider any method. The third response is worth quoting in full:

"(I would like to do) a full analysis of the underlying exposure, including using data relating to occupation, geographical location, age profile of employees, annual staff turnover by occupation. Also analysis of the actual claims reported and settled to date, split by sex, age, nature of disease, occupation, exposure period, etc."

Good to see high ambitions amongst the actuarial community!

Reinsurance (inward)

Most UK asbestos liabilities arise from direct policies, but we had asked what considerations arise when reserving for liabilities from reinsuring other writers. Responses pointed to the extra delays in presenting reinsurance claims, the extent depending on the layer involved, and the reduced likelihood of data being available to permit an exposure analysis.

Propensity to claim

Respondents pointed to a wide range of factors contributing to the recent surge in claims frequency and its possible continuation:

- Growing number of solicitors conducting targeted marketing campaigns on the radio, television, at hospitals, and so on, to encourage claims against employers on a no-win, no-fee basis.
- High profile legal cases like Fairchild (see section 4.1).
- Free scan van schemes (see section 4.4) or claims settlement frameworks leading to either an increase in or an acceleration of claims.
- Improved and speedier diagnosis of illness.
- Re-interpretation of the law to allow compensation of lung cancer caused by asbestos exposure but in the absence of asbestosis.
- Increase in lung cancer claims due to adoption of Helsinki criteria.
- Compensation culture, though uncertain whether this is leading to an overall increase in claims or to an acceleration that will result in a more rapid decline later.

However, one respondent commented on seeing spikes in non-asbestos disease claims like deafness and vibration white finger from individual assureds as a result of union activity, solicitors mounting a campaign in the area, or the closure of a workplace, but not having noticed the same happening for asbestos.

On the subject of costs, one respondent pointed to the upward pressure on average costs from conditional fee arrangements, Fairchild and other legal developments, while another expected a rise in expenses from the increase in non-mesothelioma claims.

Unimpaired claims and documentation requirements

We had asked whether pleural plaque claims should be regarded as unimpaired, and for comment on the possibility of applying a similar initiative in the UK to the London Asbestos Strategy Review ("LASR") documentation requirements currently being applied in US.

Views were split on pleural plaque claims. Some companies regard them as definitely unimpaired, one adding that the DWP do not classify these as disability claims for benefit purposes. A similar number appear to view them as not in the unimpaired category (though one wonders whether this was an informed view or perhaps mixing pleural plaques up with pleural thickening), while the final third have not yet determined their position and have the situation under review. A single company stated that pleural plaques sometimes have a discernible impact on health and that where it does, and only where it does, compensation should be paid.

Some companies see no need in the UK for any equivalent of the US LASR documentation requirements. They either do not regard unimpaired claims as a significant problem, for example because inventory settlements do not exist in UK, or they believe that standards of medical evidence are already well established in UK and claims are not settled without sufficient evidence.

Some companies were in favour, feeling especially that if any industry-wide market agreement were to be established, such a specification would be an essential part to ensure that resources are not taken from the genuinely impaired. However one respondent regarded it as unfair to seek evidence of exposure forty years ago, while another warned that in US the documentation requirements have been a mixed blessing, having the twin drawbacks of increasing costs and giving reinsurers an excuse not to pay if the requirements have not been met.

7. ESTIMATED INSURANCE INDUSTRY COSTS

7.1 Introduction

In this section we combine our survey data with information on projected future claim numbers. In doing so we've drawn on a number of aspects of UK asbestos exposure described elsewhere in the paper. This includes details of the importing/consumption of asbestos, the timing of health and safety regulations and latest legal developments. This produces a (wide!) range of asbestos-related costs for the insurance industry, see section 7.6.

Mesothelioma claims are the main component of insurance liabilities, so our starting point is the latest HSE projections of mesothelioma deaths (see sections 5.1-5.4). To be able to apply these projections to our claims costs, and understand the sensitivity of the HSE model to parameter assumptions, we have reproduced the HSE model in a spreadsheet. **John Hodgson, Andrew Darnton and their team at the HSE have been enormously helpful in explaining the workings of their model, which is very much appreciated.** The spreadsheet model we've derived and our thoughts on the sensitivity of the HSE model are described in section 7.2.

To further help our understanding of the emergence of asbestos-related claims, we have also produced a simplified, high level, model ("HLM") of the emergence of asbestos-related claims. The HSE model is a good base for mesothelioma claims but we need some sort of basis for projecting non-mesothelioma claims. As we will see, the main non-mesothelioma disease for which we need a separate model to project is asbestosis. Section 7.3 describes the derivation of our HLM and some observations based on this process.

Part of the derivation of the cost of asbestos claims is a model of claims costs. Rather than just apply simple inflation factors, for mesothelioma and lung cancer claims we have used our understanding of the age profile of claimants to produce an adjustment (down) to the headline rates of inflation. This reflects the fact that there is an underlying decrease in claims costs as claimants get older (with correspondingly lower costs of future care, for example). The average cost adjustment is described in section 7.4. The various projections, claims costs and our survey data are then combined (in section 7.5) to produce some overall insurance industry costs in section 7.6.

Our high level model (awphighlevelmodel.xls), the reproduction of the HSE projections (awphseprojections.xls) and the derivation of the average cost adjustments (awpmesoaverage.xls) are all available from the General Insurance section of the actuarial profession's web site (www.actuaries.org.uk). Alternatively please feel free to contact the working party Chairman (julianlowe@norwich-union.co.uk) who would be delighted to send you a copy.

7.2 Understanding the HSE 2003 projections

The model explains the observed mesothelioma mortality in males (by year and by single year of age) in terms of a range of inputs. The exposure of men of a given age in a given year is assumed to be proportional to the product of two factors. The first factor represents the probability of contact with asbestos for a male of a given age. The second factor is an epidemiological model for the relationship between asbestos exposure and the risk of developing mesothelioma over time. Independent epidemiological evidence suggests that after a brief exposure to asbestos, the risk of developing mesothelioma increases in proportion with a power of time, probably in the range 2 to 3 which has been taken to be the "k" factor of 2.6 in the HSE model (see below). This is possibly modified by the clearance of fibres from the lung, though the evidence for this is much more open.

A reasonable case can also be made that mesothelioma may have been under-diagnosed when records were first systematically kept in the late 1960s. A term representing increasing diagnostic completeness (as a function of time) is also included in the model.

Putting all these terms together the HSE arrive at the formula for the fitted/predicted number of mesothelioma deaths at age A, in year T (F_{AT}):

$$F_{A,T} = \left[\sum_{l=0}^{A+1} W_{A-l} D_{T-l} \{l+1-L\}^{k} 0.5^{\frac{l}{H}} \right] Dx_T P_{A,T} \frac{M}{F}$$

Where:

$P_{A,T}$ = Is the number of person years for age A in year T.

W_A = Age specific exposure potential at age A.

D_T = Overall population exposure in year T.

D_{xT} = Proportion of occurring mesotheliomas diagnosed in year T.

L = Lag period (in years) before effect starts.

H = Half life (in years) for clearance of asbestos from lungs.

k = Exponent of time, modelling the increase of risk of developing mesothelioma with increasing time from exposure.

M = The total number of observed mesothelioma deaths to date.

l = Indexes years lagged from the risk year.

F = Total fitted number of mesothelioma deaths to date, where ….

$$F = \sum_{A,T} \left[\sum_{l=0}^{A+1} W_{A-l} D_{T-l} \{l+1-L\}^{k} 0.5^{\frac{l}{H}} \right] Dx_T P_{A,T}$$

Some observations on the model

We understand that the parameters of the model are fitted "iteratively". For example an assumption of a higher or lower "k" will lead to a different shaped exposure profile and vice versa. The fact that many of the parameters have offsetting effects means that the model could potentially be simplified – although it's not entirely obvious how!

As can be seen from the description of the model, it is quite complex with a considerable number of parameters. The model fits the past data well, but the future projections are very sensitive to slight changes in some of the parameters. So whilst the latest HSE projections are the best guide practitioners have for future mesothelioma deaths, its important to realise that the central HSE projections sit in a wide range and the future number of deaths could easily be higher or lower by a considerable amount. We've given an indication of the sensitivity of the model to changes in parameters later in this section.

One of the key parameters is the power relationship, k, between time since exposure to asbestos and the development of mesothelioma. The epidemiological background to this factor is a little hazy and obviously there is no clear-cut "answer" to exactly what "k" should be. Whilst over some timescales there is evidence that the $time^{k}$ relationship holds, it seems intuitively unlikely that such a relationship can continue for ever-increasing time periods with no other diminishing factor coming into play (other than the ultimate diminishing factor, death). If the relationship continued over 60/70 years for example, this would imply that more or less everyone in the UK would die from mesothelioma in their old age, unless they'd managed to die from something else first. This is simply because the chance of mesothelioma developing would increase greatly from ages 60-70, then even more greatly from 70-80, and at a higher rate still from 80-90 and so on ($60^{2.6}$ is a lot higher than $50^{2.6}$ or $40^{2.6}$). There is of course very little data to model how the disease may develop at extremely old ages, adding further to the uncertainty of projections in the 80+ category. This age band assumes an increasing importance in the later years of the HSE projections, with more than half of all future deaths arising from 80+ year olds after 2020, as shown later in this section.

Two important points arise from the observation about the importance of very old ages in the projections. Firstly the model only projects deaths in males between the ages of 20 and 89. This in part recognises the sparseness of the data for the 90+ age band and the uncertainty over the continued appropriateness of the $time^{2.6}$ relationship. The sparseness/reliability of the data is not only in the sense that there aren't a great deal of 90+ year olds around (at the moment), but also the reliability of recording deaths as attributable to mesothelioma probably becomes more shaky at older ages. A 55 year old dying from an unpleasant lung condition would probably have his cause of death reviewed rather more carefully than a 95 year old who developed chest pains and died shortly after.

The second point relating to very old ages is the impact of the half-life factor in the HSE model. This models the fact that asbestos fibres can be broken down in the lung and removed from the body, and over time this may serve to diminish the propensity to succumb to asbestos-related diseases. In the current model, the half-life factor is set to 1,000, in other words there is deemed to be no half-life effect. Whilst this may be entirely appropriate for younger ages, if there is a half-life effect, clearly this would be more significant for the 80/90+ year olds.

The particular uncertainty over the number of deaths in the 80+ category could work two ways. On the one hand, should the time$^{2.6 \text{ (or whatever)}}$ relationship hold for ever older ages, when combined with increasing longevity, the number of 90+ year old mesothelioma deaths could become far more significant and increase the number of future mesothelioma claims above the levels currently predicted by the model. Conversely, if the continuing appropriateness of the time$^{2.6}$ factor in the current model proves to be an overstatement at older, 80+ ages, the future number of mesothelioma deaths could be far lower than currently predicted. Certainly for an early warning as to which end of the spectrum the future number of mesothelioma deaths may tend towards, the number of mesothelioma deaths in the 80+ category seems a key early warning factor.

Having pondered the shape of Britain's exposure to asbestos in deriving our own HLM, as described in section 7.3, the shape of the exposure profile seems quite "sharp". Whilst the model fits the mesothelioma deaths register data well, our a priori stab at an exposure profile would suggest perhaps a rounder curve for asbestos exposures. With the interaction of the various parameters in the model, there's the possibility that the sharply increasing propensity to succumb to mesothelioma (the time$^{2.6}$ factor) combines with the exposure profile to produce a fairly sharply increasing exposure profile.

The HSE model does not project female deaths as part of the main model because there is no significant data. This may not be a significant limitation for examining potential Employers' Liability claims as nearly all affected workers are male. For Public Liability claims this may be more of an issue.

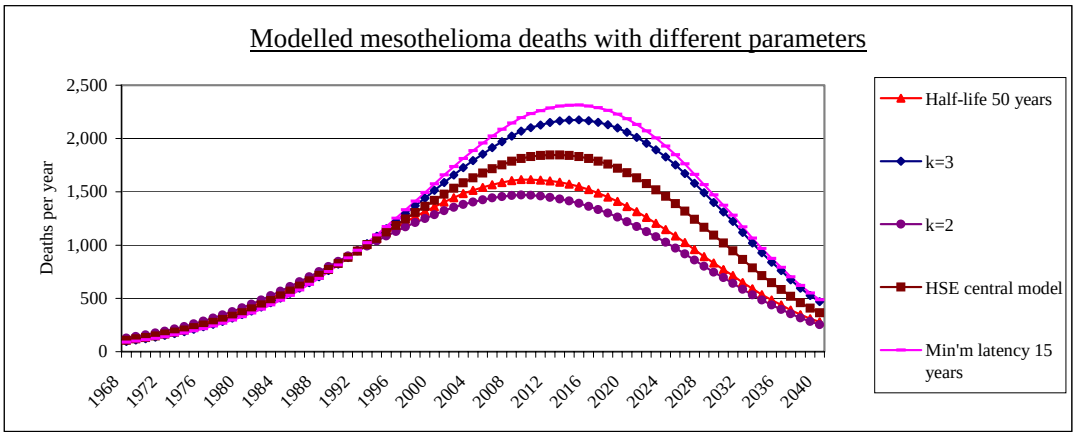
A further thought relates to a point we have already touched on, the reliability of the mesothelioma register data. Our simple HLM can, at a high level, produce projected numbers of mesothelioma deaths that hug the actual data extremely closely (with a wide range of potential "peaks" for the number of mesothelioma deaths). Where it struggles to match the HSE model is in predicting the number of deaths in each age band. The reliability of the mesothelioma register data is a key determinant of the reliability of the model. The HSE model makes an allowance for the number of mesotheliomas diagnosed, but again the final outcome is very sensitive to this parameter.

A final thought is the unknown effect of the various safety regimes introduced over time. The understanding of the latency period of mesothelioma relates to the experience largely from a time when health and safety regulations were much more lax than they are today and asbestos exposures were often far higher than permitted in later years. While the exposure index captures the overall propensity to be exposed to asbestos, there may well be additional effects at play relating to the way mesothelioma and other diseases develop following low level exposure to asbestos compared to high level, and the fact that the use of amphibole asbestos was reduced earlier than the use of chrysotile.

Having described all the sensitivities of the HSE model, it's important to re-emphasise that it remains the best predictor of British mesothelioma deaths there is and the expertise built up by John Hodgson and his team at the HSE relating to all aspects of asbestos exposure is considerable. Having reproduced the model and pondered its sensitivities, it has made us realise more than ever the tricky nature of any attempt to project future mesothelioma deaths. The main learning we gained from understanding the HSE model better and looking at a simplified version of it, is that the future number of mesothelioma deaths remains very uncertain, and could easily be much higher or lower than the current central predictions.

<u>An indication of some of the sensitivities of the HSE model</u>

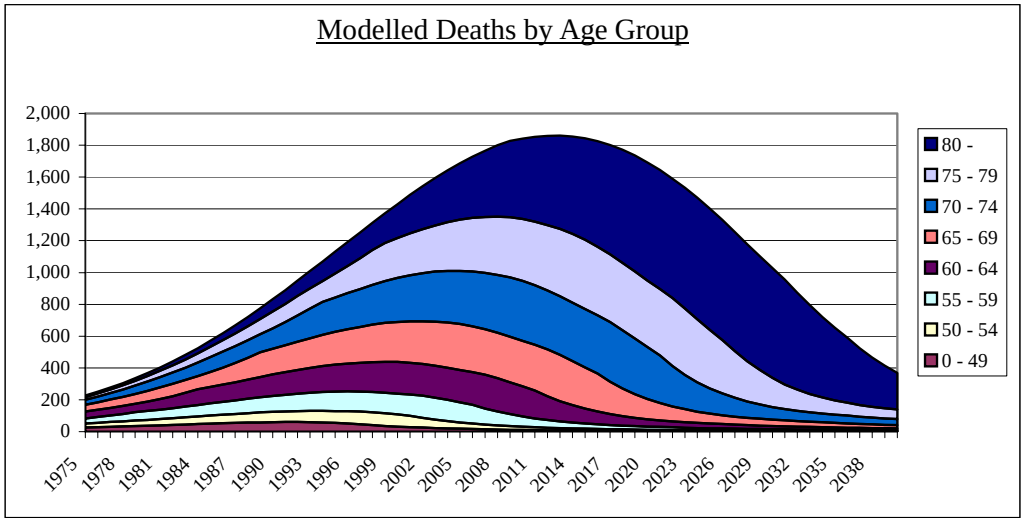
As we have alluded to, giving an indication of the sensitivity of the model is less than entirely straightforward because of the iterative nature of model fitting. No single parameter would in practice change in isolation, as a perturbation of one parameter would lead to others being refitted. The HSE 2003 paper describes various "alternative" models that give an indication of the sensitivities of the model. Recognising the limitations of any attempt to measure sensitivities by changing single parameters in isolation, nevertheless this is exactly what we've done to give some idea of the sensitivity of the model:



Clearly the future shape of mesothelioma deaths can vary markedly with relatively small changes to the parameters. Whilst each curve fits the past data at a total level very well, the different models will have varying degrees of success at fitting the age distribution of past mesothelioma deaths. By way of having some sort of basis for our high and low industry projections in sections 7.5 and 7.6, our mesothelioma curves are based on k=3 and k=2 versions of the HSE model.

As noted at the start of this section, we've more or less completely reproduced the HSE model in a spreadsheet which is available to any interested reader. The best way to understand the model is to attempt to do some model-fitting oneself.

As described previously, one of the main sensitivities is the future number of mesothelioma deaths in respect of those aged 80 or over. To give readers an idea of the impact this has on the future projections, the split by age band of the central HSE projections is shown below:



As can be seen, by 2020 around half of all mesothelioma deaths are in respect of men aged 80+ and by 2030 the vast majority are in this age band. As can also be seen, there have been very few deaths to date in this age band on which to form an understanding of the likely development of mesothelioma for these ages. So the development of the experience of mesothelioma at these ages is one of the key determinants of the total number of mesothelioma deaths.

7.3 Our own simplified model

To give us a platform to project non-mesothelioma deaths, and to help understand the current HSE model, we've produced our own simplified model of the emergence of asbestos-related diseases. The form of the model is as follows:

D_T = Overall UK exposure to asbestos in year T.

W_A = Relative propensity to be exposed to asbestos at age A.

$P_{A,T}$ = Population at age A in year T.

$C_{A,T}$ = Composite asbestos exposure at age A in year T.
$= D_T \times W_A \times P_{A,T}$.

$\%_l$ = Percentage of people who develop disease in year l,
for $l = 1, 2, \ldots 50$.

$F_{A,T}$ = Number of people who develop disease at age A in year T.
$= B \times \sum (C_{A-l,T-l} \times \%_l \times P_A,T / P_{A-l,T-l})$,
for $l = 1, 2, \ldots 50$. B is a scalar.

$P_{A,T} / P_{A-l,T-l}$ is the probability of an A-l year old in year T-l being alive in year T.

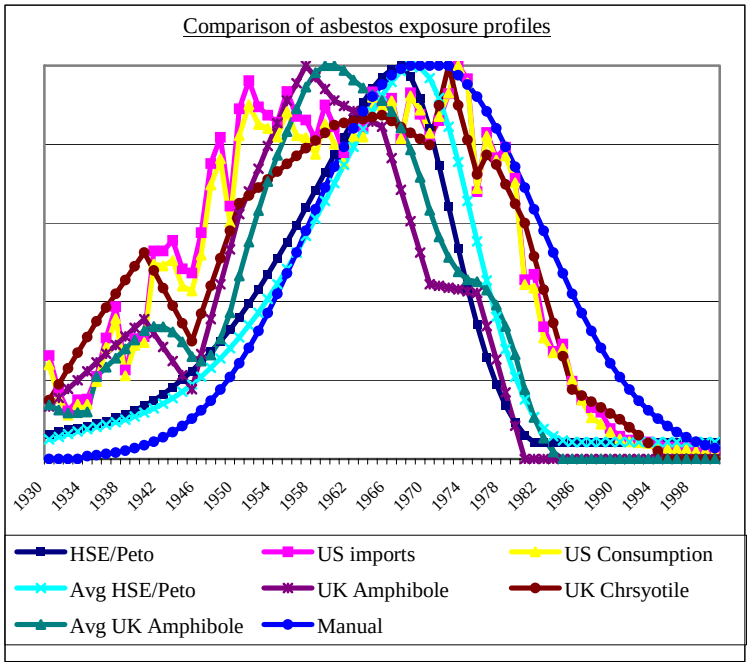
Deriving the overall UK exposure, D_T

Our HLM spreadsheet includes a number of reference indices for a measure of exposure. These include:

- The derived HSE exposure base for 1930-2000 from the latest HSE 2003 paper (see section 5.4) and a rolling average version of this.
- Indices of the volume of UK imports of amphibole and chrysotile asbestos for 1930-2000 (from the HSE's regulatory assessment of the latest CAWR regulations) and a rolling average of these.
- Indices of US import and consumption of asbestos from Virta's geographical survey publications (see section 4.8).
- Our own "flexible" bell-shaped distribution of exposure.

The exact shape of the UK's exposure to asbestos is, of course, unknowable. What we do know is that it rose steadily since the Second World War, stayed high for a while and then began to decrease. Our intuitive feel for the nature of the exposure is that the "peak" of exposure was more of a gentle plateau than a sharp spike. Similarly while the 1969 regulations (see section 2.4) should have seen the beginning of the end of particularly high levels of asbestos exposure, we suspect this may have been more the end of the beginning, as adherence to safety regulations is seldom comprehensive or instantaneous.

These intuitions lead us to favour a broad bell-shape for the profile of UK asbestos exposure. Our HLM spreadsheet allows the user to base this on a Normal curve, either stretched out in the middle, or with the build up / decline of exposure steeper or more shallow than an unadulterated Normal curve. Though in a sense "arbitrary", this shape is similar to the profile of the UK imports of the more dangerous amphibole asbestos. It is also based on a sensible understanding of how the exposure to asbestos might have developed and a pragmatic recognition of the impact of health and safety regulations.



For those of you in black and white, the pink is behind the blue. It is a bit hard to see exactly which curve is which. Interested readers are welcome to view the graphs in glorious colour in the awphighlevelmodel.xls spreadsheet. The derivation of the exposure shape is in part "circular" as it seems to combine well with other aspects of our model and matches the HSE/survey data pretty well – albeit with some limitations for predicting mesothelioma deaths by detailed age band. As noted earlier, the HSE/Peto exposure curve probably looks quite sharply peaked by comparison to some of the actual trends in UK asbestos imports but it is impossible to know with any degree of confidence what the true "exposure" to asbestos fibres may have been.

Propensity to be exposed, W_A

This factor represents the fact that the spread of ages of those working with asbestos is not uniform; not many ten year olds will be employed in shipyards and not many fifty/sixty year olds will be engaged in the fairly heavy manual labour/construction industries. Quite what these factors should be is, again, really quite subjective. But common sense tells us the weighting goes up from nothing as a child, rises to a peak then decreases towards middle age. We've based our factors on the latest HSE 2003 paper but smoothed over ages, as there doesn't seem any reason to have "step" changes by age band.

Population figures, $P_{A,T}$

These are based on some of the latest Government Actuaries Department ("GAD") projections of the UK male population, which gives figures for males by age band. The GAD figures don't provide population statistics for all the earlier periods of the twentieth century, so we have trended the more recent detailed figures back to 1930 based on census data.

Latency Profile, $\%_l$

Having a simplified model for the percentage of each disease that emerges over time is the main difference between our HLM and the HSE model. This lets an interested modeller make more understandable assumptions about how the disease emerges over time. There are a range of indications of the likely timescales for mesothelioma to emerge. As we know from section 2.2, a long latency period is typical, though an extremely short exposure period can still trigger the disease (for example the case of "Alice" at the end of section 4.2). The Helsinki Criteria (see section 4.6) implies a latency period of at least ten years before a death can be attributed to asbestos exposure.

At the 1997 International Expert Meeting on Asbestos, Asbestosis and Cancer, the mesothelioma latency period was described as being mainly between 30 and 40 years, but recognises that heavy exposure can lead to a latency period of 20 to 30 years. Information on www.asbestos.org describes the latency period as "at least 25 to 30 years" and similar information on www.mesothelioma-information.net says of the latency that "most cases of malignant mesothelioma are diagnosed 30 years or more after first exposure".

Again, exactly what the latency profile of mesothelioma might be is clearly quite uncertain, though it is certainly long. The background rationale for the power curve used in the Peto/HSE models can be used in this model too. One could also reflect the half–life effect that might cause propensity to succumb to asbestos diseases to diminish over time as part of this percentage profile. In fact considering how one might reflect a power curve with these percentages brings home how very sharply-rising the proportions of people likely to develop mesothelioma might be at much older years.

Initially we have simply set up the latency profile to apply for up to 50 years. We will be extending this to 60 years to better understand the effects around the older ages. Recognising that the latency profile may change over time, as lower exposures mean that it may take longer for the disease to emerge (as well as affecting the overall probability of developing a disease in the first place), we have set up a facility to allow latency profiles to become longer. We have done this for the periods 1950-1969, the 1970s and 1980s and beyond, corresponding more or less to the first major asbestos regulations (1969, see section 2.4) and the banning of blue and brown asbestos which was known about in the 1980s.

There are only a small number of lung cancer cases, so for our purposes we haven't dwelt on the likely future numbers of these claims. The development of the future number of pleural plaques is far more related to legal activity than any underlying epidemiological cause, so our models for future numbers of these claims is entirely judgmental. This just leaves asbestosis to consider. One of the main references for the development of asbestosis we have found is Mossman and Churg (1998). Their view is that the development of asbestosis requires heavy exposure, possibly as high as 25-100 fibres per millilitre (the 1969 regulations introduced a standard of 2 fibres per millilitre per year). They claim latency is inversely proportional to exposure and in the 1990s "is now about 12.6 to 20.2 years". At lower doses, a longer latency period would be expected.

Details at www.mesothelioma-information.net say that "the latency period for the onset of asbestosis diagnosis is typically 10 to 20 years". The US Agency for Toxic Substances (at www.atsdr.cdc.gov) says "Either heavy exposure for a short period or lower level exposure over a longer period may result in asbestosis…. Clinical manifestations typically appear 20 to 40 years after onset of exposure; however radiologic changes can occur in <20 years". So for asbestosis we've assumed the disease may start to emerge ten years after exposure and continue to become apparent up until 40 years thereafter. It is a moot point what to assume beyond 40 years. Unlike mesothelioma, we would not necessarily expect the propensity to develop asbestosis to continue to increase each year.

We've used the HLM to produce a low, medium and high estimate of the progression of asbestosis claims, as described in section 7.5. The epidemiological evidence seems to suggest it's reasonable to have the facility to extend the asbestosis latency period for the later, lighter exposures in the 1970s, 1980s and beyond. We wouldn't want to claim any particular latency profile as definitive and have left a range of possible asbestosis profiles in the awphighlevelmodel.xls spreadsheet.

7.4 Derivation of average claims costs

The main types of disease caused by exposure to asbestos fibres are described in section 2.2. The typical level of damages, in increasing order of severity, are described below.

Calcified Pleural Plaques

Pleural Plaques claims can be made up of awards for:

- The presence of scarring on the lungs.
- Anxiety.
- The risk of developing mesothelioma.
- Possible disadvantage in the labour market.
- Solicitor's costs.

Many claims are settled on a provisional damages basis which allows claimants to return to the courts should they develop a more severe condition, such as mesothelioma. The range of awards is typically £3,500-£7,500 on a provisional damages basis, £12,500-£17,500 on a full and final basis.

Very broadly, people under 65 usually settle on a provisional damages basis, and claimants over 65 settle on a full basis due to lower life expectancy, and as a means of gaining cash. Claims inflation should be relatively low, other than for the General Damages element.

There are currently some test cases with the courts (see section 4.1) which argue that pleural plaques should not be compensatable as they involve no injury or impairment per se. Indeed there is expert medical evidence that pleural plaques are simply evidence of exposure to asbestos and there is no causal link between having a pleural plaque and going on to develop any asbestos-related disease. It is being argued that claims should either not be compensatable at all or should be settled on a provisional damages basis at modest cost (less than £1,000), but that full compensation should only be payable if a claimant actually develops an asbestos-related disease. In this way, compensation would be targeted at those most in need. These court cases are likely to eventually go all the way to the House of Lords.

Certain firms of solicitors actively maintain databases of employers and who insured them for which periods of time. In the North East, a firm of solicitors recently hired an X-ray scan van for two days (see section 4.4). Potential claimants were then taken by bus to Gateshead with their wives. Whilst the claimants were being examined, their wives had a day trip to the shopping centre. Numerous other examples exist of solicitors actively targeting potential claimants. If the pleural plaques test cases referred to above succeed in showing that the plaques cause no harm per se, and damages should be correspondingly minimal then solicitors would no doubt rapidly lose interest in providing X-rays/CT scans. Clearly the potential number of claims and their average cost could vary wildly.

Pleural thickening

Like pleural plaques, settlement may be on a provisional damages basis, dependent on the age of the claimant. The range of awards on a full and final basis is typically £15,000-£45,000.

Asbestosis

At the lower end of scale, say 10-15% lung disability, General Damages are in the range £15,000-£25,000. General Damages at the upper end of the scale (50%+ lung disability), are in the range £35,000-£50,000, and also likely to attract damages for nursing care and loss of income, pushing settlements into the mesothelioma/lung cancer range.

Mesothelioma and asbestos-related lung cancer

The cost of a mesothelioma claim depends primarily on the claimants age, earnings (if in employment), marital status and dependants.

The smallest claim might comprise:

- General Damages award of around £35,000.
- Bereavement award of £10,000.
- Funeral expenses of £2,500.

Plus, of course, solicitors' costs. Therefore, the lowest claim for a single man, including costs, would be around £50,000.

General Damages for mesothelioma are in the region of £35,000-£50,000. However, invariably with these types of claim there is a claim for nursing care and past/future loss of earnings. The age of deceased at date of death together with earnings capacity, clearly influences the final settlement figures.

Lung cancers related to asbestos exposure are mostly fatal, and some are only detected at post-mortem. As noted in previous sections (see section 2.5), damages for lung cancer are often reduced for smokers, given the likelihood that smoking exacerbated the condition. Damages for lung cancer generally cost around £10,000 less than mesothelioma claims for claimants with the same financial and dependency circumstances due to a lower level of General Damages (because of the smoking contribution).

In the US (and to a lesser extent in the UK) various treatments have been tried out for mesothelioma. Organisations exist to this end such as the Mesothelioma Applied Research Foundation, a national non-profit organisation whose mission is to eradicate mesothelioma as a life-ending disease.

These treatments come in three forms:

- Surgery (taking out the cancer).
- Chemotherapy (using drugs to fight the cancer).
- Radiation therapy (using high-dose X-rays or other high-energy rays to kill cancer cells).

Often two or more of these are combined in the course of treatment. To date, there has been some success in extending life expectancy, though the impact on quality of life can be very negative. There is a theoretically curative operation called extra-pleural pneumonectomy. This operation may be preceded and followed by chemotherapy.

The impact of treatments on the future cost of claims is difficult to determine. Complicated operations following by expensive life-preserving drugs would clearly have a major impact on any cost projections. Much research effort is going into this area, and medical papers and details of treatments are widely available to sufferers looking for a cure. Section 5.5 describes a recent paper published in the British Medical Journal (“Radical surgery for mesothelioma”, January 2004), calling for trials to determine the optimal course of treatment for mesothelioma victims, before the peak number of deaths in the UK around 2010-2015.

Summary of costs

The range quoted above and the estimated costs from our survey data (see section 6) by major disease type are summarised below:

Average awards (all figures in £000's)

Disease type	Typical range	Survey Lowest	Survey Average	Survey Highest
Pleural plaques*	3.5-7.5/12.5-17.5	5	11	16
Pleural thickening	15-45	17	28	55
Asbestosis	15-50+**	25	45	85
Lung cancer	35-50+**	45	115	175
Mesothelioma	35-50+**	50	108	175

* Ranges for pleural plaques are for provisional damages and on a full and final basis.

** All these conditions are likely to include a Special Damages element in addition to the General Damages shown above.

7.5 Combining our survey data with projected future claim numbers

Looking back at costs to date

Firstly, we can look at what has happened to date from our survey data and estimate the total cost of asbestos-related claims to the insurance industry to date. We have done this by combining the number of notified claims with average cost figures. We have grossed up the figures for the number of claims from the estimated 80% market share to 100%. We have used a mixture of the actual and smoothed costs. This gives the following estimates of the total cost of all claims notified up to the end of 2003:

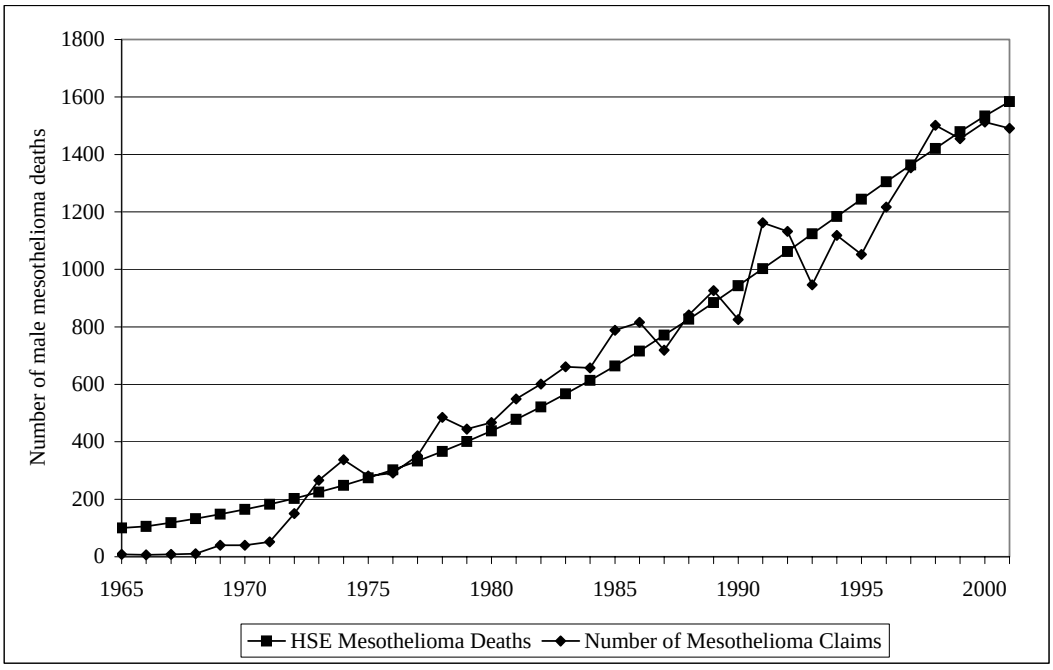
Notification year	Cost of mesothelioma claims	Cost of non-mesothelioma claims	Total cost
Pre 1970	£0.1m	£1.1m	£1.2m
1970 to 1974	£1.4m	£4.3m	£5.7m
1975 to 1979	£10.0m	£16.2m	£26.2m
1980 to 1984	£24.9m	£29.0m	£53.9m
1985 to 1989	£52.7m	£58.1m	£110.8m
1990 to 1994	£106.1m	£110.0m	£216.1m
1995 to 1999	£183.5m	£165.5m	£349.0m
2000 to 2003	£244.3m	£331.9m	£576.2m
Total	£623.0m	£716.1m	£1,339.1m

We estimate that, once all the claims notified to the end of 2003 have been settled, asbestos-related claims will have cost the insurance industry £1.3b. This is split reasonably evenly between mesothelioma and non-mesothelioma claims. Some of the £1.3b will not actually be paid though (or at least not by the original insurer), as a number of the companies involved are insolvent. We should stress at this point that all our estimates are subject to considerable uncertainty. The estimate that our data represents 80% of the UK insurance market is one of a number of sensitive assumptions. Clearly if the survey data represented 70% of the market, the figure for claims to date could be £1.5b; if it represented 90%, the figure would be £1.2b. So the market estimate is very sensitive to our assumption of the proportion of the market that our data represents.

Looking forward at future claim numbers

Projecting into the future is much more difficult! Most companies that responded to the survey on methodology used a numbers/average cost methodology and that is what we will use here. Given the different trends we have observed for the different disease types it makes sense to project each one separately.

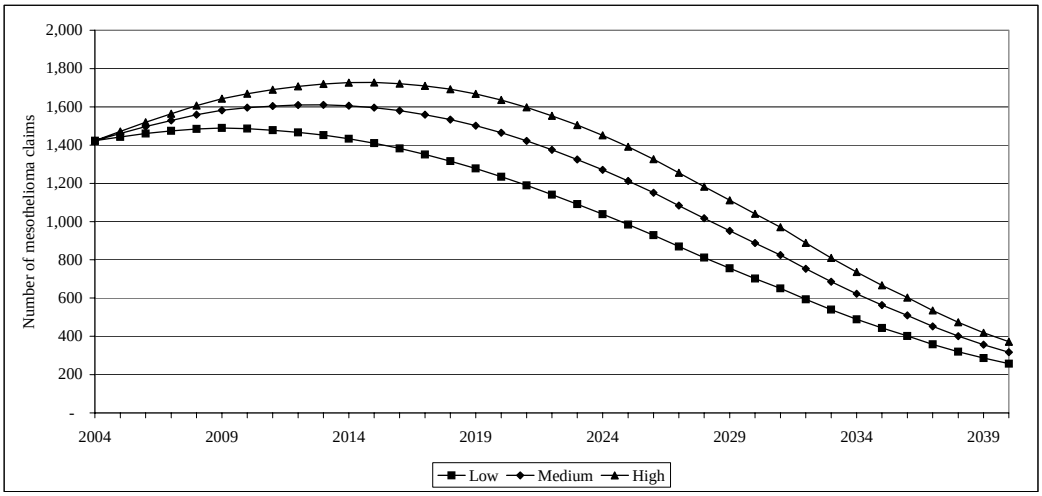
So firstly we need to come up with projected future claim numbers for each disease type. The easiest place to start is mesothelioma claims because a number of studies have been performed into the number of deaths from this disease. Details of the HSE 2003 study (and previous papers by the HSE and Peto et al) are included in section 5 and that is what we have used here as a starting point. The graph below shows the observed number of male mesothelioma deaths up to 2001 and our survey data:



Not all people with mesothelioma will make a claim though and each person may have a claim with more than one insurance company. We have therefore multiplied the claims data by a factor of 1.14 to minimise the sum of the square of the differences between the claims data and the HSE data. This gives a very reasonable fit from 1972 onwards. It is reassuring that the trend in insurance company numbers looks very similar to the trend in the HSE notifications. It is not too surprising that the number of claims looks low in the early years. There may well have been less appreciation of the ability to claim until the number of incidences started to become significant.

In section 6.3, we arrived at the figure of each claimant having claims with around 2.5 companies. If we divide the number of mesothelioma claims by 2.5 and then compare it to the number of deaths we see that only about a third of people dying of mesothelioma are making insurance claims. This seems a fairly low figure. In our projections below we have assumed there is no change in the proportion of people claiming. If this were to increase then the projections could be understated.

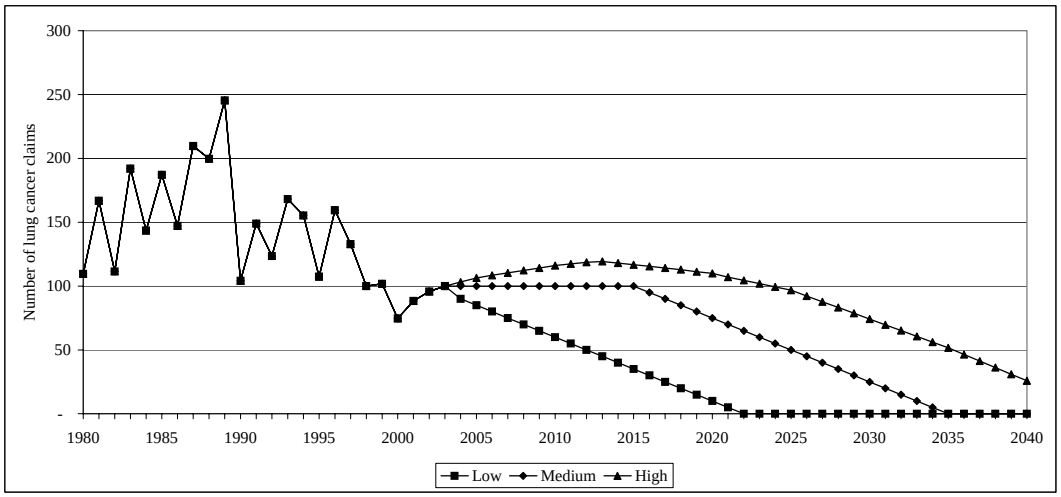
The closeness of fit gives us confidence that we can sensibly use the HSE 2003 data to project the future number of mesothelioma claims. The graph below shows a low, medium (the HSE data) and a high projection of the future number of claims:



As described in section 7.2, we have based the low and high estimates on HSE projections with slightly different "power factors", k=2 and k=3. Given the huge number of uncertainties over any projections of future numbers and costs, this seems as good a basis as any. The HSE curve does not tail off to zero but remains at about 200 deaths per year, reflecting ongoing mesothelioma claims caused by "background" exposure to asbestos. As such, these are not likely to attract any insurance claims.

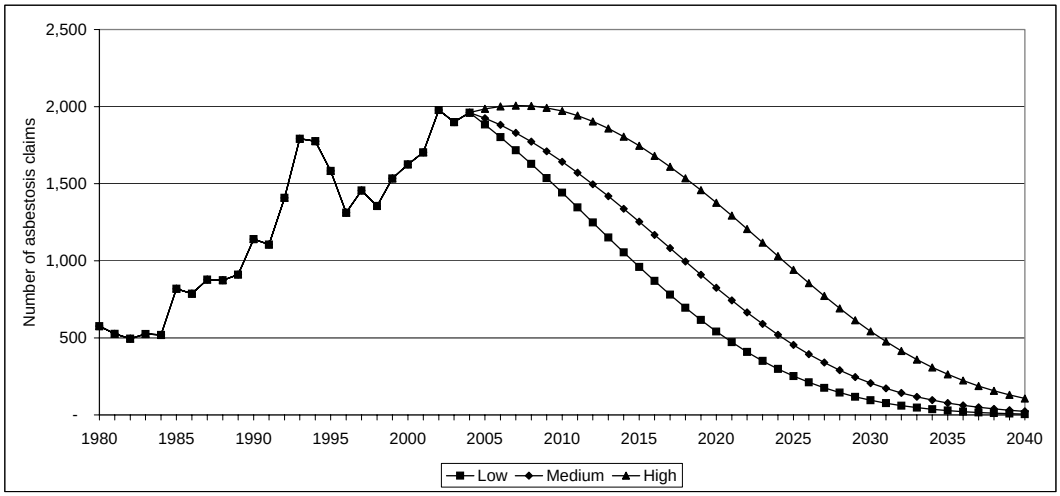
We have stopped our projections at 2040 because, well, that seems quite far enough out and the numbers of asbestos-related claims are likely to have dropped to low levels by then. As just noted, a fair number of claims by 2040 are likely to be from background environmental exposures. There is also the point that, should the current industry-sharing agreements continue up until 2040, some of the liability will relate to future periods of insurance. For example, consider someone who contracts mesothelioma in 2040 aged 80. He may have been exposed to asbestos during his working life between the ages of 20 and 60, say. The ages 40-60 happened during 2000-2020. So a pro-rata share of any asbestos claim may include a period of insurance that is currently in the future, rather than a "past" liability. We have observed that current industry sharing agreements do not attempt to pro-rate according to level of exposure, so it makes no difference whether someone was exposed during a period of more tightly controlled levels of exposure to asbestos fibres, or a more lax regime. So any possible liability for periods beyond 2040 may be more than outweighed by the fact that some of the liabilities will be picked up by insurers providing EL cover for the periods 2005-2040.

Moving on to our next disease type, the graph below shows three different curves for asbestos-related lung cancers:



The number of claims is fairly small and has been showing a downward trend over the past fifteen years. Our low projection continues that trend in a linear fashion. For the high projection we have assumed the trend is the same as the medium estimate of the mesothelioma claims (that is the latest HSE projection). Our medium projection is between the two and assumes the current number continues for a period before the numbers tail off. The main uncertainty for lung cancers relates to the possibility of lawyers targeting all lung cancer claims, most of which will be smoking-related, claiming that the condition was exacerbated by asbestos exposure. We've not explicitly considered this in the figures above, although given the clear downward trend to date, the medium and high projections represent a general worsening of the current level of claims.

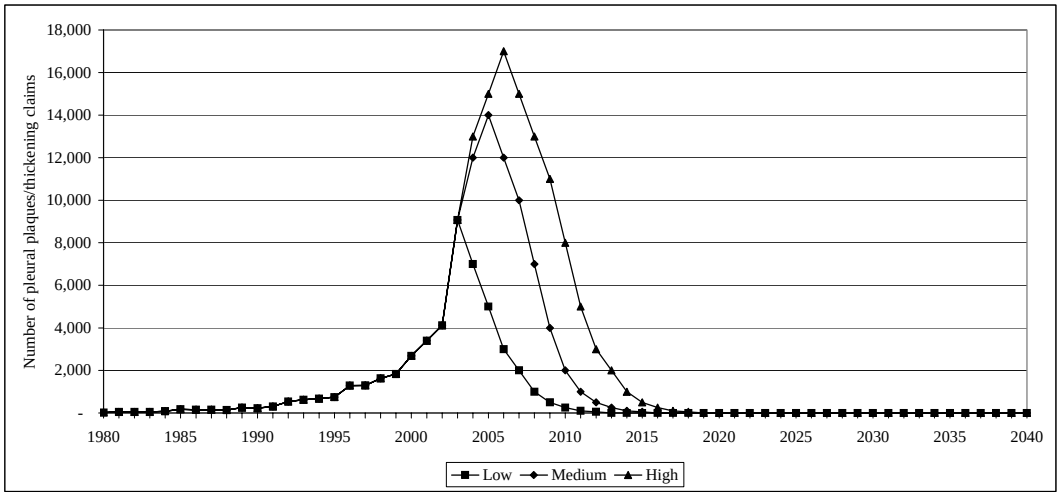
Next we move on to asbestosis claims. The graph below shows our high, medium and low curves for asbestosis claims. Unlike mesothelioma, which can allegedly be caused by a single asbestos fibre, it requires a reasonable exposure to asbestos in order to develop asbestosis (see section 2.2 on dose-related versus event-related diseases). Therefore we should expect a much earlier peak in the number of asbestosis claims because heavy exposure ceased when tighter regulations were introduced but exposure to single fibres continues.



We have based these curves on a number of variations using our HLM model. The medium curve assumes we are more or less at the peak number of asbestosis claims, which echos a number of views from our survey. The high curve assumes that asbestosis claims continue to rise until about 2008, and the low curve assumes we are already past the peak and asbestosis claims are firmly on their way down.

The survey data is a little inconvenient for asbestosis. One can see that there was a blip up in the number of claims in 1993/94. One can look at this graph with ones glass half-empty or half-full. If 1993/94 are “blips up” then the trend has continued up. Alternatively, one could consider 1996 and 1998 as “blips down”, then the trend has been fairly flat over the last ten years. Either way, we suspect that the trends have been distorted by companies joining our data set at different years during this period, which with different practices for coding claims may have distorted the data a little. In any event, inspection by eye shows the three chosen curves all look plausible future outcomes.

That just leaves pleural plaques/thickening claims. This is the most difficult area due to the extremely high numbers of claims in the past few years. The big question is whether or not insurers are about to see a blip up in claims as happened in the US. Alternatively, the test cases in the UK may nip the issue in the bud and pleural plaque claims may drop right off, both in number and in cost. As with all these projections, the reader of this paper may well take a very different view to the authors but by giving a number of possible curves we hope at least to give an idea of what the future might hold. The graph below shows our three possible curves:



There are potentially huge numbers of future claims here. This makes insurers' initiatives on reducing the payments on pleural plaques cases extremely important. It is also interesting to note the possible ramifications for other disease types. Older people tend to settle pleural plaque claims on a full and final basis. If you are aged 80 and someone offers you £25,000 now but with no chance of seeking further compensation, or £5,000 with the chance to seek further redress should an asbestos-related disease develop, its clear which option most people will plump for. This means that if there are large numbers of pleural plaque claims settled on this basis, the number of future asbestos/mesothelioma claims may actually reduce (as some of these cases will have been settled as pleural plaques with no further recourse to the courts).

Combining future claim numbers with average costs

We now need to make an assumption about future average costs. Our starting point is the "current" estimate of average costs (that is for 2003 claims) that we derived from our survey data (see sections 6.3 and 7.4). This is summarised below:

Disease type	Current average cost
Pleural plaques/thickening	£11,000
Asbestosis	£17,000
Lung cancer	£38,000
Mesothelioma	£50,000

We need to project these into the future. We have chosen to do this using low, medium and high inflation assumptions. We have based the inflation assumptions on the input from the survey and a refinement for the progression of mesothelioma (and lung cancer) average claims costs, described later in this section.

For mesothelioma and lung cancer, our base inflation assumptions are 4%, 6% and 8%. This compares to the survey data which showed inflation rates for mesothelioma claims had been 5% and 6% over the last 10 and 15 years respectively. For asbestosis and pleural plaques/thickening, the assumed rates are 1%, 3% and 5%. The central assumption ties to the observed inflation in both asbestosis and pleural claims over the last decade. Pleural plaques will only really be an issue for insurers if the number of claims takes off. If pleural plaque claims do continue to blossom, the bulk of these are likely to be settled on a provisional damages basis, hence at a lower level which would serve to keep the average cost of these claims relatively low. Given the relatively (to mesothelioma) short latency period for asbestosis, there is evidence that as asbestosis claims increasingly relate to less severe exposure to asbestos fibres, the underlying average level of claims will diminish.

The view from the survey was that inflation of asbestos claims generally was between 3% and 7%, with an average of 5%, so these assumptions seem broadly consistent with both the data for the periods to date and the consensus view of practitioners. Clearly when projecting so far into the future, the undiscounted ultimate liability is enormously sensitive to inflation assumptions.

Allowing for the increasing age of mesothelioma claimants

In order to determine the total cost of future mesothelioma claims we need an average cost model that can assess future expected average cost, taking into account court inflation, wage inflation and the increase in claimants' average ages in the future.

Simplifying the awards to mesothelioma claimants we can consider the award to be comprised of the following components:

- Fixed cost component.
- An age-related component.

The fixed cost component, as set out in the JSB guidelines (see section 4.1), comprises standard heads of damage. These would not be expected to be age-related but would increase over time due to court award inflation, which has historically been higher than wage or price inflation. We have assumed the fixed cost component to be £50,000 (in 2004 values).

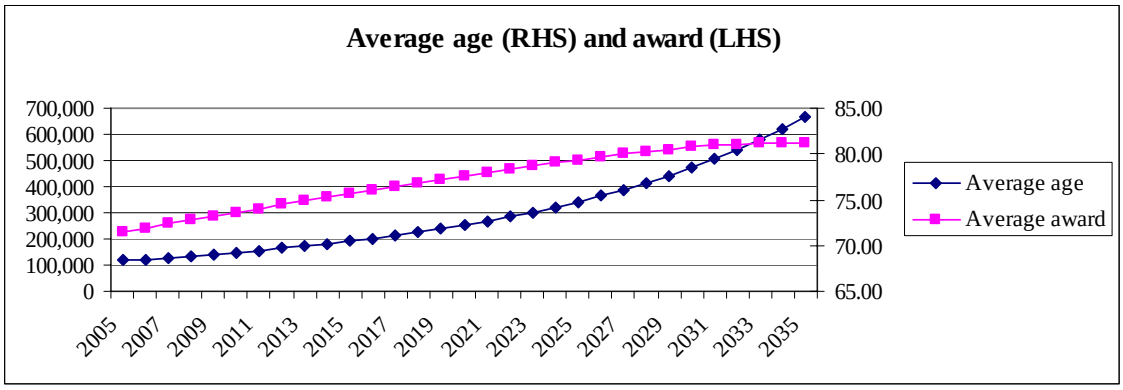
The age-related component comprises a loss of earnings component up to age 65 and a loss of pension component from age 65 to death. It is common that a deduction is made from the wage or pension amount for living expenses that would have been incurred if the claimant had lived and we have assumed this to be 50% of the wage and pension. In order to determine the age-related component, we also need to produce estimates of the wage and pension that the average claimant would expect to receive.

Anecdotal evidence states that mesothelioma claimants may expect to receive lower pay than average UK earnings (which are roughly £25,000 per year) and we have therefore taken claimants average earnings to be 80% of the UK average, or £20,000. After allowing for living expenses of 50% of earnings leaves on average £10,000 per annum for claimants under the age of 65 to retirement at age 65.

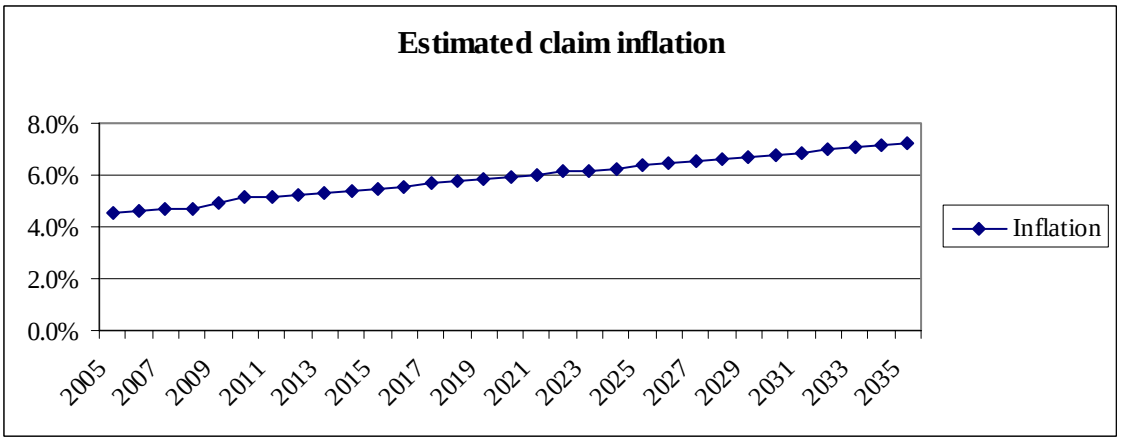
For the pension component we have assumed that pensions are 60% of pre-retirement earnings, or £12,000 per year. After allowing for living expenses of 50% of earnings, this leaves on average £6,000 per year.

These annual amounts are then applied to the age specific factors from the Ogden tables that take into account discounting at the current rate of 2.5% (specifically Ogden tables 19, 25 and 33). For future claim years we have assumed wage inflation of 4% per year.

Based on our reproduction of the HSE 2003 model we have calculated the average age of mesothelioma deaths in future years. Using this, and the average cost model above, we have then calculated an average award amount for mesothelioma in future years – see chart below:

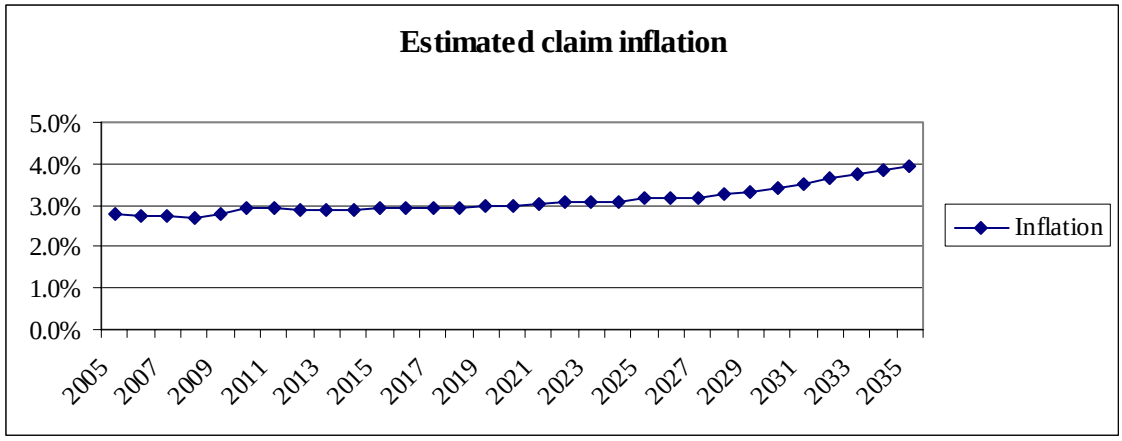


From this we have then calculated the estimated future claim inflation, see the chart below:



Thus, due in part to the higher expected inflation on the fixed component (of 8% in the case shown above corresponding to our "high" inflation assumption) the overall inflation starts lower and tends towards 8%. This effect is also due to the dampening impact of the increasing average age of claimants.

If we assume that court inflation is 4%, as per wage inflation and corresponding to our "low" inflation assumption, then the dampening impact of increasing average age of claimants can be seen below:



If we combine our high, medium and low projections of claim numbers with our high, medium and low inflation assumptions (as adjusted for the increasing age profile of mesothelioma claimants), we produce a range of insurance industry costs, described in the next section.

7.6 And the answer(s) is (are) ….

Our high, medium and low projections, for mesothelioma and non-mesothelioma claims from 2004 to 2040 are summarised below:

Mesothelioma claims

Projection of numbers	Inflation Low	Medium	High
Low	£3.0b	£3.8b	£4.9b
Medium	£3.6b	£4.4b	£5.8b
High	£4.0b	£5.0b	£6.6b

Non-mesothelioma claims

Projection of numbers	Inflation Low	Medium	High
Low	£0.7b	£0.8b	£1.0b
Medium	£1.4b	£1.6b	£1.9b
High	£2.2b	£2.7b	£3.2b

Finally, adding mesothelioma and non-mesothelioma claim types together produces the following total costs:

Total all asbestos-related claims

Projection of numbers	Inflation Low	Medium	High
Low	£3.7b	£4.6b	£5.8b
Medium	£5.0b	£6.0b	£7.7b
High	£6.2b	£7.6b	£9.8b

To get a total (past and future) cost of all asbestos claims we need to add to these figures the £1.3b cost of claims notified to the end of 2003 giving a range of costs for the total (past and future) cost to the insurance industry of £5-11b. This suggests that the industry has a lot more to pay out than it has paid so far! In true actuarial fashion, we'd like to point out that the range of numbers shown above is neither a minimum nor a maximum. We'd also like to remind people about the point made in section 7.5, that some of this cost will relate to future periods of insurance, so these costs are not entirely "past" liabilities.

Without wishing to repeat every low, medium, high combination for every disease type, the breakdown for the "medium, medium" combination is shown below:

Disease type	Number of claims	Cost of claims
Pleural plaques/thickening	63,000	£0.8b
Asbestosis	30,000	£0.7b
Lung cancers	2,000	£0.1b
Mesothelioma	43,000	£4.4b
Total	138,000	£6.0b

The range of costs from "low, low" to "high, high" for each disease type is summarised below:

Disease type	Number of claims	Cost of claims
Pleural plaques/thickening	19-104,000	£0.2-1.4b
Asbestosis	24-43,000	£0.4-1.5b
Lung cancers	1-3,000	£0.0-0.4b
Mesothelioma	38-48,000	£3.0-6.6b
Total	82-198,000	£3.7-9.8b

Discounted figures and survival ratios

The industry costs summarized on the previous page are on an undiscounted basis. To give an idea of the liabilities on a discounted basis, our high, medium and low projections are shown below discounted at 5% (roughly the yield on ten year gilts):

Total all asbestos-related claims discounted at 5%

Projection of numbers	Inflation Low	Medium	High
Low	£2.1b	£2.4b	£2.8b
Medium	£2.8b	£3.2b	£3.8b
High	£3.5b	£4.0b	£4.8b

It's not strictly realistic to combine our low, medium and high inflation assumptions with the same discount rate, but this gives an indication of the impact of discounting.

A standard way of considering the adequacy of reserves for latent claims is to consider "survival" ratios – that is, the ratio of future liabilities to the current annual rate of paying, or reporting, latent claims. The ratios for our undiscounted liabilities to the current (2003) run rate of reporting asbestos-related claims are also shown below:

Undiscounted survival ratios

Projection of numbers	Inflation Low	Medium	High
Low	18	22	28
Medium	24	29	38
High	30	37	48

Finally, the survival ratios, undiscounted and discounted, are shown by disease type for our "medium, medium" projections below:

Disease type	Survival ratios Undiscounted	Discounted
Pleural plaques/thickening	7	7
Asbestosis	22	14
Lung cancers	36	20
Mesothelioma	68	27
Total	29	16

8. LESSONS FROM THE US

8.1 Asbestos use and exposure in the US

At one time asbestos was used in the US in virtually every industrial process involving either heat or friction. Asbestos usage in the US peaked in the early 1970s and its use was virtually eliminated in the workplace by the early 1990s. The US government classified asbestos as a "strategic mineral" during World War II, when it was heavily used as part of the shipbuilding effort. See the statistics on worldwide asbestos use in section 4.8. Research suggests that the worse affected US generation were born in the 1920s, some twenty years or so before their European counterparts. Consequently, the incidence of asbestos-related diseases in the US is expected to reach its peak before it does in the UK. However, as things currently stand it is US asbestos claims that have already caused, and are expected to continue to cause, the bigger concern to the worldwide insurance industry.

Early epidemiological studies estimated that approximately 27 million Americans experienced significant occupational exposure to asbestos during the 20th century. Recent forecasts of the Manville Trust (the trust fund established to meet asbestos-related personal injury claims against Johns Manville, the largest producer of asbestos in the US between 1940 and 1970) suggest that as many as 100m Americans may have had some sort of occupational exposure to asbestos.

8.2 A brief history of US asbestos litigation

The 1973 Borel v. Fibreboard case changed the face of US asbestos litigation forever. Prior to this landmark case, individuals that contracted asbestos-related diseases as a result of occupational exposure to asbestos, claimed compensation from their employers on a no-fault basis, and these in turn claimed against their insurers under Workers' Compensation coverages. The level of awards were fairly limited. The Borel case moved the claims into the tort system as compensation was sought from the producers of asbestos and asbestos-related products, which in turn claimed redress from their insurers under Product Liability coverages.

Estimates suggest that in excess of 730,000 people have filed asbestos claims in the US since the early 1980s. Estimates of the ultimate number of claimants range from 1m to 3m. Originally the claims were filed against asbestos producers, such as Johns Manville. Claims were then filed against the manufacturers and distributors of asbestos-containing products. More recently, following the bankruptcies of these companies, they have been filed against companies that owned or operated a facility where asbestos-related products were used. Several observers have referred to this as "the search for the solvent bystander".

A typical claim cites some 60 to 70 different defendants. Because of the large number of uses of asbestos the number of potential asbestos defendants is enormous. According to a recent study by RAND (a non-profit making institution that provides research and analysis for policy and decision-making) the number of asbestos defendants named in law suits has increased from around 300 in 1982 to around 8,400 today.

The asbestos saga is the longest running mass tort litigation in US history. Awards can be large for the most severe forms of disease. For example, a typical mesothelioma claim is settled for several million dollars. In addition, claim awards for non-malignant diseases can also be sizeable from "inventory settlements" (discussed below). RAND estimated that by the end of 2002, US$70b had been spent on resolving asbestos claims. RAND also stated that at least five major companies had each spent more than $1b on asbestos litigation. A further staggering (and rather sad) statistic from the RAND study is that more than half of the expenditure to date has been spent on "frictional costs", mainly legal fees.

8.3 Deterioration in the asbestos claims environment

The number of claims filed against the Manville Trust is a good measure of asbestos claims activity. During the early 1990s the number of claims filed against the trust were fewer than 20,000 per year. This increased to 50,000 in 1996 because of a specific court decision. From 1997 to 1999 claims fell back to below 30,000 per year. This grew to almost 60,000 in 2000 and an amazing 90,000 in 2001. The number fell back to just under again 60,000 in 2002 and rose to over 100,000 in 2003. Much of this increase relates to unimpaired claimants (those with no detectable medical impairment), with claim numbers for more serious diseases tracking prior projections reasonably closely. In the early days, less than 5% of claimants showed no signs of physical impairment. This increased to around one-half by the start of the 1990s and is currently estimated at somewhere between two-thirds and three-quarters of all claimants.

One of the causes often cited for the increase has been the increased aggression shown by the US plaintiff attorneys. For example, a number of new law firms have been established by lawyers with expertise in the asbestos arena in order to seek out potential new claimants. Existing firms have also expanded to new geographical locations in order to seek out further claimants. Some of these firms have been advertising in the press and on the radio, television and internet for new claimants. Others have started X-ray screening programmes by deploying strategically positioned vans outside union meeting halls. The "no win, no fee" approach leaves potential claimants with nothing to lose. The lawyers are also successfully obtaining awards for unimpaired claims through the practice of inventory settlements. Here the lawyers bundle together a small number of claims from people with serious illnesses (such as mesothelioma) with a large number of unimpaired claimants. The lawyers force the defendant companies to settle the claims en masse or be left with the prospect of being taken to court for the more serious cases, which may cost them more in aggregate.

The surge in claim filings has led to an increase in the number of companies filing for Chapter 11 bankruptcy. There have been over seventy companies which have filed for Chapter 11 bankruptcy as a direct result of asbestos claims since the early 1980s, around thirty of which have been since 2000. Partly in response to the bankruptcy of some of the larger asbestos defendants, the lawyers have sought out more and more peripheral defendants to take their places and so the number of claims being filed against peripheral defendants has increased. According to RAND, by the late 1990s, non-traditional defendants accounted for around 60% of asbestos expenditure. If present trends continue, it is likely that most companies that manufactured a product containing even the slightest trace of asbestos will be brought into the litigation.

These bankruptcies have knock-on effects to the US economy. A 2002 study (see Stiglitz and Orszag's "The impact of asbestos liabilities on workers in bankrupt firms" in Appendix I) estimated 60,000 job losses to the end of 2002, with each worker losing between $25,000 and $50,000 in wages and 25% of the value of their "401(k)", a form of pension. The study estimated the direct cost of bankruptcies at between $850m and $1.7b. Another study ("The secondary impact of asbestos liabilities", NERA 2002) estimated that for every 10 jobs lost due to asbestos, a further 8 will also be lost in the surrounding community and that the secondary impact on the economy will be $2b.

Asbestos also has an economic impact on non-bankrupt companies. The portion of asbestos claims not covered by insurance will typically be paid from companies' retained earnings, which will reduce the capital available for investment and may cause some companies difficulties in raising capital. This in turn may lead to fewer jobs being created in the future. In fact, a 2003 study by Navigant Consulting ("Reducing the Asbestos Litigation Penalty: An Economic Benefit of Asbestos Reform Legislation") stated that failure to enact legislative reform could reduce economic growth by $2.4b, meaning that 30,770 jobs would not be created each year. Although some of the compensation paid to claimants will be reinvested in the economy in some way, it is unlikely to make up for the above reduction in investment.

Defendant companies are not the only ones to see a surge in asbestos claims in the past few years. As they receive more and more claims, they are looking for as many ways as possible to pass the increased cost on to their insurers. As a result, previously agreed coverage blocks have expanded to cover more policy years. In addition, some traditional products defendants who have nearly exhausted the limits under their products coverages, are attempting to reclassify old products claims as non-products claims. Such a reclassification has two effects. Firstly, previously exhausted products coverages are (partially) reinstated paving the way for more products claims in the future. Secondly, untapped non-products coverages become available for asbestos claims. Unlike the products coverages, the non-products coverages may not have aggregate limits, in which case it is in the defendant's best interest to reclassify as many claims as possible thus increasing insurance recoveries. Considerable uncertainty remains as how these claims will be treated for insurance and reinsurance purposes.

US carriers increased their gross asbestos reserves by at least $12b in 2003. The corresponding net increase was $8b. This followed significant increases in 2001 and 2002 and has increased the pressure on those companies that have not done so already to take similar actions. Inevitably, some of this cost will flow to London and other European carriers.

In addition, the March 2003 decision in the Norfolk & Western Railway Co v. Freeman Ayres et al case (brought under the Federal Employers Liability Act) affirmed a previous ruling that a plaintiff who suffered "future harm genuinely feared" arising from a proven injury was entitled to a pain and suffering award. This "fear of cancer" type award has the potential to increase claims costs to defendants and ultimately insurers.

8.4 Estimates of the ultimate cost of US asbestos

Considerable uncertainty surrounds the ultimate cost of US source asbestos claims, and in particular how the cost will be shared between defendants and insurers. One thing is certain, US asbestos claims represent the largest source of loss to the insurance industry to date. Current estimates are more than twice the cost of September 11 and around six times the largest insured loss from a naturally occurring catastrophe, Hurricane Andrew.

Tillinghast currently estimates that the ultimate cost of US asbestos claims will be $200b, of which approximately $80b will be paid by the defendant companies with insurers picking up the remaining $120b, split approximately equally between US and non-US insurers. Milliman estimates that the ultimate cost will be higher still at $275b, with the defendant companies paying $175b, US insurers $70b and the remaining $30b falling to non-US reinsurers. The rating agency AM Best estimates that the ultimate cost of US asbestos to the US insurance industry will be $65b.

8.5 The "FAIR" Act

There has been a lot of speculation in recent months (at the time of writing – July 2004) surrounding the possibility of federal reform in the US to attempt to resolve the asbestos problem. Most of this speculation surrounded the FAIR Act, originally introduced by Senator Orrin Hatch.

The Bill involved the establishment of a no-fault trust fund, to be funded privately by defendant companies and insurers, which would pay compensation to victims of asbestos-related diseases based on a defined set of medical criteria and award levels. There has been considerable disagreement over both the size of the fund and its allocation.

The original proposals attempted to remove claims from the tort system, thus saving significantly on frictional costs. However a sunset clause was subsequently introduced which meant that if the fund runs out of money or cannot meet its obligations, then the claims can return to the tort system.

The Bill did not have the full support of a number of key stakeholders, including organised labour, the Democratic party and the plaintiff attorneys. It also received divided support from the insurance industry. A number of insurers publicly criticised the Bill. On 22 April 2004 a vote to bring the Bill to a debate on the Senate floor failed, effectively bringing the Bill to an end in its current form. Negotiations are expected to continue although significant compromises will be needed, particularly regarding the size of the fund, before any progress is made. In any case it is unlikely that further progress will be made until after the US elections later this (2004) year.

8.6 Differences between US and UK asbestos

As discussed elsewhere in this paper the number of deaths from mesothelioma per head of population in the UK is expected to be higher than in the US. Despite the difference in size, this means roughly the same number of people will die from mesothelioma in the UK as the US. However, there are a number of significant differences between the way people are compensated for asbestos-related diseases in the UK and the US which mean that UK asbestos is not expected to cause such catastrophic losses to the insurance industry as US asbestos.

Perhaps the most significant difference is that in the UK people with no detectable medical impairment are typically not compensated, while a significant proportion of the compensation paid in the US goes to the unimpaired. There is some evidence that this is changing in the UK, as noted in the sections on pleural plaques (4.1 and 6.2) and scan vans (4.4). The practices of inventory settlements and consolidated trials, which are becoming more and more common place in the US are typically not permissible in the UK. In the US asbestos compensation cases are tried by juries, which can often lead to emotive verdicts. In the UK such cases are tried by professional judges. Another feature in the US is forum shopping. The lawyers often bring cases in states which are deemed to be "plaintiff friendly" even though there may only be a tenuous link (if any) between the case and the state. For example, at one point around 20% of all asbestos claims filed in the US were filed in Mississippi, home to less than 1% of the US population. In the UK the legal system is much more uniform and such opportunities do not exist. Punitive damages are also insurable in some US states, their UK equivalent exemplary damages are typically not insurable. Claims in the US are typically made under Products Liability coverages, those in the UK are typically made under Employers' Liability coverages and occasionally under Public Liability coverages. Another difference is that up to now the US has a more litigious and compensation-oriented culture than the UK, although there is a feeling that the difference is narrowing all the time.

9. SOME PROVOCATIONS BASED ON THE PAPER

9.1 Reforming EL insurance

The continuing spectre of asbestos epitomises the problems that the Employers' Liability ("EL") market faces in estimating future claim costs (and hence charging a fair and adequate premium for the risks to which it is exposed). The range of potential future costs of UK asbestos claims described in section 7 is very wide; yet this is 30-40 years after many of the periods of cover to which the liability relates!! If we struggle in 2004 to quantify the cost, the ability to do so in 1964 was more or less impossible. So, if some types of risk are effectively unpriceable, does this mean they are uninsurable?

The answer is of course "no", and indeed the UK has a prominent position in the world insurance market (via Lloyd's and the London Market), in part through a willingness to insure just about anything that moves and quite a few things that don't. However this willingness to insure comes with a price and in the case of EL insurance this price comes with an element of caution to reflect "the price of the unknown". Shareholders and regulatory authorities would not thank insurers for ignoring the possibility of emerging disease trends in their prices and reserves, and would probably prefer them to have an element of caution in doing so. Yet this price is passed on to the companies that purchase EL insurance. This has in part contributed to concerns being voiced about the burden on companies to pay for (compulsory) EL insurance. There are of course many other reasons that have contributed to spiralling EL claims costs (and hence premiums), such as (perhaps) an inability of insurers to reserve/price their business as well as they would like, a stream of retrospective legislative increases to claims costs and falling investment returns. But mounting long tail/latent claims and the need to allow for these going forwards have played an important part.

These observations have led to calls from some quarters, for example the ABI, to make a break between the provision of EL insurance for "immediate" liabilities, for which the compulsory insurance was originally primarily intended, and the payment of claims for longer tail/latent causes from a central fund. This would provide rather more stability and certainty for insurers and insurance purchasers alike, while still providing compensation where it is most certainly due.

Such a fund would also allow a more measured recognition of the cost of future claims. Like the State "pay as you go" funding of State pension benefits, the government does not set up a fund to pay for all future claims from the DWP compensation scheme (see section 4.7). Similarly, for the FSCS compensation in respect of Chester Street (see section 3.4), the future claims are funded by an annual levy rather than by a one-off contribution. Given the uncertainties attached to any quantification, this avoids either under- or over-provision of such liabilities, yet provides a cast-iron guarantee that funds are available when claims fall due. Such a fund is more or less what happens throughout much of Europe for asbestos claims – for example the state funding of asbestos compensation in Italy, Spain and Holland, described in section 4.10.

The number of court cases alluded to in sections 4.1-4.3 highlight another reason why, in some cases, insurance-based compensation may be less than desirable for society. Each court case represents a huge legal expenditure and each claim may attract a considerable legal cost. Not only do legal wranglings cost money, they take time, which is thoroughly undesirable for anyone seeking compensation for illness or injury. If correctly administered, a central latent disease fund may yield far more efficient compensation, both in terms of cost and speed of settlement.

Of course, the issue of the best way to deliver compensation is by no means clear-cut and there are many pro's and con's to any solution. But the delays and uncertainties for claimants behind the details in sections 4.1-4.3, and the imponderable nature of the quantification of future costs shown in section 7 (and the problems this leads to for insurance purchasers and insurers) gives strong weight to the argument for doing <u>something</u> to change the status quo.

9.2 Better data collection/disclosure

Our surveys of data and methodology (described in section 6) show some sharply differing practices in the ability of companies to record relevant information relating to asbestos claims. Given their financial significance to the insurance industry, it seems that a number of companies could usefully capture much more thorough and useful information about their asbestos exposures.

We felt the data capture element of our survey was enormously useful and provides the only public benchmark for recent developments of UK asbestos claims. As such there may be merit in repeating the exercise in years to come, so that all insurance companies can benefit from a knowledge of the aggregate industry asbestos experience.

9.3 Prescribed benchmarks/valuation methodologies

The benefit of a shared understanding of trends in asbestos claims leads on to the impenetrable nature of understanding the reserves and exposures that insurers have for asbestos-related claims. We hope the spreadsheet models we have developed will help insurers and interested parties produce and refine their own estimates of asbestos liabilities. It would be useful, though not necessarily popular with insurers, if accounting or regulatory requirements gave more guidance on disclosure of asbestos liabilities and methods of quantifying them. In the US, for example, insurers have to make detailed "APH" disclosures. With the sorts of model we have made available as part of this paper, it should not be beyond the wit of any insurer to produce liability estimates based on certain parameters/choices for their own asbestos exposures.

APPENDIX I

BIBLIOGRAPHY, PRÉCIS AND USEFUL WEBSITES

This appendix is split into the following sections:

Interested readers are welcome to contact the Chairman for copies, or web references, of any of the papers we have reviewed (copyright permitting) at: julianlowe@norwich-union.co.uk

APPENDIX I.1

PUBLICATIONS REVIEWED BY THE WORKING PARTY

The following publications have been reviewed by the Working Party as part of the process of writing this paper. Details of nearly all these papers are either included in the body of the text, or précises are given later in Appendix I.3.

"A survey of the Health problems associated with the Production and Use of High Density Chrysotile Products", J. A. Hoskins and J. H. Lange (2004)

"Amendment to the control of asbestos at work regulations 1987 and ACOP regulatory impact assessment", HSE

"APH – an update", Amy Bouskaand Darren Michaels, GIRO/CAS 2001 Joint Plenary session (2001)

"Asbestos Briefing", Willis (2003)

"Asbestos: Costs Rise for Defendants", Angelina & Biggs, National Underwriter (March 2003)

"Asbestos fibers and pleural plaques in a general autopsy population", Andrew Churg, American Journal of Pathology 109: 88-96 (1982)

"Asbestos in Europe Déjà vu", Santoni Alessandro, Emphasis 2003/01 (2003)

"Asbestos in Europe: Time to face the music", Alessandro Santoni, Laura Salvatori and Darren Michaels, GIRO Workshop 2002 (2002)

"Asbestos: Geology, Mineralogy, Mining, and Uses", Robert L.Virta, US Geological Open Survey (2002)

"Asbestos: Liabilities a special report", Equitas Report & Accounts 2001 (2002)

"Asbestos: Litigation Compensation: An Interim Report", RAND Institute for Civil Justice (2002)

"Asbestos: the current situation in Europe", Alessandro Santoni, Laura Salvatori and Darren Michaels, ASTIN (2003)

"Asbestos: The Relentless Peril", Adrian Leonard, Informa Professional Insurance, Peartree Press, ISBN/184311/2841 (2003)

"Asbestos: too hot to handle for European insurers", Fitch, www.fitchratings.com/corporate/reports/report.cfm?rpt_id=169582 (2003)

"Asbestosis: A marker for the Increased Risk of Lung Cancer Among Workers Exposed to Asbestos", William Weiss, Chest Feb 1999 (1999)

"Cancer Mortality among Workers Exposed to Amphibole-free Chrysotile Asbestos", Yano, Wang, Wang and Lan, Am J Epid, 154(6): 538-543 (2001)

"Chronic Disease Modelling", Kenneth Manton and Eric Stallard, Mathematics in Medicine No. 2, Griffin, ISBN 0-85264-286-5 (1988)

"Continuing Increase in Mesothelioma Mortality in Britain", Peto et al, The Lancet Vol 345, p535-539 (1995)

"Employers' Liability Insurance GIRO 2000 Working Party", Jefferson Gibbs, Nathan Williams et al (2000)

"European Mesothelioma Epidemic", Peto et al, British Journal of Cancer Vol 79 (304), p666-672 (1999)

"Facts and Figures about Asbestos Litigation – Highlights from the New RAND Study", RAND presentation (2003)

"Historical Statistics for Mineral and Material Commodities in the United States", David A. Buckingham and Robert L. Virta, U.S. Geological Survey Open-File Report, (2002)

"Magic Mineral to Killer Dust", Geoffrey Tweedale, Oxford University Press (2000)

"Measurement of Asbestos Bodily Injury Liabilities", Susan L. Cross & John P. Doucette, CAS (1994)

"Mechanisms in the Pathogenesis of Asbestosis and Silicosis", Brooke T. Mossman and Andrew Churg, American Journal of Respiratory and Critical Care Medicine, Volume 157, Number 5 (1998)

"Mesothelioma Mortality in Great Britain: Estimating the Future Burden", HSE (2003)

"Mesothelioma Area Statistics: Counties (Including Local Authorities) and Unitary Authorities in Great Britain 1986 – 2000", HSE (2003)

"Mesothelioma Area Statistics: County Districts in Great Britain 1976 – 1991", HSE

"Mesothelioma Occupation Statistics: For male deaths aged 16-74 in England and Wales, 1979-1995 (excluding 1981)", HSE (1999)

"Overview of Asbestos Issues and Trends", American Academy of Actuaries Public Policy Monograph (2001)

"Product Liability Forecasting for Asbestos-related Personal Injury Claims: A Multidisciplinary approach", Eric Stallard, National Institute on Ageing Conference: Centre for Demographic Studies, Duke University (2001)

"Radical surgery for mesothelioma", Peto et al, British Medical Journal Vol 328 p 237-238 (2004)

"Sizing Up Asbestos Exposure", Angelina & Biggs, Emphasis 2001/03 (2001)

"T&N Ltd, T&N Ltd: An Update, Implications of T&N's Administration Order, T&N Creditors Meet in London, T&N: An Insurance Fiasco", Laurie Kazan-Allen (2001-02)

"The Energiser Bunny of Toxic Torts", Mike Angelina, Emphasis 2001/01 (2001)

"The Quantitative Risks of Mesothelioma and Lung Cancer in Relation to Asbestos Exposure", John T. Hodgson and Andrew Darnton, Annals of Occupational Hygiene Vol.44, No.8, pp565-601 (2000)

"UK and European asbestos", Darren Michaels and Anthony Williams, GIRO 2003 workshop (2003)

"US Geological Survey Minerals Yearbook – 2002", Robert L. Virta, Chapter on Asbestos.

"Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000", Robert L. Virta, U.S Department of the Interior US. Geological Survey (2003)

APPENDIX I.2

PUBLICATIONS NOT REVIEWED BY THE WORKING PARTY

"Asbestos: A Chronology of its Origins and Health Effects", R Murray, British Journal of Industrial Medicine 47 (1990)

"Asbestos and Disease", I J Selikoff & D H K Lee, New York: Academic Press (1978)

"Asbestos: Medical and Legal Aspects", B I Castleman, NJ: Aspen Law and Business, 4th edition (1996)

"Asbestos Tissue Burden Study on Human Malignant Mesothelioma", Suzuki & Yuen Industrial Health, 39:150-160 (2001)

"Asbestosis in Great Britain", J C McVittie, Annals of the New York Academy of Sciences 132 (1965)

"Chrysotile, tremolite and carcinogenicity", J McDonald and A McDonald, Ann Occup Hyg 1997;41:699-705, (1997)

"Chrysotile, tremolite and malignant mesothelioma in man", A Churg, Chest 1988;93:621-8 (1988)

"Cohort Analysis of Changes in Incidence of Bronchial Carcinoma in a Textile Asbestos Factory", J F Knox, R S Doll & I D Hill, Annals of the New York Academy of Sciences 132 (Dec 1965)

"Compensation for Industrial Disease", N J Wikeley, Aldershot: Dartmouth Publishing, (1993)

"Dose-Response Relationships for Asbestos-Related Disease: Implications for Hygiene Standards. Part II: Mortality", J Peto, Annals of the New York Academy of Sciences 330 (1979)

"Lung asbestos content in long-term residents of a chrysotile mining town", A Churg, Am Rev Respir Dis 1986;134:125-127 (1986)

"Mesothelioma trends in the United States: an update based on surveillance, epidemiology, and the end results program data for 1973 through 2003", B Price and A Ware, Am J Epidemiol 2004;159:107-112 (2004)

"Mortality from Lung Cancer in Asbestos Workers", R Doll, British Journal of Medicine 12 (1955)

"Mortality from Lung Cancer and Other Causes Among Workers in an Asbestos Textile Factory", J F Knox, S Holmes, R S Doll & I D Hill, British Journal of Industrial Medicine 25 (1968)

"Old Trades/New Trades – Shipbuilding and Ship-Repair by Dr J F Wollaston", Journal of Occupational Medicine 1992 Volume 42 No 4

"Pulmonary Asbestosis: Its Clinical, Radiological and Pathological Features, and Associated Risk of Tuberculous Infection", P Ellman, Journal of Industrial Medicine 15 (July 1933)

"Reducing the asbestos litigation penalty: an economic benefit of asbestos reform legislation", Navigant Consulting Group (2003)

"Relationship of Mortality to Measures of Environmental Pollution in an Asbestos Textile Factory", J Peto, R Doll, C Herman, W Binns, R Clayton & T Goffe, Annals of Occupational Hygiene 29 (1985)

"The Hygiene Standard for Chrysotile Asbestos", J Peto, Lancet (4 Mar 1978)

"The impact of asbestos liabilities on workers in bankrupt firms", Joseph Stiglitz, Jonathan Orszag and Peter Orszag (2002)

"The interaction of asbestos and smoking in lung cancer", F D K Liddell, Ann Occup Hyg 2001;45(5):341-356 (2001)

"The Occurrence of Pulmonary Fibrosis and Other Pulmonary Affections in Asbestos Workers", E R A Merewether, Journal of Industrial Hygiene 12 (May/June 1930)

"The secondary impact of asbestos liabilities", NERA (2002)

"There are other non-asbestos causes of mesothelioma", K J H Lange, Letter in the American Journal of Epidemiology (2004)

APPENDIX I.3

PRÉCIS OF SOME OF THE PAPERS

Several of the papers we have received are described in detail in the body of the text (for example the various Peto/HSE papers in section 5 and some of the Virta papers in section 4). Quick summaries of some of the other papers are given below.

"A survey of the Health problems associated with the Production and Use of High Density Chrysotile Products", J. A. Hoskins and J. H. Lange

This paper is concerned solely with high density chrysotile products, their manufacture and use and the health risks that have been associated with these activities. The paper concludes that it is difficult to demonstrate any health risks.

The paper gives a brief history of the dangers associated with asbestos, and highlights the difference between chrysotile and the more dangerous amphibole types of asbestos. The paper draws on many scientific studies to show that in the case of mesothelioma there is now a solid body of opinion that says that exposure to pure chrysotile does not cause the disease.

The paper describes the main use of chrysotile in the manufacture of asbestos cement products, friction products, floor tiles, mastic and decorative coverings (Artex) and references scientific studies that relate to these products.

This (toxicity of chrysotile) is clearly a contentious issue. We contrast the views in this paper with a couple of counter-views in section 2.5.

"Asbestos fibers and pleural plaques in a general autopsy population", Churg

This paper describes work by Churg based on autopsies of those with pleural plaques and a control group from the general population. The study concluded that:

- About half of the general population developed pleural plaques due to asbestos exposure but that the etiology of the other half was unclear.
- The presence of pleural plaques is linked to commercial amphibole asbestos but not to chrysotile fibres.
- Asbestos lesions are not simply related to the number of fibres in the lung but to more complex mineralogic parameters (the total number of fibres was broadly the same in the pleural plaques group and the control group).

"Asbestos: Geology, Mineralogy, Mining, and Uses", Robert L.Virta

A comprehensive source of information on asbestos covering both scientific and commercial perspectives. The sections on geology and crystalline structure of asbestos fibres as well as their physical and chemical properties are interesting but scientifically intensive. Mining technologies and fibre classification and testing methods are also discussed in technical detail. Among the less specialised content are brief descriptions of the early history of asbestos and its modern industrial applications and centres for worldwide production. The paper also touches on the dangers of asbestos exposure and worldwide regulatory developments to control its use as well as the advances made in finding asbestos substitutes.

"Asbestos: Liabilities a special report", Equitas Report & Accounts

This is a short report looking at the factors contributing to the deterioration in asbestos claims experience that led Equitas to strengthen its US asbestos reserves in 2001.

The report provides some background on:

- Industrial use of asbestos and asbestos-related medical conditions.
- A synopsis of asbestos litigation history in the US and the implications for the insurance industry.
- Defendants' past failed efforts to solve the asbestos problem through federal legislation and other initiatives.

The report highlights the following problems as the main drivers for increasing the number of claims filed and their cost over the preceding two years:

- Physically unimpaired claimants receiving compensation.
- Growing economic and political power of plaintiff attorneys as they increase their wealth through the contingency fee system.
- Inventory settlements.
- Active 'recruitment' of potential claimants by law firms.
- Bankruptcy of a further eight defendants increasing the strain on remaining solvent defendants.

Broad commentary is also provided on:

- The adequacy of the Equitas asbestos reserves and their development over the last few years.
- Reserving methodology and its inherent uncertainties.
- A number of claim handling initiatives designed to control the global problem of rising asbestos claims, for example documentation requirements.

"Asbestos: The Relentless Peril", Adrian Leonard

This provides:

- An in-depth analysis of the thirty year development of asbestos claims in the US.
- Details where the costs have fallen.
- An idea of what lies ahead for US asbestos claimants, dependants and insurers.

The study also looks at reserving practices in the US and in the London market, as well as analysing the potential for future asbestos claims in the UK and Europe.

The study explores the questions:

- How will asbestos continue to impact run-off companies?
- Is the end near, or will the claims continue to flow?
- What is the potential for relief to be offered by pending Federal asbestos legislation in the US?
- How will contributions to any resulting fund be calculated? Who will pay?

"Asbestosis: A marker for the Increased Risk of Lung Cancer Among Workers Exposed to Asbestos", William Weiss

This paper examines the hypothesis that excess lung cancer risk in worker cohorts exposed to asbestos occurs only among those with asbestosis. A variety of cohort studies are used in support and it is concluded that asbestosis is a better predictor of excess lung cancer risk than measures of exposure.

Firstly, cohort studies that directly address the issue are reviewed. These include a study of living German asbestos workers in 1951-1959. For this study, the lung cancer incidence rate per 10,000 is reported – it is markedly higher for those workers recorded as having asbestosis. The next study considered looks at standardised mortality ratios for lung cancer in a cohort of asbestos workers in Dresden between 1959-1964. The risk of lung cancer for each gender is elevated only in workers with asbestosis. Similar links between asbestosis and lung cancer are also made in studies involving workers in a London textile plant, Quebec miners and millers and workers employed in asbestos cement plants.

Additional evidence for the hypothesis is given by looking at further cohort studies. The first group of studies looks at lung cancer risk in cohorts with no deaths due to asbestosis. If there is a close association between asbestosis and lung cancer then it is proposed that cohorts with no deaths from asbestosis would show no excess risk of lung cancer. The seven studies regarded endorse this. Six studies are examined that deduce that workers with pleural plaques, but no asbestosis, have no increased risk of lung cancer and a further 38 cohorts are analysed in which the cumulative asbestosis mortality rate is found to be an excellent predictor of the cumulative excess lung cancer mortality rate.

Weiss addresses the implications of cigarette smoking in relation to lung cancer. He also considers the opposing argument that since both the risk of asbestosis and lung cancer are exposure related, the diseases are associated but attributable lung cancer is not dependent on asbestosis.

In conclusion it is proposed that asbestosis could be used as a reliable marker for an increased risk of lung cancer, particularly when courts are awarding compensation to asbestos-exposed workers. In a similar vein, it is noted that pleural plaques are not associated with an increased risk of lung cancer.

"Historical statistics for Mineral and Material Commodities in the United States", David A. Buckingham and Robert L. Virta

Not hugely useful for the purpose of projecting numbers of asbestos-related claims. It's a reference to an online database containing statistics (mostly covered by the preceding reports) in respect of US production, import/export, apparent consumption and unit value for a large number of minerals and commodities.

"Magic Mineral to Killer Dust", Geoffrey Tweedale

An in-depth study of the history of the UK asbestos health problem in the context of one of the world's leading asbestos producers: Turner & Newall. Making use of T&N's own vast company archive released into the public domain as a result of American litigation, the book offers valuable insight into the extent of the asbestos tragedy. Although the scale of human suffering described in this book makes it difficult to remain objective, the author manages to examine a wide range of issues in a way that is informative and logical. The roles of industrialists, doctors, factory inspectors and trade unions as well as the failure of workmen's compensation and government regulation to remedy the situation are all placed under close scrutiny.

As well as being an interesting, if very sad, read, the book also contains a wealth of further bibliographical references.

Geoffrey Tweedale is a Senior Research Fellow in the Centre for Business History, Manchester Metropolitan University. From 1983 he worked as a Researcher and teacher in the History of Business, Technology, and Medicine, and more recently has held the position of Research Fellow at both Manchester and Sheffield universities.

"Measurement of Asbestos Bodily Injury Liabilities", Susan L. Cross & John P. Doucette

This paper was presented to the Casualty Actuarial Society in 1994 and is regarded as the groundbreaking paper in conducting an exposure-based analysis of US source asbestos liabilities. The paper presents a formalised approach to projecting an insurer's or reinsurer's potential asbestos bodily injury ("BI") liabilities through an analysis of exposed policy limits. The model projects the ground-up aggregate liabilities of individual assureds, allocates the liabilities to policy years and applies the coverage written in each year by the insurer or reinsurer under consideration.

While the asbestos claims environment has changed out of all recognition since the paper was written, the techniques described in the paper are still fundamental to exposure-based analyses today.

The paper describes a five-tier system for categorising defendants according to the nature of their exposure to asbestos BI claims. The approach discussed in the paper is to select a sample group of assureds based on the tier system for the model analysis and then to extrapolate the results to include all assureds.

The paper also discusses the steps necessary to restate reinsurance policies to be relative to the first dollar of loss. This enables the same fundamental modelling approach to be applied to reinsurance policies as for direct insurance policies. Detailed worked examples are provided in the attached exhibits.

The paper only considers asbestos-related BI claims and does not consider property damage claims arising from asbestos exposures.

"Overview of Asbestos Issues and Trends", American Academy of Actuaries Public Policy Monograph

This monograph was released by the American Academy of Actuaries ("AAA") Mass Torts Work Group in December 2001. Its purpose was to provide a brief history of personal injury claims arising out of asbestos exposure to aid understanding of current issues arising out of these claims. The intended audience included those who may become involved with proposed public policy responses to these issues.

The monograph provides an excellent summary of the history of asbestos usage and the health risks associated with asbestos exposure. A comprehensive summary of the personal injury claim situation at the time of preparing the monograph is also provided. There is also a detailed discussion of the concerns of the major parties involved in US asbestos litigation.

The Exhibits and Reference Lists to the monograph are a particularly useful reference source, and include a comprehensive list of prior efforts to solve the asbestos problem, a listing of epidemiological studies and a list of those defendants declaring bankruptcy as a result of asbestos claims.

The monograph provides a comprehensive yet concise overview of the asbestos problem in the US and is of particular interest to those who are not familiar with the background behind the problem.

The monograph is currently being updated. In the meantime, on 24 March 2004, the AAA Mass Torts Subcommittee wrote a letter to Senator Bill Frist in connection with the proposed asbestos-related reforms being considered in the 108th Congress (see section 8).

"U.S Geological Survey Minerals Yearbook – 2002", Robert L. Virta, Chapter on Asbestos

An annually updated publication containing salient statistics and commentary on the value and quantity of production, trade and consumption of various minerals and commodities over the last few years. The focus is largely US but some worldwide statistics are also included. In addition, the discussion covers recent developments in relevant legislation and government programmes.

"Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000", Robert L. Virta

The paper consolidates data from a wide range of sources to produce a detailed analysis of the worldwide trends in production and consumption of asbestos over the last century. Supply, demand and trade are discussed in turn for each of the major asbestos-producing countries. A separate section is devoted to worldwide consumption of asbestos and the factors that shaped its development. The paper highlights the fact that the production and use of asbestos still continues in a number of countries despite the well publicised dangers. The accompanying tables and appendices contain a wealth of statistics illustrating the estimated levels of asbestos production and consumption by period and geographical area. We have drawn heavily on this publication in writing section 4.8, which includes a number of extracts from the paper.

APPENDIX I.4

USEFUL WEB SITE REFERENCES

It is remarkably easy to find a wealth of information about asbestos using a web search engine and the word "asbestos". However to give people a head start we have described a range of web sites relating to asbestos below.

Asbestos Lung Disease A primer for patients, physicians and lawyers

www.mtsinai.org/pulmonary/Asbestos/asbestos-questions.htm

This web site is produced by the Mt. Sinai Hospital, Ohio. It has a medical bias but includes a wealth of straightforward descriptions of asbestos, references to relevant papers on asbestos and further web site links.

British Asbestos Newsletter

www.lkaz.demon.co.uk

Laurie Kazan Allen provides quarterly newsletters to anyone interested in British asbestos issues, which are available on this web site. It is a rich source of references to asbestos-related publications. Laurie Kazan Allen is also the co-ordinator of the International Ban Asbestos Secretariat ("IBAS"), see the further web reference below.

The Control of Asbestos at Work Regulations (CAWR) 2002

http://www.hmso.gov.uk/si/si2002/20022675.htm

A copy of the latest CAWR regulations.

Davies Arnold Cooper

www.dac.co.uk

One of the many legal firms that specialise in asbestos litigation (they were involved in the Cape case, for example; see section 4.2). They publish periodic articles relating to asbestos on their web site (for example a survey of how many businesses may be in breach of the new CAWR regulations).

Federal Mogul website

www.federal-mogul.com

Federal Mogul bought T&N (see section 4.3) the UK's largest asbestos company. As a result it went into Chapter 11 voluntary reorganisation. Its company statements include much useful background on asbestos exposure.

HSE

www.hse.gov.uk/ria

This site includes a number of very useful references to regulatory assessments regarding asbestos. The wider HSE site also contains a wide range of information on the various HSE papers and available statistics.

International Ban Asbestos Secretariat ("IBAS")

www.btinternet.com/~ibas/index.htm

A wealth of articles about worldwide asbestos matters, co-ordinated by Laurie Kazan Allen as noted above. IBAS is dedicated to the eradication of the continuing use of asbestos and minimisation of dangers from asbestos products already within society. As the name suggests, IBAS is firmly in the "anti" camp over questions such as the safety, or otherwise, of chrysotile.

The Asbestos Institute

www.chrysotile.com

Whereas sites such as IBAS (above) are firmly "anti" asbestos, this site represents a more "pro" view, putting forward details of studies that show controlled use of chrysotile is harmless (and flagging the health risks of asbestos substitutes).

The London Hazards Centre

www.lhc.org.uk/members/pubs/books/asbestos/asb_toc.htm

The web link above refers to "The Asbestos Hazards Handbook", which is itself a link to many other asbestos-related sites.

The National Center for Health Statistics

www.cdc.gov/nchs

This is a US site with hundreds of studies in respect of asbestos-related and every other (!) disease. Most papers are available to download free as a "pdf" file. The site has an effective search facility.

TUC

www.tuc.org.uk/h_and_s/

Contains links to other sites and copies of various TUC articles and reports.

US Geological Survey website

http://minerals.er.usgs.gove/minerals/pubs/commodity/asbestos

This web site includes various papers and annual updates of asbestos consumption and production (see section 4.8).

APPENDIX II

WORLDWIDE ASBESTOS CONSUMPTION/PRODUCTION

Source: Slides from Dr Antti Tossavainen (Finnish Institute of Occupational Health)

2000 production (000 Tons)	
Russia	700
China	450
Canada	335
Kazakhstan	180
Brazil	170
Zimbabwe	130
Greece	35
South Africa	20
Swaziland	25
India	23
Japan	18
Colombia	10
US	7
Bulgaria	7
Other	20
Malaysia	18
Spain	15.4
South Africa	12.5
Colombia	12.2
Zimbabwe	10
Other	200

2000 consumption (000 Tons)	
Russia	447
China	410
Brazil	182
India	125
Thailand	121
Japan	98.6
Vietnam	62.5
Ukraine	60
Indonesia	54.9
Kazakhstan	32.4
South Korea	29
Mexico	27
Belorussia	25.2
Iran	20
Turkey	19.5
Kyrgyzstan	17.3
US	15
Nigeria	12.5
Romania	10.2
Canada	4.8

APPENDIX III

ABI MESTHELIOMA GUIDELINES

Guidelines For Apportioning and Handling Employers' Liability Mesothelioma Claims

Contents

Overriding Principles

(I) Joint & Several Liability

The decision of the House of Lords in *Fairchild v Glenhaven & others* imposes joint and several liability on employers and by analogy their insurers in employers' liability mesothelioma claims. Notwithstanding a claimant's inability to identify the employer whose breach of duty gave rise to the exposure which induced mesothelioma, the House of Lords held that a mesothelioma claimant was entitled to be compensated in full by any single employer responsible for a period of culpable exposure. The House of Lords decided that the need for redress to employees outweighs any unfairness that joint and several liability for the full claim might give rise to as between employers.

(II) Time-based Apportionment

Fairchild did not give guidance on how this joint and several liability to pay compensation in full should be apportioned among employers (and their insurers). It is considered that the most equitable and pragmatic way to do so is first in proportion to the Periods of Culpable Exposure to asbestos by employers (this reflects insurance claims handling practice in long tail disease claims generally) and then in proportion to the periods of insurance coverage, subject always to the claim being met in full.

(III) Prompt Settlement followed by Contribution

It is in all parties' interests that apportionment be agreed quickly by employers and their insurers. This will avoid the need for further costly litigation which not only risks keeping claimants out of the full compensation to which they are entitled under *Fairchild*, but also adversely impacts on the image of employers and their insurers generally. These Guidelines on apportionment set out clearly who pays the claim to the employee and how they calculate and collect contributions from others involved. They also provide a mechanism for doing this when there are insolvent insurers involved in the claim, and as far as possible seek to do the same where solvent employers are involved who are uninsured, self-insured or unable to trace their insurers. In so doing it is intended that the Guidelines will avoid disputes and litigation between employers and insurers responsible for different Periods of Culpable Exposure and hence reduce overall handling costs.

Guidelines For Apportioning and Handling Employers' Liability Mesothelioma Claims

1. Context

1.1 Fundamental Aspects of Joint & Several Liability

(i) There are three fundamental aspects to the joint and several liability on which these Guidelines are based. They are set out below and are the consequences of applying the joint and several liability resulting from *Fairchild* as between liable employer(s) and their insurer(s). These Guidelines cannot operate effectively unless Participants accept these fundamentals:

- *First, that unless the law as set out in* Fairchild *is modified, in mesothelioma claims each employer is legally liable to pay all of the claimant's damages, regardless of the period over which he exposed the claimant to asbestos.*

- *Second, legal liability to pay all of the damages requires payment in full by traced employers for periods of culpable exposure to asbestos for which no employer can be traced. In* Fairchild, *Lord Bingham recognised this was inequitable, but clearly stated (below) that this inequity was outweighed by the public policy requirement for full compensation.*

- *Third, the legal liability of employers' liability insurers in these claims reflects the employers' legal liability. Therefore each insurer is legally liable for the totality of the claim, regardless of the period over which cover was actually provided.*

(ii) These Guidelines will apply where there are insolvent employers and/or insolvent insurers involved. These Guidelines provide for those insolvent insurers' estates to participate in the apportionment of mesothelioma claims on almost exactly the same basis as solvent insurers (although the insolvent insurers will not fund payment of the claims themselves). In such circumstances claimants or employers may be entitled to protection from Financial Services Compensation Scheme (FSCS). A summary of FSCS's position is set out at Appendix 1.

1.2 Legal Background

(i) It was the clear intention of the House of Lords in *Fairchild* that in employers' liability mesothelioma claims in which the traditional test of causation applied by the courts (i.e. on the balance of probability X caused Y's loss) cannot be satisfied in respect of any one of several employers, the balance of natural justice and public policy weighs in favour of compensating the claimant in full and lies against the duty-breaking employers, and by inference their insurers. Giving the leading opinion, Lord Bingham said (emphasis added):

"It can properly be said to be unjust to impose liability on a party who has not been shown, even on a balance of probabilities, to have caused the damage complained of.

On the other hand, there is a strong policy argument in favour of compensating those who have suffered grave harm, at the expense of their employers who owed them a duty to protect them against that very harm and failed to do so, when the harm can only have been caused by breach of that duty and when science does not permit the victim accurately to attribute, as between several employers, the precise responsibility for the harm he has suffered.

I am of opinion that such injustice as may be involved in imposing liability on a duty-breaking employer in these circumstances is heavily outweighed by the injustice of denying redress to a victim. Were the law otherwise, an employer exposing his employee to asbestos dust could obtain complete immunity against mesothelioma (but not asbestosis) claims by employing only those who had previously been exposed to excessive quantities of asbestos dust. Such a result would reflect no credit on the law."

(ii) The House of Lords also found that multiple employers in mesothelioma claims were jointly and severally liable for the full amount of the damages. Lord Bingham stated:

"C [the claimant] *is entitled to recover against both A and B* [the employers] *… Policy considerations weigh in favour of such a conclusion. It is a conclusion which follows even if either A or B is not before the court.*

It was not suggested in argument that C's entitlement against either A or B should be for any sum less than the full compensation to which C is entitled, although A and B could of course seek contribution against each other or any other employer liable in respect of the same damage in the ordinary way. No argument on apportionment was addressed to the House."

(iii) These Guidelines set out how apportionment is to be dealt with as between employers and employers' liability insurers and FSCS, when involved in these claims. The Guidelines seek to establish "best practice" for the handling of these claims in order to control the process of settlement, minimise costs and facilitate prompt payment of claims.

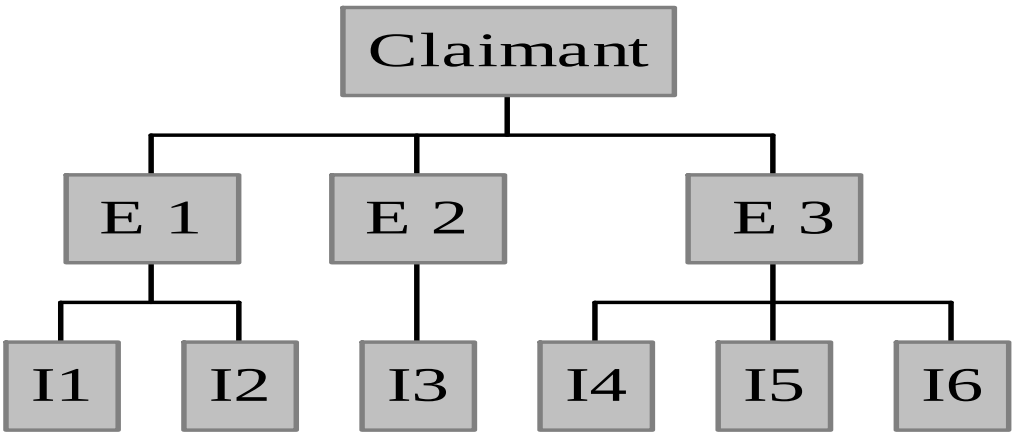
1.3 Definitions

Participant	Any person, company or body that is under an obligation to settle or make a contribution to or handle a mesothelioma claim brought by a claimant, e.g. an employer (whether public or private sector), an insurer (whether solvent or otherwise) or FSCS.
Period of Culpable Exposure	The period (or periods) during which a claimant was exposed to asbestos by a single employer for which that employer is liable.
Gap	Any part of a Period of Culpable Exposure for which the employer is self-insured, uninsured or unable to trace insurance.
Total Culpable Exposure	The total of the Periods of Culpable Exposure, ignoring Void Periods.
Void Period	A Period of Culpable Exposure for which no solvent employer can be identified and for which no insurer can be traced.
Lead Insurer / Handler	The Participant who has the largest proportion of a Period of Culpable Exposure for a single employer.
Co-ordinator	The Lead Insurer / Handler of the employer with the longest Period of Culpable Exposure, or if there is a Participant with a greater financial interest, that Participant may elect to be the Co-ordinator.
ABI	The Association of British Insurers.
FSCS	The Financial Services Compensation Scheme Limited, established under section 213 of the Financial Services & Markets Act 2000.
FSCS Shortfall	The unprotected portion, amounting to 10% of a claim or part of a claim, where that claim, or that part of the claim, is protected by FSCS to the extent of 90% only.

Pay and Be Paid	The process by which: (i) The Co-ordinator is to pay the claimant's damages and the claimant's costs in full as soon as possible and without first being put in funds by other Participants, and (ii) The Lead Insurer/Handler is to pay to the Co-ordinator upon its request, the proportion of the claimant's damages and the claimant's costs attributable to the employer with whose liability that Lead Insurer/Handler is dealing, without first being put in funds by the other Participants for that employer. In either case this process is subject to Parallel Payment.
Parallel Payment	Where there is any part of a Period of Culpable Exposure with an insolvent insurer which has subsequently become insolvent, contributions for this Period of Culpable Exposure may be due from the employer (if solvent), the insolvent insurer and the FSCS. Parallel Payment is the process by which these contributions are paid separately.
Dispute	Any dispute or difference which arises or occurs between Participants in relation to any thing or matter arising out of or in connection with a claim being handled under these Guidelines.

1.4 Framework for Apportionment

(i) A multiple employer mesothelioma claim may be represented in the diagram below, where E1 is the first employer, E2 the second etc. The insurers of the employers are shown as I1, I2 etc.



(ii) The process set out in these Guidelines involves the early identification of a Lead Insurer / Handler for each employer.

(iii) Under these Guidelines, as quickly as possible, the Lead Insurer / Handler of each employer establishes contact with the Lead Insurer / Handler of the other employers and they identify the Co-ordinator who will be responsible for the overall management of the claim.

(iv) The aim of these Guidelines is to apportion, as equitably as possible, the financial liability for the claim as between the employers, their insurers and the FSCS. An agreed mechanism for apportionment will allow for early payment of compensation to claimants and subsequent collection of contributions. A Co-ordinator will be identified and will (unless insolvent) Pay and Be Paid - settling the claim first and using all available information to recover contributions from the Lead Insurer(s) / Handler(s), who will themselves (unless insolvent) Pay and Be Paid in the same way, subject to Parallel Payment.

(v) The starting point for apportionment is to do so in proportion to the Period(s) of Culpable Exposure to asbestos. This will achieve the fairest horizontal spreading of the liability over time. It seeks to avoid a vertical stacking of all the liability on any one employer or insurer.

2 Objectives

2.1 The overall aim of these Guidelines is to establish an agreed process such that Participants can be satisfied that best practice standards have been adopted and that these claims have been settled and apportioned on a fair and equitable basis.

2.2 The objectives are to achieve early settlement and payment in full of the claimant’s damages and the claimant's costs and a quick and effective means of calculating and collecting contributions from Participants by:

(i) establishing quickly the identity of the Co-ordinator

(ii) establishing quickly an apportionment schedule of Participants

(iii) establishing a common “best practice” investigation standard for validating the claim and for using all available information about employment history and insurance history to identify as many Participants as possible

(iv) maximising the recovery of contributions to the claimant’s damages and claimant’s costs from Participants

(v) facilitating effective communication between Participants

(vi)maximising the damages payable to the claimant as a proportion of the total cost of a claim.

3 Scope

3.1 The scope of the Guidelines covers employers' liability mesothelioma claims involving more than one Participant. The scope is wider than the decision in *Fairchild*. The intention of the Guidelines is to control the conduct of claims that have not been settled before 1 November 2003. The Guidelines are intended to establish an agreed mechanism for sharing such claims pragmatically and equitably between Participants.

3.2 The table below illustrates the scope of these guidelines.

Employers	**Insurers**	**included in *Fairchild*?**	**included in guidelines?**
Single	None	No	No
Single	Single	No	Yes
Single	Multiple	No	Yes
Multiple	None	Yes	Yes
Multiple	Single	Yes	Yes
Multiple	Multiple	Yes	Yes

3.3 These Guidelines acknowledge that the consequence of the House of Lords decision in *Fairchild* is joint and several liability for claims of this nature and that there will be many instances where a single employer and/or insurer is presented with a claim which may not have been brought against any or all other Participants.

3.4 These Guidelines apply only to claims for mesothelioma made and pursued in respect of employment and employers' liability insurance. Claims made under other policies such as public liability insurance policies are excluded.

3.5 These Guidelines set out recommended best practice and as such are voluntary and non-binding, so Participants could agree to handle a claim on a different basis where to do so would be more appropriate.

3.6 It is not intended that, in agreeing to handle a claim in accordance with these Guidelines, insurers will be increasing their legal obligations to their policyholders.

3.7 Nothing in these Guidelines is intended to impose, extend or increase any duty or obligation which FSCS does not otherwise owe to policyholders, claimants or third parties.

3.8 These guidelines apply to claims subject to the jurisdiction of England and Wales.

4 Basis of apportionment / contribution

4.1 The Co-ordinator shall, as quickly as possible, establish an apportionment schedule (see Appendix II). The following principles will be adopted.

(i) The claimant's damages and claimant's costs shall be paid in full.

(ii) As much information as possible about employment history and insurance history shall be obtained from the claimant or his advisers and others (e.g. ABI) so that, where possible, all Participants are identified and contributions can be maximised.

(iii) The claim shall first be apportioned between traced employers in the proportion that their respective Periods of Culpable Exposure bear to the Total Culpable Exposure.

(iv) The proportion of the claim which is thereby attributable to an employer shall then be apportioned between that employer and its insurers (if any) for the relevant Period of Culpable Exposure. This apportionment shall be in the proportions that periods of insurance and/or Gaps bear to the relevant Period of Culpable Exposure. Gaps (if any) will be attributed either:
(a) if the employer is solvent, to the employer, or
(b) if the employer is insolvent, to its insurers (whether solvent or insolvent).

(v) Any part of a period of employment falling within a ten-year period prior to the date of clinical diagnosis of mesothelioma (or the date of death if no diagnosis was made in the claimant's lifetime) shall not count as a Period of Culpable Exposure for the purposes of applying these Guidelines.

(vi) There shall be no "weighting" of the apportionment to reflect the "dose" of asbestos received during any Period of Culpable Exposure.

(vii) There shall be no "weighting" of the apportionment to reflect the type of asbestos to which the claimant was exposed during any Period of Culpable Exposure.

(viii) Unless otherwise agreed, there shall be no apportionment of defence costs other than common disbursements.

(ix) FSCS does not currently meet defence costs. Therefore the portion of defence costs relating to the insolvent insurer's portion of the Period of Culpable Exposure shall be met by the insolvent insurer in accordance with the arrangements or other procedures governing the payment of defence costs in respect of that insolvent insurer.

4.2 The FSCS Shortfall shall be apportioned as follows.

(i) Same Employer - If there is an FSCS Shortfall, the FSCS Shortfall will be re-apportioned amongst the other solvent insurers for that insolvent employer in proportion to their already determined contributions.

(ii) Other Employer - If there are no solvent insurers for that employer, the FSCS Shortfall will be re-apportioned amongst other employers in proportion to their already determined contributions.

(iii) General Approach - FSCS shall not be required to contribute to the FSCS Shortfall in relation to a particular employer pursuant to either (i) or (ii) unless and to the extent that part or all of the already-determined contribution due from another insolvent insurer for another employer is fully protected by FSCS.

5 Duties of the Lead Insurer / Handler

5.1 It shall be the responsibility of the Lead Insurer / Handler for each employer to:

(i) confirm to the claimant that it is the Lead Insurer/Handler for an employer and that it will assume the duties of Co-ordinator until the Co-ordinator is identified

(ii) actively contact every other known Participant to identify the Co-ordinator, using not only employment history and insurance history obtained from the claimant but also using information from the Lead Insurer/Handler's own records, knowledge and experience of handling mesothelioma claims

(iii) liaise with other Participants in the claim against that employer

(iv) respond within 21 days to the Co-ordinator to its requests for instructions and, in default of a response, the Co-ordinator shall be entitled to assume that any recommendations made by it are accepted

(v) provide all necessary and available information to the Co-ordinator relating to periods of employment or periods of insurance and respond to the Co-ordinator's requests for information within 21 days

(vi) subject to Parallel Payment, pay, upon the Co-ordinator's request, the proportion of the claimant's damages and the claimant's costs attributable to the employer, with whose liability that Lead Insurer / Handler is dealing

(vii) where Pay and be Paid applies, recover contributions from other Participants associated with the employer with whose liability that Lead Insurer / Handler is dealing, including recovering from a solvent employer any contribution to Gaps.

(viii) provide appropriate proof of payment where Pay and be Paid applies and a Lead Insurer / Handler seeks recovery of a Participant's contribution

5.2 These duties apply regardless of whether the Lead Insurer / Handler is a solvent employer, a solvent insurer or an insolvent insurer subject to section 7.

6 Duties of the Co-ordinator

6.1 The over-riding duties of the Co-ordinator are to:

(i) use its best endeavours to obtain written confirmation from the Participants and claimant that the Guidelines will apply to the claim unless the Co-ordinator's view is that the claim should not be dealt with under the Guidelines

(ii) use its best endeavours to assess the claim and achieve best available settlement

(iii) minimise the claimant's and Participants' costs by settling the claim quickly and efficiently

(iv) ascertain and implement the fair and equitable "horizontal spread" of the liability between Participants.

6.2 Specifically, the Co-ordinator will:

(i) act as Lead Insurer / Handler for the employer with whose liability it is dealing

(ii) if a Lead Insurer / Handler has notified a claimant in accordance with clause 5.1(i) above, advise the claimant that it is taking over the role of Co-ordinator

(iii) confirm to the claimant that it will Pay, without deduction for Void Periods, the claimant's damages in full, and be Paid contributions from other Participants, subject to Parallel Payment

(iv) explain to the claimant that the Co-ordinator's handling of the claim under these Guidelines is conditional on the claimant providing all necessary and available evidence both for valuing the claim and for identifying employers for all Periods of Culpable Exposure

(v) comply with such obligations under the Civil Procedure Rules (CPR) as it is able to on behalf of all Participants, including handling the claim in accordance with any relevant pre-action protocol

(vi) investigate the claimant's employment history in full by way of CPR Part 18 request, Contributions Agency employment history, claimant's statements, medical records, and all other appropriate investigations

(vii) investigate fully the insurance history of each employer (where not represented by a Lead Insurer / Handler) allegedly or potentially responsible for culpable exposure by way of such investigations as may be appropriate for example with other Participants, brokers or other sources including the ABI Code of Practice for Tracing Employers' Liability Insurance Policies

(viii) produce Co-ordinator's notes (see Appendix II) outlining employment history, insurance history and the proposed apportionment schedule

- the Co-ordinator will prepare a preliminary Co-ordinator's note to be sent to Participants within 28 days of receipt of the letter of claim.

- further Co-ordinator's notes will be circulated quarterly thereafter or as required in the event of significant developments.

(ix) pay (subject to any Parallel Payment) on final settlement of the claimant's damages and the claimant's costs, such damages and costs in full promptly and then request from other Lead Insurers / Handlers or Participants payment of their contributions to the claimant's damages and the claimant's costs

(x) provide appropriate proof of payment where Pay and be Paid applies and the Co-ordinator seeks recovery of a Lead Insurer / Handler's contribution

(xi) comply promptly with any reasonable request for further documentation or evidence, in addition to the Co-ordinator's notes, made by another Participant involved in the claim.

(xii) make the Claim file available for inspection or audit on 7 days notice, for the purpose of verifying apportionment and the handling of the Claim, by another Participant involved in the claim if reasonably requested to do so.

6.3 These duties apply regardless of whether the Co-ordinator is a solvent employer, a solvent insurer or an insolvent insurer. In the latter case, see section 7 below.

7 Payments

7.1 General Approach

(i) Subject to the Co-ordinator or Lead Handler/Insurer (as appropriate) providing the information referred to in sections 5 and 6, contributions by Participants are to be paid promptly and, at the latest, within 21 days from the date of request for payment by the Co-ordinator or Lead Insurer / Handler as appropriate. These Guidelines encourage early settlement of claims and hence by analogy depend upon early payment of contributions. Therefore Participants shall Pay and Be Paid (subject to Parallel Payment), paying contributions promptly as requested and resolving any disputes about amounts afterwards.

(ii) Where a request for contribution is not paid by a Participant within 60 days, the Co-ordinator or the Lead Insurer / Handler making the request shall be entitled to simple interest on the amount requested, calculated daily, at the prevailing Bank of England base rate from the date of the request made in accordance with either of sections 5 and 6 above (as appropriate) to the date of payment.

7.2 Payments by Insolvent Insurers

(i) Where an insolvent insurer is a Participant any payment will be by Parallel Payment**.** The insolvent insurer will:

- obtain appropriate payment from its insured employer, if solvent, for any Period of Culpable Exposure not protected by FSCS.

- if the claim is fully or partly protected by FSCS, before making any payment on behalf of FSCS, obtain a signed acceptance form and/or deed of assignment (or such other documentation as FSCS may require) from the claimant (or the claimant's representatives) or the insured employer and then obtain appropriate payment from FSCS.

- in all cases, except those involving FSCS, secure cheque(s) payable only to the claimant (or the claimant's representatives) and, if possible, payment on behalf of the insolvent insurer should be made at the same time as payment is made in respect of solvent Participants for that employer. Any payment by FSCS may be made either directly to the insolvent insurer or to the claimant or his representatives.

7.3 Insolvent Insurers As Co-ordinator and/or Lead Insurer/Handler

(i) Insolvent insurers can still act as Co-ordinator and/or Lead Insurer/Handler. However, Parallel Payment will apply instead of Pay and be Paid, so that:

- An insolvent insurer acting as Co-ordinator will collect payments from the other Lead Insurers/Handlers (who are still expected to Pay and be Paid in respect of the Participants associated with the employer with whose liability it is dealing, unless they are also insolvent in which case the following paragraph applies) and these payments will be forwarded to the claimant.

- An insolvent insurer acting as Lead Insurer/Handler will collect payments from other Participants associated with the employer with whose liability it is dealing (other than FSCS and/or the solvent employer) and these payments will be forwarded to the Co-ordinator.

8 Dispute resolution

8.1 Any Dispute between Participants shall be resolved by the dispute resolution process set out in Appendix IV.

9 Date of Introduction of The Guidelines

9.1 Participants shall as far as possible apply these Guidelines to all claims within the scope (see section 3 above) that have not been settled by 1 November 2003.

9.2 The operation of the Guidelines shall be reviewed from time to time in light of legal developments and with experience of the Participants. ABI shall co-ordinate with bodies representing Participants to review these Guidelines not more than 12 months after the date of introduction of the Guidelines and/or as the ABI and Participants agree.

APPENDIX I (to mesothelioma guidelines)

Financial Services Compensation Scheme

1. This Appendix is by way of guidance only. It summarises the scope of protection under the Policyholders Protection Act 1975, and pursuant to the Financial Services and Markets Act 2000, provided by FSCS in respect of insurers who are insolvent, and become insolvent before 1 December 2001, the date the 2000 Act came into force. These insurers include Chester Street Holdings Limited, BAI (Run Off) Limited and Independent Insurance Company Limited.

2. Accordingly, this guidance will not apply to any insurer which becomes insolvent in the future, claims against which will be subject to the FSCS Compensation Rules.

3. Under the 1975 Act, to be eligible to receive protection (meaning in order for FSCS to meet a claim for which an insolvent insurer is liable), a policyholder must be a "private policyholder" (e.g. an individual, or partnership of persons all of whom are individuals). However, by way of exception, "corporate" policyholders are protected under the 1975 Act to the full amount of any liability of an insolvent insurer only where the liability is subject to compulsory insurance.

4. Accordingly, corporate policyholders are protected for employers' liability insurance claims subject to the Employers' Liability (Compulsory Insurance) Act 1969. Employers' liability insurance became compulsory in the UK from 1972 and from 1975 in Northern Ireland.

5. In addition to the protection to corporate employers provided under the 1975 Act, the FSCS also protects claims against certain corporate employers which pre-date compulsory insurance (pursuant to its Compensation Rules, and the transitional arrangements made with effect from 1 December 2001).

6. Insofar as the claim pre-dates compulsory insurance and the corporate employer is insolvent, an employee claimant, having established or agreed a claim against the insolvent employer, may make a claim to that employer's insurer under the Third Parties (Rights Against Insurers) Act 1930.

7. In these circumstances, protection is available from the FSCS to that employee claimant if the employer's insurer is also insolvent. Because the claim is not in respect of compulsory insurance, protection is limited to 90%. Accordingly, there is a 10% "FSCS Shortfall" (as defined in these guidelines) in the funding of these employees' claims.

8. As a general rule, FSCS cannot contribute to the payment of the FSCS Shortfall.

9. For claims in respect of pre-compulsory employer liability insurance, only a third party individual claimant is entitled to protection. The FSCS is not able to make payment to a solvent employer in respect of such claims nor is FSCS able to make payment to any other entity, such as solvent insurers (who may have settled the employee's claim in full and be seeking a contribution in respect of the insolvent insurer's "time on risk"). A solvent employer will be required to meet the costs of the claim itself (in the absence of a solvent insurer).

APPENDIX II (to mesothelioma guidelines)

Template For Co-ordinator's Notes

Co-ordinators Note No #

1. CLAIM DETAILS	
Employee / Claimant name	
Co-ordinator	
Co-ordinator's reference	
Dates of previous Co-ordinator's notes	
Fatal Accidents Act 1976 claim	Yes / No

2. APPORTIONMENT SCHEDULE						
Employer	**Period of Employment (dates)**	**Period of Culpable Exposure (dates)**	**Insurer / Participant and Reference**	**Contribution Period (months)**	**Contribution (%)**	

3. STATEMENT BY CO-ORDINATOR ABOUT ENQUIRIES MADE		
Type	Yes / No	**Comment** **(date enquiry made, result etc)**
Standard Employment Enquiries		
ABI EL Code of Practice		
Witness Statements		
Contributions Agency		
Medical Report (include name of reporting doctor)		
Medical Records		
Inquest Report		
Earnings information		
Other		

4. DAMAGES		
Head of damage	Amount recommended or paid	**comment**
General damages (PSLA)		
Loss of earnings		
Care		
Funeral expenses (Fatal Accidents Act 1976 only)		
Bereavement (Fatal Accidents Act 1976 only)		
Future loss of earnings		

Services dependency		
Earnings dependency		
Other		
TOTAL DAMAGES		**agreed / settled / awarded**

5. CLAIMANT'S COSTS & DISBURSEMENTS	
Profit costs (base costs)	
Success Fee	
ATE premium	
Medical evidence	
Counsel	
Other disbursements	
VAT	
TOTAL CLAIMANT COSTS	

6. DEFENCE COMMON DISBURSEMENTS	
Medical evidence	
Counsel	
Other disbursements	
VAT	
TOTAL DISBURSEMENTS	

7. SUMMARY		
Cheques are requested payable to insert name of Co-ordinator / Insurer / claimant / claimant's solicitor	From (name of participant)	**For (amount)**
Plus Co-ordinator's apportioned share (insert)		
TOTAL CLAIM APPORTIONED		

APPENDIX III – Basic Worked Examples Of Apportionment Under These Guidelines

BASIC FACTS

periods of culpable exposure – months

40	25	25	10
Employer A	Employer B		Employer C
X Insurance Co	Y insurance Co	Z insurance Co	(none)

- Ten-year disregard has already been applied.
- Amount to be apportioned for mesothelioma claim agreed at £100,000 (covering the claimant's damages and the claimant's costs.
- Assume all exposure post 1972 so that no FSCS Shortfall arises.

APPORTIONMENT SCENARIOS

1 All insurers and employers solvent. Apportionment.

X (coordinator) pays in full			£100,000.00
X's apportioned share	100,000 x 40/100	£40,000.00	
Y contributes	100000 x 25/100	£25,000.00	
Z contributes	100000 x 25/100	£25,000.00	
C contributes	100000 x 10/100	£10,000.00	
	TOTAL		£100,000.00

2 **All insurers solvent. Employer C insolvent. Apportionment ignoring C's exposure which is a Void Period.**

X (coordinator) pays in full			£100,000.00
X's apportioned share	100,000 x40/90	£44,444.00	
Y contributes	100,000 x 25/90	£27,778.00	
Z contributes	100,000 x 25/90	£27,778.00	
			£100,000.00

3 **All employers solvent. Insurer Z is untraced and this gives rise to a Gap. Other insurers solvent.**

X (coordinator) pays in full				£100,000.00
X's apportioned share	100,000 x 40/100		£40,000.00	
Y contributes	100,000 x 25/100		£25,000.00	
B contributes	100,000 x 25/100	contribution to Gap	£25,000.00	
C contributes	100,000 x 10/100		£10,000.00	
		TOTAL		£100,000.00

4 **All employers solvent. Insurer Z is insolvent (and FSCS protected) so Parallel Payment applies. Other insurers solvent.**

Apportionment			
X (coordinator) pays	100,000 x 40/100	£40,000.00	
Y contributes	100,000 x 25/100	£25,000.00	
FSCS contributes	100,000 x 25/100	£25,000.00	
C contributes	100,000 x 10/100	£10,000.00	
	TOTAL		£100,000.00

5 **All employers solvent. Insurer Z is insolvent (and FSCS protected) so Parallel Payment applies. Insurer Y is untraced and this gives rise to a Gap.**
Other insurers solvent.

X (coordinator) pays	100,000 x 40/100		£40,000.00	
B contributes	100,000 x 25/100	(contribution to Gap)	£25,000.00	
FSCS contributes	100,000 x 25/100		£25,000.00	
C contributes	100,000 x 10/100		£10,000.00	
		TOTAL		£100,000.00

6 **Employer A is untraced, so X cannot be found. This is a Void Period.**
All other Participants solvent.
Y or Z should agree who is the Coordinator.

Y pays/contributes	100,000 x 25/60	£41,667.00	
Z pays/contributes	100,000 x 25/60	£41,667.00	
C contributes	100,000 x 10/60	£16,666.00	
			£100,000.00

APPENDIX IV (to mesothelioma guidelines)

Dispute Resolution

For the purposes of Appendix IV, only, Participants (unless otherwise stated) means the parties to the Dispute

1. Overriding objective

- Disputes shall be resolved in accordance with the provisions set out in this appendix.

- The overriding objective is to resolve Disputes as quickly and as cheaply as is reasonably practicable in order to achieve the overall aims and objectives of these Guidelines as set out in section 2 of the Guidelines.

- Participants shall co-operate and act in good faith in order to achieve this overriding objective.

- *Participants may agree any form of dispute resolution at any time which they consider has reasonable prospects of achieving this overriding objective.*

2. Direct negotiations in good faith by Participants

2.1 Invoking the dispute resolution procedure is to be a procedure of last resort. Accordingly, Participants will use their best endeavours to resolve disputes before invoking any of the dispute resolution procedures referred to below.

2.2 Before invoking these dispute resolution procedures the Participants should have set out in writing the issues in dispute together with copies of any relevant documents and the Participants should have taken steps to agree any facts which can be agreed and otherwise to narrow the issues in dispute. The whole package of facts and arguments relied upon by each Participant should have been advanced and the Participants attempted to resolve their differences by an open exchange of views.

3. Unresolved Issues

3.1 If issues remain in dispute there are two stages to the resolution of the Dispute:

- **Stage 1 - Direct negotiation**

  Each Participant will appoint a senior person with authority to settle the Dispute on their behalf who will have 28 days in which to seek the resolve the dispute by negotiation (see section 4 below).

- **Stage 2 - Determination by arbitration or litigation**

If resolution of a Dispute is unsuccessful after invoking the procedures in Stage 1, the Participants may seek a final determination of the Dispute by arbitration or litigation, in accordance with one of the procedures set out in Stage 2 (see section 5 below). Participants should be mindful that determination by these procedures may substantially increase the costs and time involved and that all reasonable steps should have been taken to resolve the Dispute before commencing Stage 2.

4. Stage 1 - Direct negotiation by persons with authority to settle

4.1 If, and only if, matters cannot be resolved by the Lead Insurers / Handlers, the existence of a Dispute shall be notified in writing to the Participants (and the Co-ordinator) by a Notice of Dispute. The Notice of Dispute shall set out with precision:

- the issues remaining in dispute.
- the facts or matters relied upon by the Participant notifying the Dispute.
- the name of a person with authority to settle the Dispute on its behalf (that person having sufficient seniority to understand the complexities of the claim, as well as the objectives of these Guidelines.

and shall attach the supporting documents which the Participant notifying the Dispute intends to rely on, unless the Participants to whom the Dispute is being notified have copies of those documents already, in which case this must be stated. If they do not have copies of those documents already, they must be provided promptly by the Participant notifying the Dispute, at its own cost (subject to any right to recover costs if arbitration/litigation is commenced).

4.2 Within 7 days of receipt of the Notice of Dispute (and accompanying documents) the receiving Participant will respond in writing to each point made in it, setting out any positive case which the receiving Participant may have and setting out any reasons why points in the Notice of Dispute are rejected. At the same time, the receiving Participant will nominate a person with authority to settle the dispute on its behalf and will inform the other Participants.

4.3 The persons with authority to settle shall act in good faith to seek to settle the Dispute within 28 days of receipt of the Notice of Dispute (which may be extended by unanimous agreement). Communications to settle the Dispute shall be privileged and confidential.

4.4 Where the Dispute is resolved at this stage, any Participants in the claim who were not Participants to the Dispute should be informed in writing of the resolution, if the Dispute has affected them.

5. Stage 2: Determination by arbitration or litigation

5.1 Arbitration

- Subject to there being agreement to arbitrate by the Participants, by an exchange of correspondence, any Dispute between the Participants with a monetary value of or exceeding £5,000 may be finally settled by arbitration by a sole arbitrator, appointed in default of agreement between the parties by the President of the Chartered Insurance Institute.

- The arbitration will take place in London, England (or such other place agreed between the Participants) and be governed by the law of England & Wales. Multi-party arbitration proceedings are permitted. The arbitration shall be governed by the Arbitration Act 1996.

- Under the Arbitration Act 1996 an arbitrator has duties

(a) to act fairly and impartially between the parties, giving each party a reasonable opportunity of putting his case and dealing with that of his opponent and

(b) to adopt procedures suitable to the circumstances of the particular case, avoiding unnecessary delay or expense, so as to provide a fair means for the resolution of the matters falling to be determined.

- Without requesting the arbitrator to depart or derogate from those duties, the Participants will take all reasonable steps to ensure that, if possible, the arbitration can be undertaken as a “documents only” exercise, without the need for attendances other than by telephone or by correspondence.

6.2 Litigation

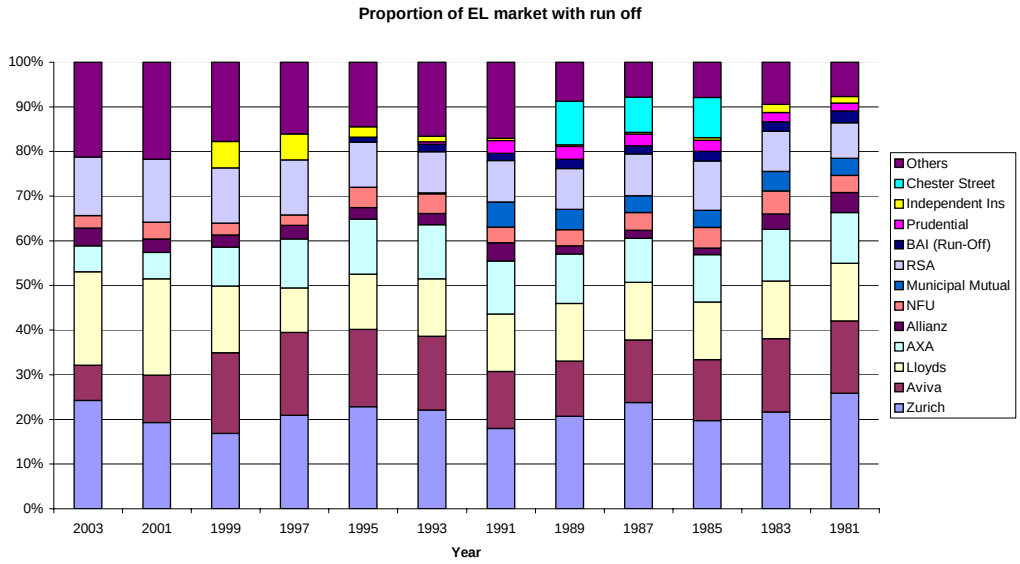
- If the Dispute is not resolved by any of the above means, the Participants may seek a final determination by the court.

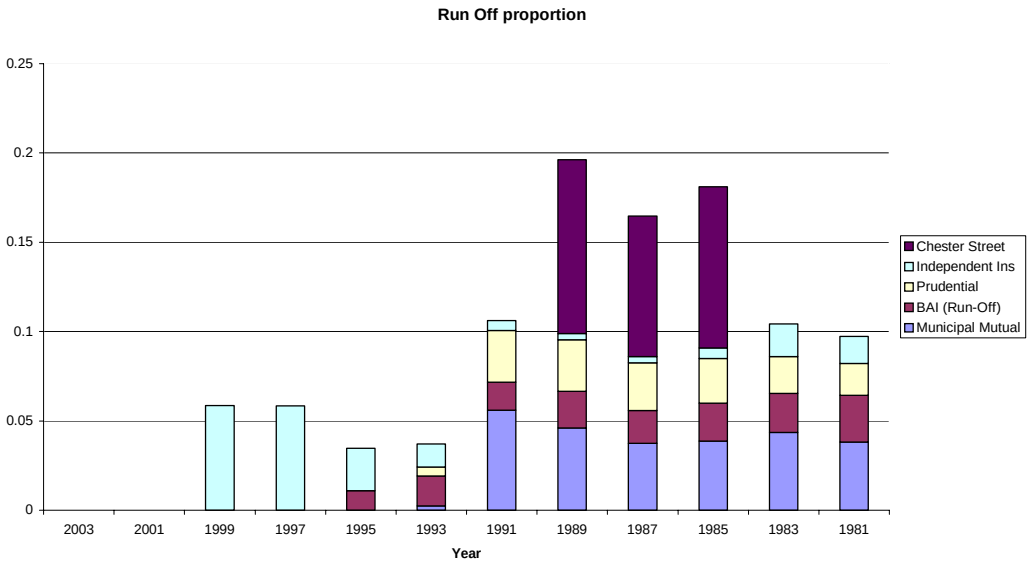
- As regards costs, any Participant may bring to the attention of the court the refusal of any other Participant to agree to seek resolution of the Dispute by any of the above means.

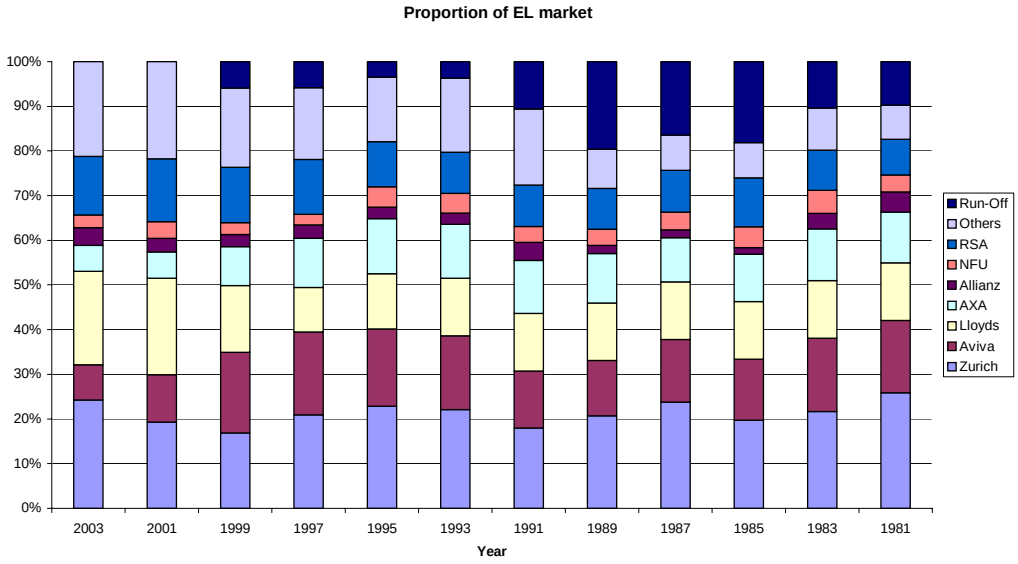
The dispute resolution process in this appendix will not apply if the Dispute involves a party that has not agreed to adopt these Guidelines unless that party agrees otherwise, or if a Participant's rules of business operation do not permit it to agree to this dispute resolution process.

APPENDIX IV.1

EL MARKET SHARE DATA 1981-2003




Run Off proportion
0.25
0.2
0.15
0.1
0.05
0
2003
2001
1999
1997
1995
1993
1991
1989
1987
1985
1983
1981
Year
Chester Street
Independent Ins
Prudential
BAI (Run-Off)
Municipal Mutual


Proportion of EL market
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2003
2001
1999
1997
1995
1993
1991
1989
1987
1985
1983
1981
Year
Run-Off
Others
RSA
NFU
Allianz
AXA
Lloyds
Aviva
Zurich

EL Market share percentages

Company	2003	2001	1999	1997	1995	1993	1991	1989	1987	1985	1983	1981
Zurich	24%	19%	17%	21%	23%	22%	18%	21%	24%	20%	22%	26%
Aviva	8%	11%	18%	19%	17%	17%	13%	12%	14%	14%	16%	16%
Lloyds	21%	22%	15%	10%	12%	13%	13%	13%	13%	13%	13%	13%
AXA	6%	6%	9%	11%	12%	12%	12%	11%	10%	11%	12%	11%
Allianz	4%	3%	3%	3%	3%	2%	4%	2%	2%	1%	3%	4%
NFU	3%	4%	3%	2%	5%	4%	4%	4%	4%	5%	5%	4%
Municipal Mutual	0%	0%	0%	0%	0%	0%	6%	5%	4%	4%	4%	4%
RSA	13%	14%	12%	12%	10%	9%	9%	9%	9%	11%	9%	8%
BAI (Run-Off)	0%	0%	0%	0%	1%	2%	2%	2%	2%	2%	2%	3%
Prudential	0%	0%	0%	0%	0%	0%	3%	3%	3%	2%	2%	2%
Independent Ins	0%	0%	6%	6%	2%	1%	1%	0%	0%	1%	2%	2%
Chester Street	0%	0%	0%	0%	0%	0%	0%	10%	8%	9%	0%	0%
Others	21%	22%	18%	16%	14%	17%	17%	9%	8%	8%	9%	8%

EL annual premium (£m)

Company	2003	2002	2001	2000	1999	1998	1997	1996	1995	1994	1993	1992
Zurich	418.9	285.7	171.2	128.2	131.9	161.9	177.0	192.9	208.3	206.6	167.9	122.9
Aviva	136.1	92.8	94.0	112.5	140.9	159.4	157.2	157.0	158.4	149.0	125.1	94.6
Lloyds	361.5	245.2	191.0	115.0	116.6	89.8	84.1	91.4	112.7	120.1	97.7	83.4
AXA	101.1	73.1	52.7	53.1	68.0	91.0	93.0	103.6	112.0	101.3	91.8	83.2
Allianz	68.8	45.7	26.8	21.5	20.9	24.9	25.6	25.1	23.7	18.0	18.8	20.9
NFU	48.3	42.5	33.1	24.9	21.0	19.9	20.2	19.5	41.9	37.5	33.4	26.0
Municipal Mutual	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	19.4
RSA	225.8	184.5	125.1	87.7	96.8	105.5	104.1	101.7	91.8	81.7	69.8	59.1
BAI (Run-Off)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.4	9.9	14.4	12.7	10.1
Prudential	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	3.8	13.6
Independent Ins	0.0	0.0	0.0	0.0	45.7	33.1	49.3	48.3	21.6	15.8	9.8	5.6
Chester St Emp	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Others	366.9	220.7	192.4	148.7	138.6	130.8	135.7	129.6	132.0	112.2	125.7	108.4

EL annual premium

Company	1991	1990	1989	1988	1987	1986	1985	1984	1983	1982	1981
Zurich	108.7	104.6	104.3	99.6	95.7	69.2	53.9	45.6	43.7	46.9	53.4
Aviva	77.3	70.6	62.1	58.7	56.5	47.1	37.2	33.3	33.0	33.2	33.6
Lloyds	77.9	72.8	64.7	58.7	51.9	42.7	35.1	27.3	25.9	25.4	26.6
AXA	71.9	62.6	55.7	50.1	39.8	35.3	28.9	22.8	23.3	23.6	23.5
Allianz	24.5	24.3	9.2	8.3	7.2	5.3	4.1	7.2	6.9	7.5	9.3
NFU	21.5	20.0	18.0	16.6	16.0	14.9	12.6	11.3	10.4	9.2	8.0
Municipal Mutual	33.8	27.6	23.2	19.7	15.0	12.4	10.6	9.2	8.8	8.5	7.9
RSA	56.1	53.4	45.9	41.7	37.6	31.6	30.1	21.8	18.1	16.1	16.4
BAI (Run-Off)	9.5	10.9	10.3	9.2	7.4	6.5	5.8	4.5	4.4	4.7	5.4
Prudential	17.6	16.1	14.5	12.1	10.7	9.0	6.8	5.1	4.1	3.6	3.7
Independent Ins	3.3	2.4	1.8	1.5	1.4	1.5	1.6	2.3	3.7	3.6	3.1
Chester St Emp	0.0	11.2	48.9	41.4	31.7	28.2	24.7	0.0	0.0	0.0	0.0
Others	102.9	88.7	44.1	37.8	31.6	28.0	21.5	21.2	19.0	15.0	15.8

APPENDIX IV.2

PARTICIPATION IN BRITISH ELECTRIC POOL 1949-79

Name of Company	% Share
"Tariff" companies	
Alliance Insurance Company Limited	3.82% - 14.46%
Andrew Weir Insurance Company Limited	0.25% - 0.29%
Atlas Assurance Company Limited	3.37% - 4.29%
Avon Insurance Company Limited	0.25% - 0.29%
Beacon Insurance Company Limited	0.25% - 0.29%
Bedford General Insurance Company Limited	0.5% - 1.15%
British Merchants' Insurance Company Limited	0.5% - 0.57%
British Reserve Insurance Company Limited	0.5% - 0.57%
Caledonian Insurance Company	1.8% - 2.28%
Cambrian Insurance Company Limited	0.24% - 0.14%
Century Insurance Company Limited	1.5% - 1.71%
Commercial Union Assurance Company Limited	3.82% - 14.88%
Contingency Insurance Company Limited	0.25% - 0.29%
Crusader Insurance Company Limited	0.12% - 0.29%
Dominion Insurance Company Limited	0.5% - 1.14%
Eagle Star Insurance Company Limited	1.5% - 5.13%
Ecclesiastical Insurance Company Limited	0.37% - 0.57%
Economic Insurance Company Limited	0.25% - 0.29%
Employers' Liability Assurance Corporation Limited	1.0% - 1.14%
Federated Employers' Insurance Association Limited	0.25% - 0.29%
General Accident File and Life Assurance Corporation Limited	1.5% - 5.42%
Guardian Assurance Company Limited	2.92% - 7.76%
Guardian Royal Exchange Assurance Limited	13.99% - 15.99%
Legal and General Assurance Society Limited	1.5% - 1.71%
Licenses and General Insurance Company Limited	0.45% - 0.57%
London and Edinburgh Insurance Company Limited	0.5% - 0.57%
The London Assurance	4.25% - 4.86%
London and Lancaster Insurance Company Limited	4.25% - 4.86%
Merchants' and Manufacturers' Insurance Company Limited	0.5% - 0.57%
New Zealand Insurance Company Limited	0.31% - 0.71%
North British and Mercantile Insurance Company Limited	3.82% - 4.86%
Northern Assurance Company Limited	4.25% - 6.0%
Norwich Union Fire Insurance Company Limited	0.12% - 6.95%
Orion Insurance Company Limited	0.12% - 0.14%
Pearl Assurance Company Limited	1.5% - 1.71%
Phoenix Assurance Company Limited	4.25% - 6.57%
Provincial Insurance Company Limited	0.75% - 0.86%
Prudential Assurance Company Limited	3.0% - 3.43%
QBE Insurance Limited	0.5% - 0.57%
Queensland Insurance Company Limited	0.5% - 0.57%
Royal Exchange Assurance	3.82% - 8.23%
Royal Insurance Company Limited	5.5% - 16.18%
Scottish Insurance Corporation Limited	0.5% - 0.57%
Scottish Union and National Insurance Company	2.25% - 2.86%
Sea Insurance Company Limited	0.5% - 0.57%
South British Insurance Company Limited	0.5% - 0.57%
Sun Alliance and London Insurance Limited	12.65% - 14.58%
Sun Insurance Office Limited	3.82% - 4.86%

Tobacco Insurance Company Limited	0.25% - 0.29%
Union Insurance Society of Canton Limited	1.5% - 1.71%
United Scottish Insurance Company Limited	0.25% - 0.29%
Victoria Insurance Company Limited	0.37% - 0.42%
Western Assurance Company	0.5% - 0.57%
Western Australian Insurance Company Limited	0.25% - 0.29%
World Auxiliary Insurance Corporation Limited	0.5% - 0.57%
Yorkshire Insurance Company Limited	2.0% - 2.85%
Zurich Insurance Company	0.81% - 9.28%

“Mutual” companies

Co-operative Insurance Society Limited	1.0% - 1.33%
Iron Trades Mutual Insurance Company Limited	0.5% - 0.76%
Midland Employers Mutual Assurance Limited	0.0% - 0.5%
Municipal Mutual Insurance Limited	0.75% - 0.86%
National Employers Mutual General Insurance Association	1.5% - 6.7%
National Farmers’ Union Mutual Insurance Society Limited	1.0% - 1.14%

The percentage shares are a (non-zero) minimum and a maximum over the period 1949-1979. Some companies stopped participating for various periods over 1949-1979, so in these cases the “minimum” will, of course be zero for some years.

APPENDIX V

COPIES OF SURVEYS/QUESTIONNAIRES

Accompanying e-mail

Dear XXX,

Thank you very much for agreeing to help the UK Asbestos Working Party. Any information and data you are able to provide us with would be greatly appreciated. The more information we get the more relevance and use the finished paper will be to us all. Unlike some recent GIRO surveys we have not sent this to all GI actuaries. We have taken a more concentrated approach and have tried to send it to one person from each company or consultancy. By having a more targeted approach we hope to get a good response rate. The two parts should only take half an hour to complete.

The information we are seeking to gather is in two parts. The first part is a questionnaire on data, assumptions and benchmarks. This is a word document so please just type your answers straight into it making as much space as you need. There are quite a number of questions but if there are some that you don't want to answer or can't answer then please just skip over them. The second part is data itself. We have attached a spreadsheet with a number of areas to complete on two sheets. Please only use the spaces we have designated for the data and don't move areas around; this will make collation of the data easier. As with the questionnaire, if there are sections you do not want to complete or can't complete then please indicate this.

We realise that the only way that most people will be willing to contribute to this survey is if their answers are anonymous. Peter Stirling (who is on the staff of the Institute) has kindly set up ukasbestossurvey@actuaries.org.uk as an e-mail address for responses. Please send your completed word documents and spreadsheets to this address. Peter will then combine all the results and give them back to the working party. This ensures that no members of the working party will be able to identify the data for any particular company ie whatever you send will remain anonymous. In the paper we will make no mention of which companies or consultancies took part.

For those of you who work for companies then please answer for your current company only. If you work for a consultancy then we realise that it may be harder for you to pass on this information but we would appreciate it if you could give some general answers about the data that is available in the market from your experience and your own methodology when doing projections.

Our interest is largely in UK claims from UK Employers Liability policies. However, if you have data on injury claims on General Liability policies then please include these too. Please limit any data and answers you give to direct business or business that is a reinsurance of a captive insurer.

Please could you let me know whether or not you will be completing each part of the survey so that we know what to expect. Ideally we would like responses before our next working party meeting which is on the 15th April but at the very latest we would like them by the end of April.

Thank you for your assistance.

Questionnaire about methods

The working party would prefer to work with actual data and be able to ask questions to clarify or expand on answers. If you would be prepared for your answers (just to this questionnaire, not the spreadsheet) to be sent to the working party instead of combined and anonymised, please indicate here: YES / NO

Policy / exposure data

1. For policies exposed to UK asbestos claims, do you have the following elements of data available: deductible, limit, exclusions, signed line (if relevant), other (please specify)?

2. Do you keep a list of policies not yet hit but subject to possible future UK asbestos claims?

3. Do you try to obtain exposure data, such as turnover, number of employees, proportion at risk of asbestos inhalation? If so, please supply general approach.

Claims data

4. Do you split mesothelioma claims from non-mesothelioma for reserving purposes?

5. Do you analyse non-mesothelioma as a block or by disease for reserving purposes? If so, what disease types do you use?

Average cost per claim reserving methods

6. Do you use a reserving method involving separate projection of future claim numbers and average claim cost? If so, please answer the next two sections. If not, please skip to (**)

Assumptions for frequency

7. Do you project future claim numbers by curve fitting, by exposure projection for major assureds, or by other methods (please specify)?

8. When are your anticipated peaks for (a) mesothelioma notifications, (b) non-mesothelioma notifications?

9. What is the general shape of curve(s) you project for future notifications? In particular:
   - does it follow the projection by Peto, HSE (2001 or 2003?) or other (please specify)?
   - does it start at, above or below the recent annual average experienced?
   - how does non-mesothelioma relate to mesothelioma, if projected separately?

10. What are your ratios of projected future filings to (a) current average annual filings and (b) total past filings (if available)? (Separately for mesothelioma and non-mesothelioma, if available)

Assumptions for average cost

11. What average cost do you estimate for current notifications for (a) mesothelioma and (b) non-mesothelioma? Do these include or exclude claims settled at zero cost or for expenses only?

12. Are these the full court awards or is the claimant's share (contributory negligence) and company's share (if more than one insurer or uninsured period) implicit in the averages?

13. If these shares are implicit, do you know what the full average costs are?

14. What impact are you assuming, for reserving purposes, that the Fairchild judgement will have on your company share?

15. What rates of inflation do you apply?

Please skip to (##)

(**) Other non-benchmark methods

16. What other non-benchmark methods do you use to reserve for UK asbestos, and how do these operate?

17. What methods would you like to use if you had the data?

(##) Benchmarks

18. Do you use benchmarks or multipliers as a main method, for certain accounts only (small ones, those with poor data, other?), just as a check or not at all?

19. Which benchmarks or multipliers do you use?

20. From where do you get the benchmark values?

Future developments

21. What impact have you seen in your data, and do you expect to see in future, from trends in propensity to claim, scan vans and any other social changes?

22. What do you anticipate happening regarding unimpaired claims in the UK? (Do you regard pleural plaques as in this category?)

23. What is your view on the use of a similar initiative in the UK to the London Asbestos Strategy Review documentation requirements introduced by the London Market for US asbestos, i.e. that insurers pay only those claims for which there is sufficient documentation of injury and exposure to satisfy the requirements of those policies?

Reinsurance

24. If you have any UK asbestos liability on reinsurance contracts, what differences are there in your reserving for these, compared with your answers above?

Question about data

Questions about what claims data is available

1) **What years of exposure do you have data for?** Start Year: 1900 (1900, 1901, 1902, 1903, 1904) End Year: 2003 (1999, 2000, 2001, 2002, 2003) Comments: (eg breaks in exposure)

2) **Can you identify all asbestos related claims in your data?** Yes / No / No answer (eg from which year)

3) **Do you hold a field showing disease type (ie whether the claim is for pleural plaques, pleural thickening, asbestosis, mesothelioma or asbestos related lung cancer)?** Yes / No / No answer

4) **Do you record electronically the period the claimant was exposed to asbestos for?** Yes / No / No answer

5) **What is the average exposure period for each claimant (to the nearest year)?** Not known / 1 / 2 / 3

6) **Do you record electronically how the claimant was exposed to asbestos (eg which industry they worked in)?** Yes / No / No answer

7) **Do you record electronically where in the country the claimant was exposed to asbestos (eg town)?** Yes / No / No answer

8) **Do you record electronically the age of the claimant?** Yes / No / No answer

9) **Do you record electronically the sex of the claimant?** Yes / No / No answer

10) **Do you give each claim an event/accident date?** Yes / No / No answer How is this date defined?

11) **Do you have one claim per claimant?** Yes / No / No answer If 'no' then what do you do?

12) **Does your data hold legal costs separately?** Yes / No / No answer

13) **What do you think are typical current settlement values for each type of disease (at the 100% level rather than company share) excluding costs:**

Pleural Plaques	£0
Pleural Thickening	£0
Asbestosis	£0
Mesothelioma	£0
Asbestos Related Lung Cancer	£0

Data entry

Data entry - please enter data in the yellow shaded cells. Questions run across the page:

1) Please enter the number of claims notified in each calendar year by disease type. If disease type is not available for some years then please enter totals. If year is not available then please enter totals:

	Pleural Plaques	Pleural Thickening	Asbestosis	Asbestos Related Lung Cancer	Non Mesothelioma sub total	Mesothelioma	Total
1960							
1961							
1962							
1963							
1964							
1965							
1966							
1967							
1968							
1969							
1970							
1971							
1972							
1973							
1974							
1975							
1976							
1977							
1978							
1979							
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							
Total							

2) Of the claims entered in question 1 how many have been settled at nil cost:

	Pleural Plaques	Pleural Thickening	Asbestosis	Asbestos Related Lung Cancer	Non Mesothelioma sub total	Mesothelioma	Total
1960							
1961							
1962							
1963							
1964							
1965							
1966							
1967							
1968							
1969							
1970							
1971							
1972							
1973							
1974							
1975							
1976							
1977							
1978							
1979							
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							
Total							

3) For the claims entered in question 1 please enter the company share of the gross (of outward reinsurance) incurred cost. This is the paid plus outstanding and should not include any IBNR. If the company share is not available for any cells then please estimate it:

	Pleural Plaques	Pleural Thickening	Asbestosis	Asbestos Related Lung Cancer	Non Mesothelioma sub total	Mesothelioma	Total
1960							
1961							
1962							
1963							
1964							
1965							
1966							
1967							
1968							
1969							
1970							
1971							
1972							
1973							
1974							
1975							
1976							
1977							
1978							
1979							
1980							
1981							
1982							
1983							
1984							
1985							
1986							
1987							
1988							
1989							
1990							
1991							
1992							
1993							
1994							
1995							
1996							
1997							
1998							
1999							
2000							
2001							
2002							
2003							
Total							