

# Asbestos and Other Man-Made Disasters

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**Abstract**—Widespread use of asbestos over the last century has left a terrible legacy of lung disease. Doctors knew of the health risks long ago, but almost nothing was done to protect workers and the public. Some aspects of nanotechnology may have risks similar to asbestos.

**Keywords**—Asbestos, causation, nanotechnology.

## I. INTRODUCTION

THE use of asbestos for industrial and domestic applications has been a man-made disaster. Some knowledge of how that disaster unfolded may assist us to avoid similar catastrophes. Let us start from the proposition that if you are an entrepreneur with a product that is extremely profitable, but dangerous, you will not voluntarily restrict your earnings [1]. Let us further assume that if you can play down the hazards associated with your product, you will. You will suggest that any negative publicity or research about the dangers is unproven speculation. You will emphasize the benefits to the individual of your product as a fictional character said about promoting cigarettes – “They’re legal, they’re cool and they’re addictive – the job is almost done for us” [2].

Asbestos dust causes several serious lung diseases, chiefly asbestosis and mesothelioma. Asbestosis results from asbestos fibres entering the lung and causing fibrosis or scarring. This scar tissue reduces lung function and hampers blood flow. The disease is dose related – the more dust you inhale, the greater the risk of the disease. And it is progressive – even if you stop your exposure to asbestos the scarring will continue to get worse. Most asbestosis sufferers worked in industry and were exposed to significant concentrations of dust for many years.

Mesothelioma is a cancer of the pleural membranes which surround the lung or the peritoneal membrane which protects the abdominal cavity. The sufferer struggles to breathe and suffers incessant pain. Even small doses can cause mesothelioma – the wife who washed her husband’s dusty overalls, the child who stood by as her father constructed the family garage. It is inevitably lethal, usually causing death with 12-18 months of diagnosis. It takes about 40 years to develop, thus causing unique problems for lawyers trying to prove how a person was exposed to asbestos so long ago, and who was responsible for that exposure.

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## II. MEDICAL RESEARCH

The medical profession is different to the legal profession, in its concerns with science and research. It takes the long-term view. The legal profession comes along after things have gone wrong and tries to apply rules and fit events into boxes. You run the case, you get the verdict, and you go on to the next problem.

Generally speaking, medical researchers in this field have covered themselves in glory. In 1899 the first autopsy was conducted which concluded that a death had been caused by exposure to asbestos [3]. By 1928 researchers discovered that in a survey of a particular cohort of asbestos workers, one-quarter suffered pulmonary fibrosis, and among those who had worked for more than 20 years, four-fifths were so afflicted [4]. By 1932 the first abstract appeared in the Medical Journal of Australia concerning asbestosis [5]. By 1953 a study found that asbestos workers had an eleven-fold risk of developing lung cancer [6].

In 1960 a pioneering study linked small exposures to asbestos with the development of mesothelioma [7]. In 1965 the British Journal of Industrial Medicine published a study of asbestos-related illnesses in family members of workers [8] – the so-called “bystander” exposure.

With all this knowledge, how was it that exposure to asbestos continued to claim victims? Indeed, levels of exposure continued to rise, not just in industry but also in the general population. Why did no one blow the whistle?

## III. WIDESPREAD USE OF ASBESTOS

Partly the answer lies in the perceived benefits of asbestos. While it is a mineral, it is also a fibre. It was plentiful, strong and remarkably heat resistant. In the middle of last century there was a feeling that asbestos had saved more lives than it cost. So highly was it regarded that asbestos insulation was often specified by governments – one of the last asbestos insulated buildings constructed in Sydney is the Supreme Court building at Queens Square. The Supreme Court building in Adelaide has yellow stickers on the doors warning that they should not be sawn as they contain asbestos.

Unions were more concerned with obtaining better pay than better conditions – the so-called “dirt money” allowance. Industrial hygiene and safety generally was a low priority.

Nobody clearly and forcefully told workers that dust was dangerous. A common scenario in Australian asbestos cases is the fitters who worked at the Eveleigh Railway Workshops, known to the workers as “Siberia”, as it was covered in white dust. Apprentices filled in quiet periods by making snowballs of asbestos paste and throwing them at each other. Wharfies in the holds of ships used to eat their meals at tables from which

they had to sweep an inch of asbestos dust.

But those in the industry who knew said nothing. Not all of the medical profession was paragons of virtue. Doctors who worked for industry suppressed the truth from workers. One company medical officer recognized the problem and wrote his employer a memo advising that only older workers should be employed "because the older men will not live long enough for the cancer to develop" [9]. That advice was heeded. One litigant expressing puzzlement to this day as to why he and all his fellow ladders were sacked on a Friday in the mid-1960s, only to be contacted on the Monday by a \$2 company they had never heard of which then supplied their labour back to his original employer.

There is a mining town in Canada called Asbestos. In 1948 a survey of 708 miners found only 4 with normal healthy lungs. The medical officer decided to tell his employer, but not the workers, so that they could continue to live without worry, until they were eventually diagnosed with a disabling disease, and in the meantime the company could benefit by their many years of experience [10].

So if industry didn't warn its employees, why didn't the government? Regulations concerning asbestos dust were not made until the 1970s. Even then, inspections which revealed dangerous levels of dust did not result in prosecutions. This curious inactivity may have been in part because governments were among the largest users of asbestos. After World War II governments constructed power stations, all of them insulated with asbestos, to meet Australia's growing industrial demand. Governments had long been involved in running the railways, one of the largest users of asbestos. Mention has already been made of the fact that governments often mandated the use of asbestos insulation in buildings. Governments supervised and controlled the post-war expansion of housing in the cities, much of it constructed from asbestos cement building products. Service personnel were exposed to asbestos which insulated warships [11].

#### IV. LEGAL RESPONSES

The failure of governments to act decisively to prevent asbestos deaths and disease is one of the most disappointing aspects of the story. So is the failure of the Courts to hold government accountable for failure to act to prevent injury to its citizens. Perhaps that is unfair – courts only apply the law, so the failure of the law to offer redress is disappointing. However, governments in recent times have acted quickly and decisively to protect the rights of the injured against asbestos producers and suppliers.

In New South Wales the government in 1989 created the Dust Diseases Tribunal, a specialised court designed to quickly hear and determine all common law claims for damages for dust diseases. In its first years the Tribunal often sat in "bedside" hearings and gave judgments on the spot, so that dying plaintiffs would not lose their right to damages for pain and suffering. The NSW parliament then brought in reforms so that such damages survived the death of the

plaintiff. The usual time limitation period for suing was abolished. Many of these reforms have been adopted by other states.

When the largest asbestos producer sought to move its domicile overseas, with the risk that claimants would be left without recompense, a special commission of inquiry was called and draconian legislation was threatened. Better arrangements were made for payment of damages.

#### V. THE CAUSATION DEBATE

One aspect of asbestos litigation where law and medicine have intersected is in the field which lawyers love to call "causation". Mesothelioma has a latency period typically of about 40 years, and that quite small doses can cause the disease. No problem if you only had one minor exposure and you can remember it. But if you had several different exposures over the years, how do you identify which exposure caused your disease? This was a particular problem until about 10 years ago, when respiratory specialists used to advance the "single fibre theory". One rogue fibre, of the millions which might have invaded your lungs, had led to the development of cancer. If a worker had 5 different asbestos employers over 20 years, how could you ever prove which defendant caused your disease? There was the added complication that you had to hope that the "guilty" defendant was still solvent decades later or at least had adequate insurance cover.

Medicine came to the rescue with a theory which the courts embraced enthusiastically. Medicine postulated that while there is uncertainty concerning the process of the development of mesothelioma, it is related to the cumulative effect of all asbestos fibre inhaled in the latency period. Under this theory the fibre produces genetic mutations and eventually invasive clonal growth which results in mesothelioma. The theory had obvious attractions to the courts. No longer was there a risk of the plaintiff missing out if he could not prove which single fibre led to cancer. An added bonus was that since all exposures make a material contribution to the disease, all defendants are liable for the whole of the damages. The science behind this "cumulative effect" theory has never been closely examined by a court.

#### VI. WHAT HAVE WE LEARNT?

In 2003 the Federal government banned completely the importation of asbestos. But it will be decades before the last asbestos victim comes before the courts. In the interim, careful management is required of the asbestos contained in our schools, hospitals, factories, homes and penguins.

In 1975 the charming hamlet of Penguin in Tasmania celebrated its hundredth anniversary. The good citizens of the town celebrated by the erection of a 3 metre high penguin manufactured by a Tasmanian cement company, hundreds of thousands of tourists have since stood beside the penguin to have their photo taken. In 2008 a worker from the cement plant, who contracted asbestosis, informed the media that the

penguin contained asbestos. A risk assessment confirmed this. The mayor of Penguin firmly indicated that because the asbestos was encapsulated in polyester and fibreglass, it was completely safe. Next time you are travelling through Tasmania you might like to stop and give it a cuddle, it's completely safe.

We must guard against it all happening again. One of the most chilling recent statements was made by the chairman of the largest Australian asbestos producer. Speaking in 2004 she said, when she realised that the product was deadly:

*It would be like sitting on the board of Nokia in 50 years time when they discover that some early medical reports now were right and that mobile phones turned out to be deadly.*

## VII. THE NEXT ASBESTOS

Nanotechnology is the manufacture of particles at the atomic or molecular level. A nanometer is one billionth of a metre. Nanoparticles are to be found in sunscreen, food packaging, sports equipment, clothes, electronics, construction and cosmetics. Nanoparticles are so small that they can be taken into the body through the lungs or the skin. From there they get into the blood and can end up in the brain.

The Australasian Faculty of Occupational and Environmental Medicine has expressed concern about nanotechnology, particularly cylindrical nanostructures called nanotubes. Dr. Ian Gardner, an expert in occupational medicine, has expressed the suspicion that some carbon nanotubes may act very similarly to asbestos, if inhaled into the lung [12].

Much medical research in Australia is being directed towards harnessing the beneficial properties of nanoparticles [13]. Professor Mark Kendall is developing a nanopatch, which will deliver vaccines, without using a needle, direct to the dendritic cells close to the skin [14]. Professor Michael Monteiro [15] is working on nanospheres in order to deliver anti-cancer drugs directly to tumours. New vaccines such as the cervical cancer vaccine Gardasil [16] have been created which resemble viruses, in order to trigger a powerful immune response. Others are working on techniques to allow rapid modification of vaccines so as to keep pace with mutations within viruses. Nanotechnology promises far more social benefits than asbestos ever delivered, but its uses will be far more widespread and harder to detect.

The Federal Government has set up the Australian Office of Nanotechnology [17]. There is a published National Nanotechnology Strategy [18]. Its objective is to capture the potential benefits of nanotechnology while effectively addressing the issues impacting on the successful development of the technology. You may have thought there is a potential for a conflict between those two objectives. One of the key paragraphs of the Strategy contains the following phrases: "*whole of government approach*", "*inter-departmental committee*", "*cross-portfolio issues*", "*whole of government perspective*", "*network*", "*facilitate*" and "*sharing*".

An article recently published in the journal Nature suggests that some forms of carbon nanotubes could be as harmful as asbestos if inhaled in sufficient quantities [19]. Studies at the University of Rochester demonstrate that when rats breathed in nanoparticles, they settled in the brain and the lungs, leading to significant increases in biomarkers for inflammation and stress response [20]. In March 2009 the members of the European Parliament voted for a de facto moratorium on nanotech foods [21]. The ACTU has called for the Federal Government to introduce specific regulation in Australia relating to nanotechnology [22]. A committee set up by the NSW Parliament recommended that nanoparticles should go through safety testing before they can be sold [23].

While the Australian Office of Nanotechnology is anxiously considering cross-portfolio responsibilities while taking a whole of government approach, sunscreen specifically designed for babies is being sold to Australian parents without testing or certification. It contains titanium dioxide nanopowder [24].

## VIII. WATCH THE INSURERS

The above is a very basic outline of the timeline regarding research into the dangers of asbestos. The first leading article was not published until 1930. The link between mesothelioma and small doses of asbestos was not discovered until 1960. The Prudential Insurance Company of America concluded much earlier that asbestos mining and manufacture unquestionably involved a considerable hazard. At that point some American and Canadian insurers declined to offer life policies to asbestos workers. This was in 1918. Perhaps we should be looking at what insurers today think about nanotechnology.

Swiss Re, one of the world's largest re-insurers, published a report entitled "Small Matter, Many Unknowns". Noting that despite early warnings about the effects of asbestos on health, it took 100 years to introduce internationally accepted asbestos standards, the report says with Teutonic understatement: "It would be advisable to find a consensus faster this time". Understandably from a commercial viewpoint, the report recommends ways in which insurers may protect themselves from what the report describes as "an unforeseeable, ruinous loss accumulation unleashed by a flood of late claims".

Asbestos claimants in Australia do recover their damages, either because the defendants had adequate insurance against such risks, or because the defendants themselves are still operating and still solvent. If insurers are already arranging to protect themselves against claims many years in the future, it may be that the companies involved in the manufacture of products involving nanotechnology will similarly protect themselves. At least the victims of the asbestos disaster have been able to obtain monetary compensation. With the benefit of great hindsight, the disaster should never have happened. It is to be hoped that we have learned enough from the last 100 years to take steps to ensure that a similar disaster will not

befall our descendants. At present, events are following an alarmingly familiar pattern.

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