The Senate

Community Affairs References Committee

Workplace exposure to toxic dust

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EXECUTIVE SUMMARY

This inquiry arose out of the exposure of workers to crystalline silica in the sandblasting industry. One worker, Mr Richard White, unsuccessfully sought compensation for lung disease allegedly as a result of exposure in the 1970s during employment as a sandblaster. Mr White then contacted others who knew or suspected that they had acquired lung or other disease through sandblasting, eventually obtaining over 900 names. It appeared that very few had received or sought compensation for their disability.

The harmful effects of toxic dust have been known for many years. The health impacts vary with the type of dust to which a worker is exposed. For crystalline silica, diseases range from silicosis, to chronic obstructive pulmonary disease and lung cancer. Beryllium dust exposure leads to damage of the lungs, liver and spleen while exposure to timber dust is associated with cancer of the nasal sinuses.

Many Australian workers have suffered potentially harmful exposure to toxic dust because of poor work practices and slow response by regulators. Identifying the extent of illness related to toxic dust is difficult because the datasets are not compatible and most rely on workers' compensation data. Workers' compensation data is limited in scope as it does not record work-related illness that is of less than five days duration and does not record unsuccessful claims.

Added to the limitations of the datasets is the impact of the long lag time for some dust related diseases to be diagnosed. This often means that disease is blamed on lifestyle factors such as smoking rather than workplace exposure to toxic dust. It is for this reason that the importance of regular health surveillance of employees, including lung function tests and X-rays, was emphasised in evidence.

The national occupational health and safety framework comprises Commonwealth and State and Territory legislation. While the regulatory system has been developed to ensure worker safety, some problems were identified including the timeliness of implementation of changes to the regulatory regime, the enforcement of regulations, particularly in small industries, and ensuring that all workers are aware of the dangers of exposure to toxic dust. There is also considerable debate about the national exposure standards for crystalline silica and beryllium with calls for the crystalline silica standard to be reduced by half and the beryllium standard to match that published in the USA.

Compensation issues for those affected by exposure to toxic dust are complex: the long latency of disease makes it difficult to link work exposure to disease; compensation systems vary in the States and Territories; various limitations exist to prevent access to compensation; and a number of models for financial support exist.

While concern exists to ensure that workers who have already been exposed to toxic dust receive adequate medical assistance and compensation, the emerging field of

nanotechnology presents new occupational health and safety challenges. Research already indicates that nanoparticles may have serious health outcomes but there are significant gaps in knowledge about how nanoparticles act, their toxicity and how to measure and monitor nanoparticle exposure. These issues must be addressed to ensure that adequate regulations are introduced to overcome occupational health and safety concerns.

RECOMMENDATIONS

Chapter 3

Recommendation 1

3.59 That the Australian Safety and Compensation Council review the National Data Action Plan to ensure that reliable data on disease related to exposure to toxic dust is readily available.

Recommendation 2

3.60 That the Australian Safety and Compensation Council extend the Surveillance of Australian Work-Based Respiratory Events (SABRE) program Australia-wide and that the program provide for mandatory reporting of occupational lung disease to improve the collection of data on dust-related disease.

Chapter 4

Recommendation 3

4.34 That the Australian Safety and Compensation Council, in conjunction with the Heads of Workplace Safety Authorities, consider mechanisms to improve health surveillance of employees, particularly those exposed to toxic dust.

Recommendation 4

4.35 That the Australian Safety and Compensation Council promote the dissemination of information concerning the health effects of exposure to toxic dust to the medical profession.

Recommendation 5

4.36 That the Australian Safety and Compensation Council examine the need for improvements in testing regimes for lung disease associated with exposure to toxic dust including the training of those conducting tests and equipment requirements.

Chapter 5

Recommendation 6

5.86 That the Australian Safety and Compensation Council undertake a national campaign to raise awareness of the hazards associated with toxic dust.

Recommendation 7

5.87 That the Minister for Employment and Workplace Relations raise with the Workplace Relations Ministers' Council the need to ensure enforcement of

hazardous substance regulations and the need to enact nationally consistent standards in a more timely manner.

Recommendation 8

5.88 That the Australian Safety and Compensation Council, in conjunction with the Heads of Workplace Safety Authorities, consider mechanisms to increase the number of occupational hygienists being trained and employed by regulators.

Chapter 6

Recommendation 9

6.31 That State and Territory Governments move as soon as possible to set up nationally consistent identification, assessment and compensation mechanisms for persons affected by workplace related exposure to toxic dust and their families to at least the current New South Wales standard.

Recommendation 10

6.32 That the State and Territory Governments use the New South Wales *Workers' Compensation (Dust Diseases Act) 1942* as the model for this mechanism.

Recommendation 11

6.33 That the State and Territory Governments, other than New South Wales, move as soon as possible to adopt the approach of New South Wales to remove statutes of limitation that restrict legal proceedings for claims for personal injuries resulting from exposure to toxic dust.

Chapter 7

Recommendation 12

7.84 That the National Nanotechnology Strategy be finalised as a matter of priority.

Recommendation 13

7.85 That a working party on nanotechnology regulation consisting of representatives of the Therapeutic Goods Administration, NICNAS and the Australian Safety and Compensation Council be established to consider the impact of the emerging field of nanotechnology on the regulatory framework including:

- whether existing regulations are appropriate;
- how gaps and uncertainties in the regulatory framework can be addressed;
- how comprehensive management of risks of exposure to nanoparticles can be incorporated into the regulatory framework;

- whether Australia will require materials, already classified as safe at the macroscale, to be reassessed if they are to be used at the nanoscale; and

- whether there is a need for the establishment of a permanent body to regulate nanotechnology.

The working party should consult with stakeholders including consumer groups, State and Territory governments, unions, industry, health organisations and the public and provide a public report on these issues by March 2007.

Recommendation 14

7.86 That Commonwealth agencies including the Office of the Australian Safety and Compensation Council and NICNAS actively pursue links to overseas regulatory and research bodies to ensure that they are kept fully informed of developments in the rapidly emerging field of nanotechnology.

CHAPTER 1

INTRODUCTION

Terms of reference

1.1 On 22 June 2005 the Senate referred the following matters to the Community Affairs References Committee for inquiry and report by 1 December 2005:

(a) the health impacts of workplace exposure to toxic dust including exposure to silica in sandblasting and other occupations;

(b) the adequacy and timeliness of regulation governing workplace exposure, safety precautions and the effectiveness of techniques used to assess airborne dust concentrations and toxicity;

(c) the extent to which employers and employees are informed of the risk of workplace dust inhalation;

(d) the availability of accurate diagnoses and medical services for those affected and the financial and social burden of such conditions;

(e) the availability of accurate records on the nature and extent of illness, disability and death, diagnosis, morbidity and treatment;

(f) access to compensation, limitations in seeking legal redress and alternative models of financial support for affected individuals and their families; and

(g) the potential of emerging technologies, including nanoparticles, to result in workplace related harm.

1.2 The reporting date was subsequently extended by the Senate to 31 May 2006.

Conduct of the inquiry

1.3 The inquiry was advertised through the Internet, *The Australian* and regional newspapers: *Whyalla News*; *Illawarra Mercury*; *North West Telegraph* (WA); *Newcastle Herald*; *Katherine Times*; *Kalgoorlie Miner*; *Transcontinental* (SA); *Maitland Mercury*; *Mt Isa North West Star*; *La Trobe Valley Express*; and *Moe and Narracan News* (Yallourn). The Committee wrote to interested individuals and groups inviting submissions. The Committee received 46 public submissions and 2 confidential submissions from a range of organisations, individuals and Commonwealth and State Government bodies. A list of individuals and organisations who made public submissions is at Appendix 1.

1.4 The Committee held public hearings in Melbourne, Sydney and Canberra. A list of witnesses who gave evidence at the public hearings is at Appendix 2.

Background to the inquiry

1.5 The Committee's interest in workplace exposure to toxic dust arose from the case of Mr Richard White who was employed between 1971 and 1974 in the sandblasting industry in the Northern Territory. Mr White subsequently developed lung disease. He initiated a compensation claim in the Northern Territory Supreme Court in 1998 and alleged that as result of his employment, he had developed silicosis and/or emphysema and/or chronic air flow limitation. Mr White lost the first instance trial, the subsequent appeal to the Supreme Court of the Northern Territory and an appeal to the High Court of Australia.[1]

1.6 Following the unsuccessful litigation, Mr White placed a newspaper advertisement requesting people who knew or suspected that they had acquired lung or other disease through working for companies that used sandblasting techniques to contact him. By Christmas 2004, Mr White had obtained 916 names. Many of the respondents to the advertisement claimed to have experienced symptoms consistent with lung disease or cancer related to workplace exposure to toxic dust. It appeared that very few had received or sought compensation for their disability.

1.7 Mr White believed that 'many other Australians have suffered potentially harmful exposure to toxic dust, without ever seeking more specific diagnosis or financial compensation'.[2] Mr White and Dr Thomas Faunce, Senior Lecturer at the Medical School and Law Faculty, Australian National University, lobbied for the establishment of an inquiry into workplace risks of exposure to toxic dust.

Impact of exposure to toxic dust

1.8 There are many substances in dust form which lead to health problems for workers. The following provides an overview of some diseases arising from workplace exposure to toxic dusts:

- Asbestosis: Asbestosis is scarring of the lungs due to asbestos exposure;
- Asbestos Related Pleural Disease (ARPD);
- Mesothelioma: cancer of the pleura and the peritoneal lining. It is an invasive tumour related almost exclusively to asbestos exposure;
- Lung cancer: may result from exposure to asbestos or silica;
- Silicosis: caused by exposure to crystalline silica dust;
- Silicotuberculosis: the most common complication of silicosis;
- Mushroom Worker's Lung: caused by the inhalation of microbial spores living in the compost used to cultivate mushrooms;

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1 *Submission* 25, Additional information 10.11.05, p.4 (Mr R White et al for ASDC).

2 *Submission* 25, Additional information 10.11.05, pp.4-5 (Mr R White et al for ASDC).

- Bagassosis: caused by mouldy bagasse, which is the fibrous cellulose residue of sugar cane after the extraction of juice. This disease is uncommon;
- Farmer's Lung: caused by exposure to mouldy hay, straw or grain;
- Bird Fancier's Lung: caused by exposure to bird excreta and bloom;
- Byssinosis: airways disease due to the inhalation of certain textile dusts;
- Siderosis: caused by the long-term inhalation of iron oxide fumes;
- Aluminosis: seen in workers exposed to fine aluminium powder or dust;
- Berylliosis: an inflammatory disease of the lung caused by the inhalation of dust or fumes containing beryllium;
- Hard Metal Pneumoconiosis: the consequence of the inhalation of cobalt containing dust, either in the manufacture of hard metals or the sharpening of tools made from hard metals;
- Coal Dust Pneumoconiosis: caused by the inhalation and retention of coal dust in the lungs;
- Hexavalent Chromium associated lung cancer; and
- Occupational Asthma: an inflammatory disorder of the lungs resulting from a hypersensitive reaction to an inhaled foreign substance. It is the most common occupational lung disease in Australia.[3]

1.9 The most commonly known dust which causes harm is asbestos. Asbestos was mined in Australia principally at Wittenoom (Western Australia) from 1940 to 1966 and at Baryulgil and Barraba. The use of all forms of asbestos was banned in Australia from 31 December 2003, except in prescribed circumstances.

1.10 The fibres of asbestos cause asbestosis, lung cancer, asbestos-related pleural diseases and mesothelioma. Claims for asbestos compensation are not limited to the mining of asbestos; many claims arise from use of asbestos products. Estimates of Australia's total liability for future asbestos claims start at around $6 billion.[4]

1.11 The case of asbestos is well documented and mechanisms are now in place to manage asbestos related compensation claims. Therefore the Committee has not addressed the specific issue of asbestos in this report rather it has reviewed workplace exposure to other toxic dusts including silica dust, beryllium and timber dust.

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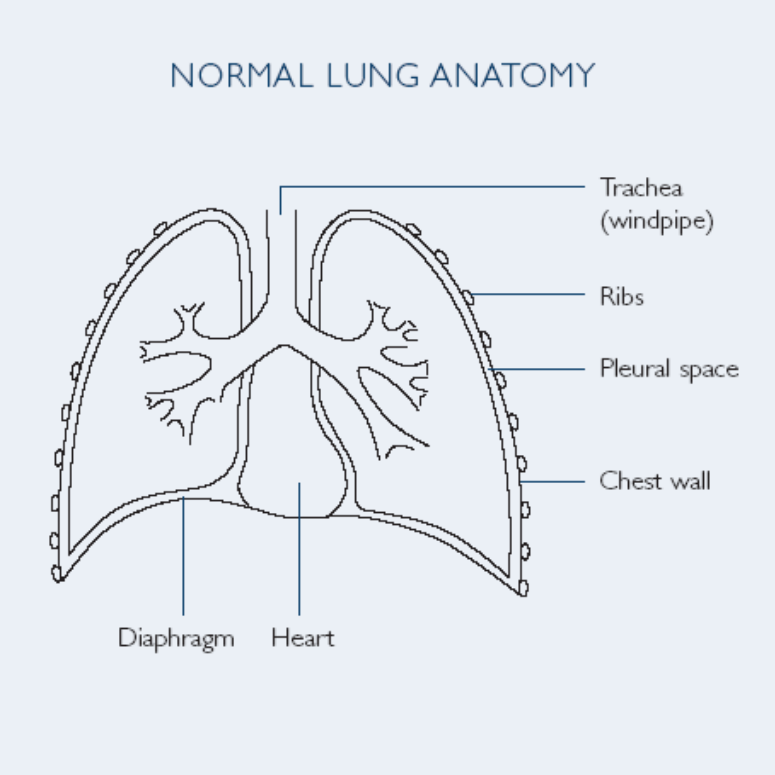
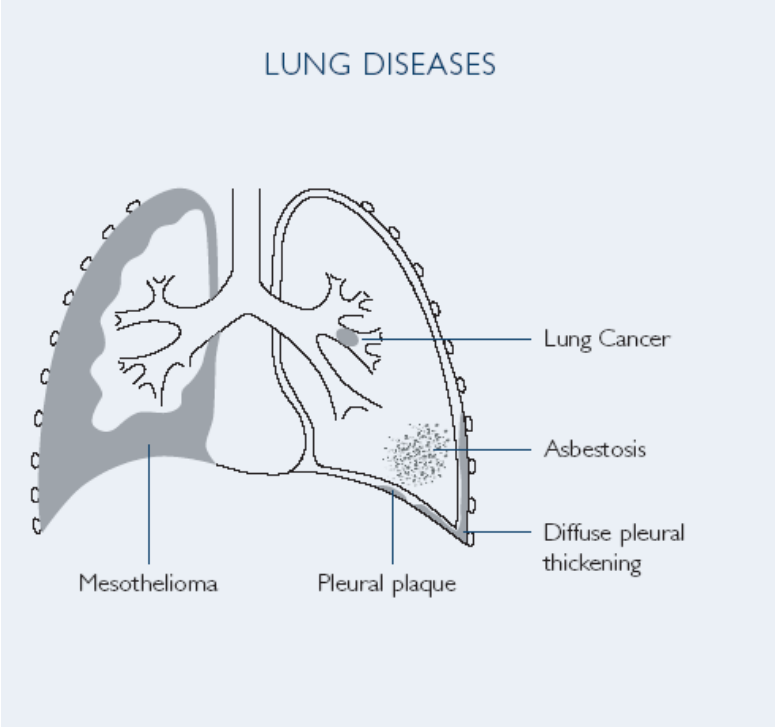
3 *Submission* 32, pp.1-5 (Dust Diseases Board of NSW).

4 O'Neill P & P Prince, *Asbestos-related Claims (Management of Commonwealth Liabilities) Bill 2005 and Asbestos-related Claims (Management of Commonwealth Liabilities) (Consequential and Transitional Provisions) Bill 2005,* Bills Digest, nos 175-176, 2004-05, at www.aph.gov.au/Library/pubs/bd/2004-05/05bd175.htm

1.12 The following two diagrams show healthy lungs and the impact of lung diseases:





Source: A Guide to Compensated Occupational Lung Disease in NSW, Dust Diseases Board of NSW, viewed at http://www.ddb.nsw.gov.au/home.asp

Australian Safety and Compensation Council (ASCC)

1.13 During the course of the Committee's inquiry, the Australian Safety and Compensation Council was established as a national advisory council on occupational health and safety (OHS) and workers' compensation. It had its first meeting in October 2005. The ASCC succeeded the National Occupational Health and Safety Commission (NOHSC). Like its predecessor, the ASCC comprises representatives from Federal, State and Territory Governments, the Australian Council of Trade Unions and the Australian Chamber of Commerce and Industry.

1.14 The key role of the ASCC is to provide leadership and coordination for national efforts to prevent workplace death, injury and disease. The ASCC will lead and monitor research and develop broad OHS and workers' compensation policy and strategic directions under the guidance of the Workplace Relations Ministers' Council. The work of the ASCC is aimed at achieving national consistency in OHS and workers compensation. It also has the power to declare national standards and codes of practice, as was the case with NOHSC documents developed as the basis for nationally consistent OHS regulations.

1.15 The Office of the Australian Safety and Compensation Council (OASCC), based in the Department of Employment and Workplace Relations, will support the work of the ASCC and is also a source of national research and statistical information relating to OHS and workers' compensation.[5]

1.16 As most submissions were written before the ASCC was established, the Committee has used NOHSC in the text rather than ASCC.

5 *Committee Hansard* 10.11.05, p.2 (DEWR); see also *Submission* 11, p.2 (DEWR).

CHAPTER 2

HEALTH IMPACTS OF WORKPLACE EXPOSURE TO TOXIC DUST

2.1 Workers may come into contact with many forms of toxic dust ranging from crystalline silica to wood dust and nanoparticles. This chapter provides an overview of the health impacts of exposure to respirable crystalline silica, beryllium, wood dust, alumina and textile dusts. The emerging issue of nanoparticle hazards is discussed in chapter 7.

Crystalline silica

2.2 Silica is a naturally occurring abundant mineral that forms the major component of most rocks and soil. Silica occurs in several crystalline forms and in amorphous non-crystalline forms. Amorphous non-crystalline forms of silica occur in nature, mainly as diatomaceous earth (the skeletons of marine organisms). The amorphous forms of silica are classified as nuisance dusts and do not induce pneumoconioses (respiratory diseases caused by inhalation of inorganic dusts). Among the crystalline forms, quartz is the most abundant, cristobalite and tridymite are less common.[1]

2.3 Exposure to respirable crystalline silica (RCS) occurs through cutting, chipping, drilling or grinding objects containing crystalline silica or through the use of materials that contain crystalline silica for abrasive blasting, for example sandblasting.

2.4 Workers in many occupations and industries use and come into contact with materials containing crystalline silica. Workers may come in contact with RCS through:

- excavation, where dust is created by drilling, chipping, jackhammering, etc;
- cutting to size of bricks, blocks, lightweight concrete panels, tiles, etc;
- sandblasting;
- grinding of floor slabs, granite for decorative purposes;
- concrete cutting and drilling;
- road building;
- glass manufacturing;
- refractory bricklaying;
- demolition; and

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1 *Submission* 11, pp.3-4 (DEWR).

- sweeping concrete floor slabs.[2]

2.5 The number of workers potentially exposed to silica in the course of their work was reported by the National Occupational Health and Safety Commission (NOHSC)[3] as nearly 294 000 in 2002. NOHSC noted that 'it should be kept in mind that workers in some of these industries have a different likelihood of exposure compared to those in others, that not all workers in the same industry will have the same likelihood of exposure, and the different exposed workers are likely to be exposed to different levels of silica'.[4]

2.6 A revised national exposure standard of 0.1 mg/m^3 (TWA, 8 hours) for quartz, cristobalite and tridymite came into effect on 1 January 2005.[5] Exposure standards are discussed in chapter 5.

Exposure to crystalline silica

2.7 Exposure to crystalline silica is known to cause a number of diseases and is linked to others.

Silicosis

2.8 Silicosis has long been known as a disease associated with mining and is caused by the inhalation of dust containing crystalline silica. Silicosis is characterised by a diffuse, nodular, interstitial pulmonary fibrosis.[6] Silicosis may cause breathing difficulties, chest pain, respiratory failure and lead to death. There are three main types of silicosis:

- Chronic/classic silicosis, which is the most common type, occurs after 15-20 years of moderate to low exposure. Symptoms associated with chronic silicosis may or may not be obvious in its early stages. As the disease progresses the worker may experience shortness of breath upon exercising. In the later stages the worker may experience extreme shortness of breath, chest pain or respiratory failure.
- Accelerated (subacute) silicosis, which can occur after 5-10 years of exposure to high levels of silica. Symptoms include severe shortness of breath, weakness and weight loss. The onset of symptoms takes longer than in acute silicosis. This is found in workers in occupations such as sandblasting, production of silica flour and stone masonry involving power tools.

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2 *Submission* 13, p.3 (CFMEU); NOHSC, *Regulation Impact Statement on the Proposed Amendments to the National Exposure Standards for Crystalline Silica*, October 2004, p.16.

3 In 2005, NOHSC became the Australian Safety and Compensation Council (ASCC).

4 NOHSC Regulatory Impact Statement, pp.18-19.

5 *Submission* 11, p.4 (DEWR).

6 *Submission* 26, p.3 (WHS).

- Acute silicosis, which occurs after a few months or as long as two years following exposure to extremely high concentrations of respirable crystalline silica. Symptoms include severe disabling shortness of breath, weakness and weight loss, which often leads to death. The fatal course of the disease is not influenced by treatment. This disease is primarily reported in occupations that can have very high exposures to fine silica dusts and include sandblasters, stone crushers, ceramic workers and workers in abrasive manufacturing.[7]

Latency

2.9 There was extensive discussion in evidence on the latency of chronic silicosis. Cement Concrete and Aggregates Australia (CCAA) stated that chronic silicosis has a latency that may be up to seven years after cessation of exposure: 'that is, a worker may have no symptoms or signs of silicosis either clinical or on chest X-ray at the time of cessation of exposure and then be diagnosed with clinical silicosis up to about seven years later, with little or no clinical evidence of disease in the intervening period (and no ongoing exposure)'.[8]

2.10 CCAA went on to state that this delayed appearance or latency is rare and 'probably 95 per cent of all cases of silicosis are diagnosable within a year of cessation of exposure, if not at the time of exposure'.[9] CCAA commented:

> The evidence from the literature is that nearly all workers who will eventually be diagnosed as having silicosis are diagnosable at the time their exposure ceases. Some who cease work because they are unwell, or leave work without having a recent X-ray, may not actually be diagnosed until they are investigated, but this usually occurs in a short period after they report illness to their doctor. If they have been under surveillance in compliance with the Hazardous Substances Regulations governing crystalline silica (in all Australian jurisdictions) they should have had an X-ray within 5 years of ceasing exposure. It can be expected that almost all who will eventually be diagnosed as having silicosis will have evidence on those X-rays.[10]

2.11 CCAA stated that silicosis does not have a long latency period, comparable with mesothelioma (which may occur up to 40 years after exposure has ceased) or some other occupational cancers. Those workers whose X-ray is classed as 'no opacities' when they cease exposure, will rarely develop opacities (with or without any signs of silicosis) in later years. CCAA concluded 'latency is not a major issue in relation to silicosis, and there will not be a wave of hidden cases occurring years

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7 *Submission* 13, p.2 (CFMEU); see also *Submissions* 14, Additional information, 2.12.05 (CCAA); 20, pp.8-9 (AIOH); 32, p.2 (Dust Diseases Board of NSW).

8 *Submission* 14, Additional information, 2.12.05, p.4 (CCAA).

9 *Committee Hansard* 30.9.05, p.5 (CCAA).

10 *Submission* 14, Additional information, 2.12.05, p.4 (CCAA).

ahead. The few who do will develop those opacities within a short time of ceasing work'.[11]

2.12 CCAA concluded:

> When considering individual and isolated cases, it is possible that a worker who has retired many years may have a chest X-ray for some reason and that a radiologist at that stage may detect a opacity on the X-ray which was not evident on X-rays done at the time of exposure. When coupled with the past history of exposure, the opacity may be queried or even diagnosed as due to silica exposure. Whether this could be regarded as silicosis in the absence of any clinical signs is debatable. Many workers with X-rays which have been queried in this way in Australia in recent years, are subsequently recognised as not having silicosis ie the opacity is an artefact, or due to some other cause. In a recent series of X-rays where five were queried, an opinion from Professor Paul Wheeler at Johns Hopkins in Baltimore a world-recognised expert, was that all were due to false opacities showing up, but really caused by obesity coupled with poor X-ray technique. Early signs of silicosis on X-ray can be confused with small opacities caused by many other medical conditions.[12]

2.13 In response to CCAA, Dr Faunce of the Australian Sandblasting Diseases Coalition stated that it did not agree that silicosis comes on long after exposure ceases without any initial evidence:

> That is simply not supported, and we would disagree with that. We would certainly disagree that 95 per cent of all silicosis cases are diagnosable within a year of cessation of exposure.[13]

2.14 The US National Institute for Occupational Safety and Health (NIOSH) noted that chronic silicosis develops years after exposure to relatively low concentrations of respirable crystalline silica and that epidemiologic studies have found that chronic silicosis may develop or progress even after occupational exposure has ceased.[14] Researchers studying silicosis compensation in Western Australia stated:

> Silicosis (except acute silicosis after intense exposure) usually takes many years to develop after silica exposure has begun and therefore, may not occur until long after a subject has left the industry where the relevant exposure occurred.[15]

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11 *Submission* 14, Additional information, 2.12.05, p.4 (CCAA).

12 *Submission* 14, Additional information, 2.12.05, p.4 (CCAA).

13 *Committee Hansard* 10.11.05, p.36 (Dr Faunce).

14 Department of Health and Human Services, *NIOSH Hazard Review: Health Effects of Occupational Exposure to Crystalline Silica*, Publication No 2002-129, April 2002, www.cdc.gov/niosh/pdfs/02-129.pdf, p.v.

15 de Klerk NH, Ambrosini GL, Pang SC and Musk AW, 'Silicosis Compensation in Western Australian Gold Miners Since the Introduction of an Occupational Exposure Standard for Crystalline Silica', *Annals of Occupational Hygiene,* Vol 46, No 8, pp.687-692, 2002.

2.15 Workplace Health and Safety Queensland (WHS) noted that 'there is general consensus amongst the researchers that the latency period of most cases of silicosis is in excess of twenty years from first exposure'.[16]

Risks to the community

2.16 The Committee received submissions from members of communities living in the vicinity of quarries and smelters which raised concerns about the potential for members of the community to develop dust-related disease.

2.17 The Somersby Action Committee reported that due to extensive quarry activities on the Somersby Plateau NSW, residents experienced exposure to silica dust. Dust also effects schools and businesses in close proximity to quarries. There have been reports of the increased incidence of asthma and concerns that the community has been put at risk of silicosis. The Action Committee pointed to problems with policing sites to ensure that dust in minimised. Although fines have been imposed, these are considered to be too low to act as a deterrent. As there are proposals to expand quarries in the area, the Action Committee called for greater protection of populations living near quarries, more regular inspection of work sites, and independent environmental impact statements.[17]

2.18 CCAA stated that there have been no observances of silicosis arising from exposure to RCS in the community. This was not only the case in Australia, but overseas as well. Silicosis was seen as an industrial problem, not a community problem:

> …any source of silica dust that is industrial is dissipated in terms of its intensity very rapidly by distance. So, although there is a theoretical possibility that somebody could be living next to a source of respirable silica dust, in practice nobody has ever found such a case.[18]

CCAA went on to note that there is also monitoring of exposures including around all industrial sites and around the perimeters. Controls are also in place to prevent dusts from escaping and organisations can and are prosecuted for failing to meet those standards.[19]

2.19 The Whyalla Red Dust Action Group voiced concern at the dust exposure of residents near the Onesteel Steelworks in South Australia. Fine iron ore dust is emitted from the works and the Action Group indicated that the dust seriously contaminates 1000 homes, public facilities, schools, businesses and sporting facilities. It noted that in July 2003, the South Australian Environment Protection Agency and the Department of Human Services 'issued a joint public statement which advised the

16 *Submission* 26, p.3 (WHS).

17 *Committee Hansard* 30.9.05, pp.40, 43 (Somersby Action Committee).

18 *Committee Hansard* 30.9.05, pp.1, 4 (CCAA).

19 *Committee Hansard* 30.9.05, p.17 (CCAA).

exposed community that it may suffer adverse health effects from exposure to Onesteel's dust'.[20]

Airway disease

2.20 While silicosis has long been identified as an occupational disease arising from inhalation of dust containing crystalline silica, there has been some dispute over the association of airway disease with crystalline silica. There was extensive discussion in evidence as to the incidence of airway disease related to toxic dust and in particular the compensation case of Mr Richard White arising from his exposure to RCS.

2.21 Chronic obstructive pulmonary disease (COPD) refers to a combination of cough and phlegm, breathlessness and airflow obstruction. Professor E Haydn Walters, University of Tasmania, stated that generally, 'it is likely that somebody will go from having some irritant cough and a bit of sputum to gradually developing some airflow obstruction to then becoming symptomatic and breathless on exercise perhaps over a 15- to 20-year period if they have moderate dust exposure which is continuing'.[21]

2.22 Professor Walters noted that COPD is a common problem in Australian society and is usually due to cigarette smoking. The Professor commented that it appeared that the case of Mr White 'suffered from legal and medical preconceptions' that 'airway disease is either classic "asthma"…or chronic obstructive pulmonary disease…caused by cigarette smoking'. Further it also appeared that there was a view that exposure to silica and other toxic dust causes lung parenchymal fibrosis or silicosis and not airway disease. The Professor went on to state:

> The idea that occupational dusts and fumes can also give rise to airway disease and be a cause of fixed obstructive airway disease, but at doses to the lung insufficient to give clinically evident lung fibrosis, seems to have been slow to be accepted. However, I think the evidence is now becoming really quite strong and generally accepted that this is indeed the case.[22]

2.23 The Professor pointed to a study undertaken in Melbourne which showed that exposure to organic dusts was a significant cause of COPD in non-smokers rather than the general assumption it would all be due to cigarette smoking. The Professor concluded:

> This does not relate of course directly to silica exposure, which is a non-organic mineral dust, but it does show in a general sense that occupational dusts are not insignificant in contributing to the burden of COPD in Australia. The population that we were dealing with in Melbourne would not have been significantly exposed to silica dusts but this does not mean

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20 *Submission* 1, p.2 (Whyalla Red Dust Action Group).

21 *Committee Hansard* 10.11.05, pp.26, 28 (Prof EH Walters).

22 *Submission* 3, p.2 (Prof EH Walters).

> that in relevant populations that this would not also be potentially of importance.[23]

2.24 The Professor informed the Committee that internationally there is now increasingly wide acceptance that non-organic dusts can also be a cause of fixed airflow obstruction and chronic bronchitis, and that this may be either additive to cigarette smoking or might be more evident in smokers. The Professor pointed to two recent papers. The first, a literature review by the UK Institute for Environment and Health concluded that the literature suggested that there are clearly elevated risks of developing COPD associated with several occupations including welding, flour mill work and cotton textile work.[24] Secondly, the US National Institute for Occupational Safety and Health (NIOSH) published a hazard review on RCS in 2002. The review concluded that silica is one of a number of occupational dusts associated with COPD. The review also noted that some studies suggest that these diseases may be less frequent or absent in non-smokers.[25]

2.25 In addition, in 1999 British miners were recognised as suffering a high incidence of COPD in relationship to mineral dust exposure, even in the absence of classic Coal Workers' Pneumoconiosis (CWP). Subsequently, the British Government assessed miners and ex-miners and provided compensation. Professor Walters noted that 'this has really been an extremely important development and a mind shift in terms of recognition that bronchitis and COPD are not just cigarette smoker diseases but also a disease of dust exposed workers'.[26]

2.26 The Australian Institute of Occupational Hygienists (AIOH) also commented on airway disease and noted that it has been statistically associated with some occupational groups such as miners who may have been exposed to long term high dust exposures. AIOH went on to comment that:

> The findings are controversial as the associated disease symptoms are confounded due to lifestyle factors, particularly tobacco smoking. Similar to the findings with lung cancer outcomes, for airways disease detailed examination of the various risk factors indicates that tobacco smoking contributes a higher risk component and hence the majority of the case numbers.[27]

2.27 The Committee also notes that in its Regulation Impact Statement on the Proposed Amendment to the National Exposure Standards for Crystalline Silica in

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23 *Submission* 3, p.3 (Prof EH Walters).

24 Institute for Environment and Health, *Review of Literature on chronic Bronchitis and Emphysema and occupational Exposure*, January 2005, p.4.

25 *NIOSH Hazard Review*, p.vi.

26 *Submission* 3, p.3 (Prof EH Walters); see also *Committee Hansard* 10.11.05, pp.29, 30 (Prof EH Walters).

27 *Submission* 20, p.12 (AIOH).

October 2004, NOHSC stated emphysema, the main cause of chronic obstructive lung disease, can be caused by inhalation of crystalline silica and that silica dust can worsen the damage done by smoking.[28]

Lung cancer

2.28 Since 1997 silica has been listed as a Class One carcinogen by the International Agency for Research on Cancer (IARC).[29] In 2002 NIOSH commented that 'the carcinogenicity of crystalline silica in humans has been strongly debated in the scientific community'.[30] The NOHSC Regulation Impact Statement (2004) stated that 'the balance of evidence suggests that RCS exposure causes lung cancer' but that 'there is dispute as to whether RSC exposure causes lung cancer directly, or whether RCS exposure causes lung cancer indirectly, i.e., whether the development of silicosis increases the risk of lung cancer'.[31]

2.29 The Regulation Impact Statement provided the following comparison of carcinogen classifications of crystalline silica.

Table 2.1: International carcinogen classification of crystalline silica

International Body	Carcinogen Classification
International Agency for Research on Cancer (IARC)	Crystalline silica – human carcinogen
National Institute of Occupational Safety and Health (NIOSH, USA)	Crystalline silica – *potential* occupational carcinogen
National Toxicology Program (NTP, USA)	RCS – known to be a human carcinogen
British Health & Safety Executive	RCS – causes lung cancer, but is probably a *weak carcinogen*
American Conference of Governmental Industrial Hygienists (ACGIH, USA)	Crystalline silica – *suspected* human carcinogen

Source: NOHSC, *Regulation Impact Statement on the Proposed Amendment to the National Exposure Standards for Crystalline Silica*, October 2004, p.14.

2.30 In evidence differing views on the link between RCS and lung cancer were also expressed. AIOH stated that:

28 NOHSC, Regulatory Impact Statement, p.13.

29 *Submission* 13, p.2 (CFMEU).

30 *NIOSH Hazard Review,* p.v.

31 NOHSC, Regulatory Impact Statement, p.14.

> Several studies among the many reviewed by the [International Agency for Research on Cancer] IARC working group on the question of silica exposure and cancer risk in humans were negative or equivocal, and carcinogenicity of silica was not detected in all industrial operations. However, nine studies showed excessive risk for lung cancer. These included refractory brick workers, pottery workers, diatomaceous earth workers, foundry workers, granite workers, and mine workers, (although not coal-mine workers). It appears that the carcinogenic property of crystalline silica may be dependent on its biologic activity, polymorphic nature, or specific industrial processes such as heat treatment and mechanical grinding.[32]

2.31 AIOH went on to note that an Australian study indicated that 'long term exposure to high levels of crystalline silica has also been associated with increase in lung cancer. Although detailed examination of the various risk factors indicates that tobacco smoking contributes a higher risk component and hence the majority of the case numbers.'[33]

2.32 Mr Lindsay Fraser of the Construction, Forestry, Mining and Energy Union (CFMEU) noted that both IARC and NIOSH accept that exposure to crystalline silica is a carcinogen and stated 'so I dispute the evidence that there is now equivocation on that. It is accepted by the world's medical and scientific professions that it is a carcinogen and that it can lead to a horrid death.'[34]

2.33 The Minerals Council of Australia (MCA) stated that in the review of the silica standard it had put the view that there was 'uncertainty in the epidemiological evidence linking exposure to silica to lung cancer, especially in those workers where there was no evidence of silicosis'.[35] The CCAA went further and called the IARC's listing of silica a 'controversial decision' and went on to state that the original decision has been disputed by members of the original IARC panel since that time. In addition, CCAA commented that the IARC panel only considered epidemiological evidence up to 1994 and the more current research on workers, for example in the UK sand industry, indicated no excess risk of lung cancer or other cancers. CCAA quoted from recent reviews undertaken for the American Chemical Society:

> …the literature does not support the view that silica dust causes lung cancer, nor does it suggest that silicosis is a cause of lung cancer. Further, the data indicate that the current (and probably the former) TLV-TWA for silica dust is protective for silicosis with an adequate margin of safety.[36]

2.34 CCAA also provided the Committee with a paper on research conducted into the British sand industry carried out by the Institute for Environment and Health.

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32 *Submission* 20, p.10 (AIOH).

33 *Submission* 20, p.12 (AIOH).

34 *Committee Hansard* 30.9.05, p.22 (CFMEU).

35 *Committee Hansard* 10.11.05, p.15 (MCA).

36 *Submission* 14, Additional information, 2.12.05, p.5 (CCAA).

CCAA stated that the 'paper shows beyond reasonable doubt that there is no cancer risk in that industry, and also indicates that any risk of silicosis is extremely low (although that issue was not the primary focus for the research)'.[37]

2.35 WHS also commented that 'crystalline silica has been found to be a carcinogen in animals (rats) but it is yet to be proven in humans from epidemiology studies' and noted that:

> It was this revelation that led the International Agency for Cancer Research (IARC) to classify crystalline silica as a group 1 human carcinogen. (Brown and Rushton, 2005; Verma, Purdham and Roels, 2002). Brown's research (2005) did not find any consistent correlation between respirable crystalline silica and the development of lung cancer.[38]

WHS went on to state that in studies of NSW Dust Diseases Board compensation cases the excess lung cancer risk amongst compensated silicotics corrected for smoking, was found to be 1.90 (confidence interval 1.54 to 2.33). WHS commented that this 'is highly significant so lung cancer remains an issue. Whether it remains to be so in the absence of silicosis is not yet fully clear and is expected to become a battleground for plaintiff lawyers and compensation bodies during the next 10 to 20 years.'[39]

2.36 The Dust Diseases Board of NSW has also commented that there is much debate as to whether silicosis is a pre-requisite to the development of lung cancer. In addition, 'smoking is believed to increase the risk, possibly 2-fold more than in non-smokers'. Lung cancer developing in patients with silicosis is accepted for compensation by the Board, 'even if the person has smoked or is smoking'. Approximately 8 per cent of all compensated lung cancer cases are in association with silicosis.[40]

Other diseases related to respirable crystalline silica

2.37 Occupational exposures to respirable crystalline silica can also have heart effects. In severe cases, fibrosis in the lungs can lead to prolonged increase in the blood pressure in the arteries and veins of the lungs (pulmonary hypertension).[41] Exposure may also be related to the development of autoimmune disorders (such as scleroderma, systemic lupus erythematosus and rheumatoid arthritis), chronic renal disease and other adverse health effects.[42]

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37 *Submission* 14, Additional information, 2.12.05, p.5 (CCAA).

38 *Submission* 26, pp.3-4 (WHS).

39 *Submission* 26, p.7 (WHS).

40 Dust Diseases Board, *A Guide to Compensated Occupational Lung Disease in NSW*, p.6.

41 NOHSC Regulatory Impact Statement, p.13.

42 *NIOSH Hazard Review*; see also *Submission* 26, p.5 (WHS).

Beryllium

2.38 Beryllium copper alloy or copper-beryllium is exceptionally strong and hard and is an excellent electrical and thermal conductor, nonmagnetic and resistant to corrosion and fatigue. Beryllium oxide is an outstanding conductor of heat. These metals are used in the automotive industry, mining, glass manufacturing, smelters, foundries, ship manufacture, dental laboratories (crown and bridge), bicycle frames, aerospace, nuclear power, aviation and electrical instruments. They are used extensively in aircraft: engines, auxiliary power units (APUs), aircraft main and nose landing gear brushes, wheels and brakes, in airframe structures, in helicopters and in some jet engine igniter plug firing tips, electrical wiring, instruments, communications systems including radios, radar, computers, and weaponry systems.[43]

2.39 Inhaled beryllium dust particles causes lymphocytes in the lungs to become sensitised and then proliferate. As the cells react to the particles they form clumps that rob the lungs of their elasticity and make it difficult to breath. Exposure to high concentrations of beryllium dust results in acute beryllium disease (ABD). Symptoms of ABD include shortness of breath, cough, chest pain, and rapid heart beat. Workers generally recover from ABD but some will develop chronic beryllium disease (CBD). CBD is incurable, although when caught early, symptoms can be suppressed with steroids. CBD can damage the lungs, liver and spleen. It can also cause skin ulcers and other rashes. CBD has a long latency, appearing up to 40 or more years after initial exposure. It occurs in as much as 17 per cent of workers in particularly risky occupations, such as those who work in machine shops or in construction where beryllium is used.[44]

2.40 Mr John Edwards stated that he and others considered CBD to be far worse than asbestos-related lung diseases as CBD can affect every major organ of the human body: lungs, heart, eyes, kidneys, liver and joints; and cause fibrosis.[45]

Timber dust

2.41 Exposure to timber dust may cause simple irritation or, less frequently, immunologically mediated effects such as rhinitis, asthma, bronchitis and pneumonitis. Not all persons are allergic and not all timber species are allergenic. Asthma has been reported in workers using a variety of timbers, particularly certain softwoods, for example Western red cedar, Californian redwood, spruce and some pine species, and a few hardwoods, for example blackwood, messmate and rosewood.

2.42 AIOH also noted that hardwood dust has been associated with adenocarcinoma of the nasal sinuses, especially in those industries requiring fine,

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43 *Submission* 45, p.2 (Mr J Edwards).

44 Newman LS, 'Toxic Beryllium: New Solutions for a Chronic Problem', *Environmental Health Perspectives*, Vol 109, No 2, Feb 2001; see also *Submission* 24, p.5 (Dr G Pain).

45 *Submission* 45, p.1 (Mr J Edwards).

accurate work such as furniture making and pattern making. Such work requires extensive sanding and shaping, and produces much fine hardwood dust. Sino-nasal cancers associated with hardwood dust, or with a mixture of hardwood and softwood dust, have been reported from many countries including Australia. Softwood dust may be associated with squamous cell carcinoma of the nasal sinuses. The average reported time between first exposure to wood dust and diagnosis is around 40 years.[46]

2.43 Fibreboard dust is another hazard. Fibreboard is made from wood fibres bonded together with a resin. Construction workers doing flooring and wall panelling handle large amounts of particleboard or fibreboard. These custom woods contain formaldehyde, which can possibly cause cancer in humans. Machining operations such as sawing, drilling and sanding can generate large amounts of airborne wood dust. Inhaling formaldehyde can cause burning sensations in the eyes, nose and throat and a range of other symptoms if higher levels are in the air.[47]

2.44 The CFMEU stated:

> Since [medium density fibreboard] has been introduced, there have been all kinds of problems associated with it. There is a formaldehyde problem that has been dealt with here in Australia. We have the lowest formaldehyde emission of anywhere in the world – that is by agreement between the manufacturers and ourselves…But wood dust is a known carcinogen. Nobody has ever argued it is not. The employers know that. The manufacturers know that. There are all kinds of regimes set up for when you are cutting hardwoods, about the extractors and the cutting rooms, so we do not see that as quite the same problem as silica.[48]

2.45 Exposure standards for timber dusts have changed over the years as more has become known about the hazards of particular timber species. AIOH commented that 'since 1998, the standard has become much more complex, not only because of the burgeoning literature on the carcinogenic and allergenic effects of a larger number of timber species, but also because of changes in dust sampling techniques and in the definition of inhalability'. Proposals have been made in the US to reduce further the exposure standards for both allergenic and carcinogenic species.[49] The exposure standards for formaldehyde have also reduced over time.

2.46 Dr John Bisby for CCAA commented on the high risks associated with wood dust:

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46 *Submission* 20, p.16 (AIOH).

47 *Submission* 28, p.4 (ACTU).

48 *Committee Hansard* 30.9.05, p.33 (CFMEU).

49 *Submission* 20, p.17 (AIOH).

> It is killing Australians today. The incidence of certain cancers in wood workers exposed to wood dust is 50 times or more. Not 50 per cent; 50 times. And that is today. In our group we have seen about 30 [cases].[50]

Dr Bisby went on to state that 'wood dust is a bigger issue [than silicosis] because nobody is aware of it'.[51]

2.47 AIOH concluded that 'in small to medium enterprises, many workers will continue to be exposed to unacceptably high levels of wood dusts, with the attendant disease risks. This is a situation that can and should be rectified.'[52]

Alumina

2.48 Aluminosis is the occupational lung diseases seen in workers exposed to the fine aluminium powder or dust. The disease is characterised by a scarring of lung tissue after prolonged inhalation. The degree of scarring is related to the duration of a worker's exposure to the dust, the concentration of the dust in the air and the fineness of the particles.[53]

Textile dusts

2.49 Byssinosis is an occupational airways disease seen in textile workers due to the inhalation of certain textile dusts. The symptoms include chest tightness, wheezing and shortness of breath. Initial symptoms appear several hours after arriving at work on the first day of the working week or the first day back from a holiday. They generally improve over the course of the week and do not recur until the beginning of the following week after the individual has had at least two days of no exposure to textile dust. With prolonged and intense exposure the individual's symptoms may progress to become continuous throughout the week, both at work and home. This continuous irritation of the airways can lead to permanent irreversible impairment of a worker's lung function. This condition is now rare.[54]

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50 *Committee Hansard* 30.9.05, p.7 (Dr Bisby).

51 *Committee Hansard* 30.9.05, p.15 (Dr Bisby).

52 *Submission* 20, p.18 (AIOH).

53 *Submission* 32, p.4 (Dust Diseases Board of NSW).

54 *Submission* 32, p.3 (Dust Diseases Board of NSW).

CHAPTER 3

THE NATURE AND EXTENT OF ILLNESS AND DISABILITY

3.1 The Committee was informed that the true nature and extent of illness, disability and death due to toxic dust was difficult to ascertain. Data sources rely primarily on workers' compensation data which is limited in scope. While workers in some industries particularly the mining industry are monitored regularly, this is not the case for all industries. The Construction, Forestry, Mining and Energy Union (CFMEU) commented that the transient nature of the construction industry, coupled with the possible delay in developing symptoms, is an impediment to the accurate compilation of statistics. Many workers move on to other industries and in some cases lung disease is attributed to other causes for example, smoking.[1]

Data sources

3.2 Under the National Occupational Health and Safety Data Action Plan, the National Occupational Health and Safety Commission (NOHSC) maintain national occupational health and safety data. The primary data source used in Australia is the National Dataset for Compensation-based Statistics (NDS) which consists of accepted workers' compensation claims. Datasets are also maintained on notified work-related fatalities and voluntary notifications of mesothelioma cases. Other data sources include the National Hospital Morbidity data, the National Coronial Information System, national surveys of households run by the Australian Bureau of Statistics and surveys of GPs.

3.3 The Department of Employment and Workplace Relations (DEWR) noted that a review of available data sources shows that there is limited information on the extent of work-related respiratory disease in Australia. Estimations of occupational contribution to respiratory disease in society are difficult because respiratory disease can be attributable to other non-occupational factors, unless it is specifically related to a unique workplace causative factor or it can be differentiated by its clinical features. The information that is available comes from a variety of sources, including published studies; workers' compensation claims data, the Dust Diseases Board (DDB) of NSW and the two Surveillance of Australian Workplace-Based Respiratory Events (SABRE) programs in Victoria and NSW. Published general practitioner and hospital presentation data sources do not provide useable information, because respiratory disease cases are included in categories that also contain such diseases not related to work.[2]

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1 *Submission* 13, p.3 (CFMEU).

2 *Submission* 11, p.5 (DEWR).

3.4 The Dust Diseases Board of NSW maintains statistical information gathered from and about individuals who have attended a medical screening or who have applied for compensation. Information includes:

- new certificates of disablement issued categorised by dust disease;
- deaths categorised by causation and average age;
- statistics relating to mesothelioma; and
- medical data on individuals such as x-rays, lung function tests etc.[3]

3.5 The SABRE project is a voluntary, anonymous notification scheme of occupational lung diseases. It has been operating in Tasmania and Victoria since 1997 and NSW since 2001. It is supported by the Dust Diseases Board of NSW and is being undertaken in collaboration with the team in London who developed the Surveillance of Work-related Occupational Respiratory Disease (SWORD) scheme. It also has links with New Zealand. The aim of the SABRE project is to determine the incidence of work-related respiratory disease and inhalation injury in NSW and Victoria and to disseminate information about the burden of occupational respiratory disease.[4]

3.6 Other witnesses commented on the lack of comparability of datasets and the reliance on workers' compensation data. The Australian New Zealand Society for Respiratory Science (ANZSRS) commented that the need for consistency of approach in collecting data is becoming increasingly important as the workforce becomes more mobile. Comparability of data would be in the interest of gaining long term trending and separating pre-existing trends from current trends.[5] WorkSafe Western Australia informed the Committee that it recognised the difficulties associated with collecting reliable data associated with toxic dust exposure, and it is working with NOHSC to improve the availability and quality of data according to the NOHS Data Action Plan.[6]

3.7 Workplace Health and Safety Queensland (WHS) commented that, in undertaking research for its submission to the inquiry, it had found it difficult to access data as there was a 'paucity of information of significance held in a readily accessible form by any organisation, including the State regulator' in all but the mining industry:

> ...there have been no identifiable programs for routine collection of exposure data of the kind which will bring great substance to these discussions…Industry, probably for reasons related to competition, has not been motivated or sufficiently organised to fund and set up any scheme for either data collection or shared data management. This situation applies not only to those in dusty industries, but to almost all fields where exposure

3 *Submission* 32, p.6 (Dust Diseases Board of NSW).

4 *Submission* 32, p.7 (Dust Diseases Board of NSW); *Submission* 28, Additional Information (ACTU).

5 *Submission* 9, p.8 (ANZSRS).

6 *Submission* 12, p.2 (WorkSafe WA).

> occurs to hazardous substances with both short and long term health consequences, but particularly long term exposures with chronic diseases. Only in mining has there been a long standing arrangement of routinely collecting dust exposure data by government bodies.[7]

3.8 WHS went on to state that only government seems to be in a position to command the collection and analysis of data, however:

> Efforts to establish such collections of data in Australia on a national basis through either the National Institute for Occupational Health and Safety or the NOHSC have come to nought, because of their lack of continuity. Impartiality and independence in the national arena are now new considerations. In the case of exposures to respirable crystalline silica, the time frame must be many decades long. The Health and Safety Executive in the UK has operated a mechanism into which such critical data from across the nation can be collected and analysed.[8]

3.9 The Minerals Council of Australia (MCA) also noted that workers' compensation data lacked detail and timeliness. In addition, a worker needs to be off work for five days to be included in the workers' compensation data, whereas the minerals industry records one day off in its statistics. MCA commented that there is no central database to facilitate analysis, to establish trends or to track the health of workers as they move from one company to another, or to track any disease through their life. The data that are available are often not available in electronic form, so analysis is not easy:

> We believe that the focus has been very much on collection rather than on analysis. In some organisations that do collect data, such as government agencies, there are cupboards full of material but no resources to analyse it.[9]

3.10 MCA also referred to the difficulties of tracking the health of workers and commented that HealthConnect could be a useful means of monitoring the health of workers in certain industries. HealthConnect collects, stores, and exchanges health information under strict privacy safeguards. With amendments to include information on occupation, MCA suggested that tracking people after they had left the industry could be possible.[10]

3.11 The Australia Institute of Occupational Hygienists (AIOH) pointed to the Health Watch study of workers in the Australian oil industry. This is an independent epidemiology program which commenced in 1980. The program studies the health of about 18,000 past and present employees in the petroleum (oil and gas) industry. The Health Watch study could be adapted as a model to study the incidence of occupational disease as a consequence of exposure to toxic dusts in the workplace

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7 *Submission* 26, p.26 (WHS).

8 *Submission* 26, p.26 (WHS).

9 *Committee Hansard* 10.11.05, p.15 (MCA).

10 *Committee Hansard* 10.10.05, pp.16,18 (MCA).

(such as exposure to silica in sandblasters). However, AIOH also commented that the oil industry in Australia is made up of just a few large, well-resourced companies and an active industry association that are both able to draw upon occupational hygienists, occupational physicians and epidemiologists. Most Australians, however, are employed in small to medium sized enterprises, which do not have access to these levels of resources and as a consequence, it is difficult to characterise the precise incidence and prevalence of dust related disease in the general working population.[11]

3.12 Mr Bruce Ham commented that work had been undertaken to examine the possibility of a National Mining Health Database. The study concluded that the current large mining health databases were very similar in structure and had potential to be combined, especially for research purposes. However, the existing legislative structures made a central database unlikely. Mr Ham noted that the research potential of using existing databases was demonstrated in a joint New South Wales Heart Disease risk project. A feature of this research was the matching of the register of miners with the Deaths Index held by the Australian Institute of Health and Welfare. This has provided an important dataset for further health outcomes research.[12]

3.13 The Australian Council of Trade Unions (ACTU) and CFMEU also highlighted the need for improved data sources. The ACTU recommended improvements in data collection across the jurisdictions, including establishing a national medical registry of dust diseases cases. The ACTU commented that one possible means was to make SABRE compulsory rather than relying on workers' compensation data:

> We need to look at improving the data collection; compulsory reporting by the states, the jurisdictions, to this scheme; and perhaps expanding it to the hospitals and GPs and other groups that deal on a daily basis with people who have contracted airborne diseases. Until that happens we do not get the right figures and therefore we do not know how big this problem is and we cannot work out a good strategy, so that is essential.[13]

3.14 The Dust Diseases Board noted that:

> The SABRE Scheme plays an important role in determining which occupations and industries are likely to cause disease and why. Once known, positive strategies can be developed to prevent lung diseases in these industries and occupations. The Scheme has the potential to decrease the incidence of occupational lung disease and to be of significant public health benefit.[14]

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11 *Submission* 20, pp.21-22 (AIOH).

12 *Submission* 22, p.4 (Mr B Ham).

13 *Committee Hansard* 29.9.05, p.89 (ACTU); 30.9.05, p.25 (CFMEU); see also *Submission* 28, p.8 (ACTU).

14 Dust Diseases Board of NSW, *A Guide to Compensated Occupational Lung Disease in NSW*, p.13.

Incidence of disease related to toxic dust

3.15 WHS stated that during the last 100 years, exposure to dust has resulted in dust diseases which, in Australia, have claimed thousands of lives and caused some incapacity and suffering to tens of thousands of others. During the same period, control of dust exposures following increasingly stringent dust standards has, with the noted exception of asbestos, reduced present and future incidence of dust disease to a tiny fraction of that previously observed. WHS commented that the coal mining industry best illustrates the success of regulation with the prevalence of coalworkers' pneumoconiosis declining from as high as 27 per cent before World War II and 16 per cent in 1948 to virtually non-existent levels by the turn of the 21st century.[15]

3.16 DEWR provided the Committee with an overview of the estimates of the incidence of respiratory disease in Australia. Population based estimates in Australia are used to indicate the magnitude of premature mortality induced by exposure to hazardous substances in the workforce. The estimated age-adjusted mortality rates (expressed in number of deaths per million per year) were estimated to be 5 and 2 for asthma, and 8 and 0 for dust diseases, respectively in men and in women. However, these estimates only addressed mortality, not morbidity.[16]

3.17 Workers' compensation-based estimates of rates of work-related respiratory disease are limited as the information published at a national level only includes cases that result in five or more days off work. A proportion of respiratory disease cases will not be formally diagnosed or will occur in workers after they leave work, in which case the connection to work is unlikely to be established and a workers' compensation claim is unlikely to be made. Also, a sizeable minority of workers has been shown not to be represented in Australian workers' compensation statistics.[17]

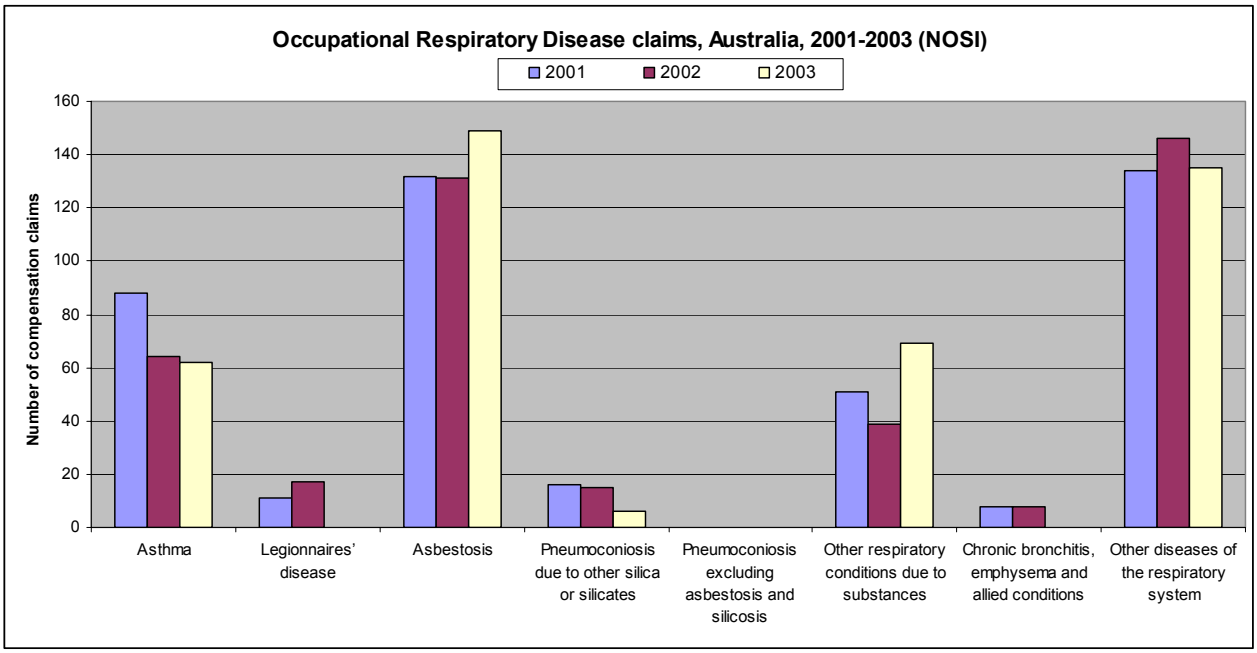
3.18 Figure 3.1 shows the numbers of cases of accepted claims for occupational respiratory diseases in Australia over the three year period of 2001-2003.

15 *Submission* 26, p.10 (WHS).

16 *Submission* 11, p.5 (DEWR).

17 *Submission* 11, p.6 (DEWR).

Figure 3.1. Occupational Respiratory Disease claims, Australia, 2001-2003 (NOSI)



Source: Submission 11, p.6 (DEWR).

3.19 The most common occupational respiratory disease is asbestosis, followed by asthma. Pneumoconiosis and chronic bronchitis are much less common. Two of the more common categories are 'Other respiratory conditions due to substances' and 'Other diseases of respiratory system'. DEWR also provided the Committee with a breakdown of 'other respiratory conditions due to substances' showing the number of accepted compensation claims against a causal chemical agent. For example, industrial fumes and gases had 225 accepted claims from 1996-97 to 2003-04 while there were 635 claims for 'dust not elsewhere classified'.[18]

3.20 The three industries with higher disease claims are manufacturing followed by education, and health and community services. In manufacturing, asbestos related-disease is the main disease group (233 claims), with asthma in the second group (59 claims). In education and health and community services, claims are mainly in the 'Other diseases of the respiratory system' group. When considering occupation groups, the higher number of claims occur in professionals, associate professionals and labourers respectively. Most claims occur in 'Other diseases of the respiratory system' for professionals, while most claims for associate professionals and labourers are asbestos-related disease.[19]

3.21 Table 3.1 shows the number of workers and dependents who received compensation under the NSW dust diseases scheme during 2004-05.

18 *Submission* 11, Additional information, 19.12.05 (DEWR).

19 *Submission* 11, p.6 (DEWR).

Table 3.1: Compensation payments during 2004-05 by disease for the NSW dust diseases scheme

Disease	Workers	Dependants	TOTAL
Asbestosis	230	308	**538**
Silicosis	188	276	**464**
Byssinosis	2	7	**9**
Hard Metal Pneumoconiosis	3	2	**5**
Farmer's Lung	0	1	**1**
Aluminosis	2	1	**3**
Bagassosis	0	0	**1**
Asbestos Related Pleural Disease (ARPD)	449	112	**561**
Silico-Tuberculosis	1	9	**10**
Asbestosis/ARPD	63	23	**86**
Talcosis	0	1	**1**
Silico-asbestosis	4	2	**6**
Mesothelioma	226	1244	**1470**
Lung cancer associated with silicosis	1	0	**1**
Silicosis/ARPD	2	0	**2**
Carcinoma of the Lung*	20	85	**105**
Silica/Lung cancer	5	16	**21**
Silicosis/mixed dust fibrosis	0	1	**1**
Plueral plaques & pain	1	0	**1**
Mixed dust with pneumoconiosis	1	1	**2**
Lung cancer in association with asbestos exposure	12	100	**112**
Peritoneal mesothelioma	16	46	**62**
TOTAL	**1226**	**2235**	**3461**

* includes Hexavalent chromium associated lung cancer, asbestosis/lung cancer & ARDP/lung cancer

Source: Dust Diseases Board of NSW, *Making a Difference Annual Report 2004/2005*, Appendix 5, p.70.

3.22 Table 3.2 shows data published by the Dust Diseases Board of NSW on deaths by causation and average age since the inception of the Workers' Compensation (Dust Diseases) Act on 29 February 1968.

Table 3.2: Deaths according to disease for the NSW dust diseases scheme since 1968

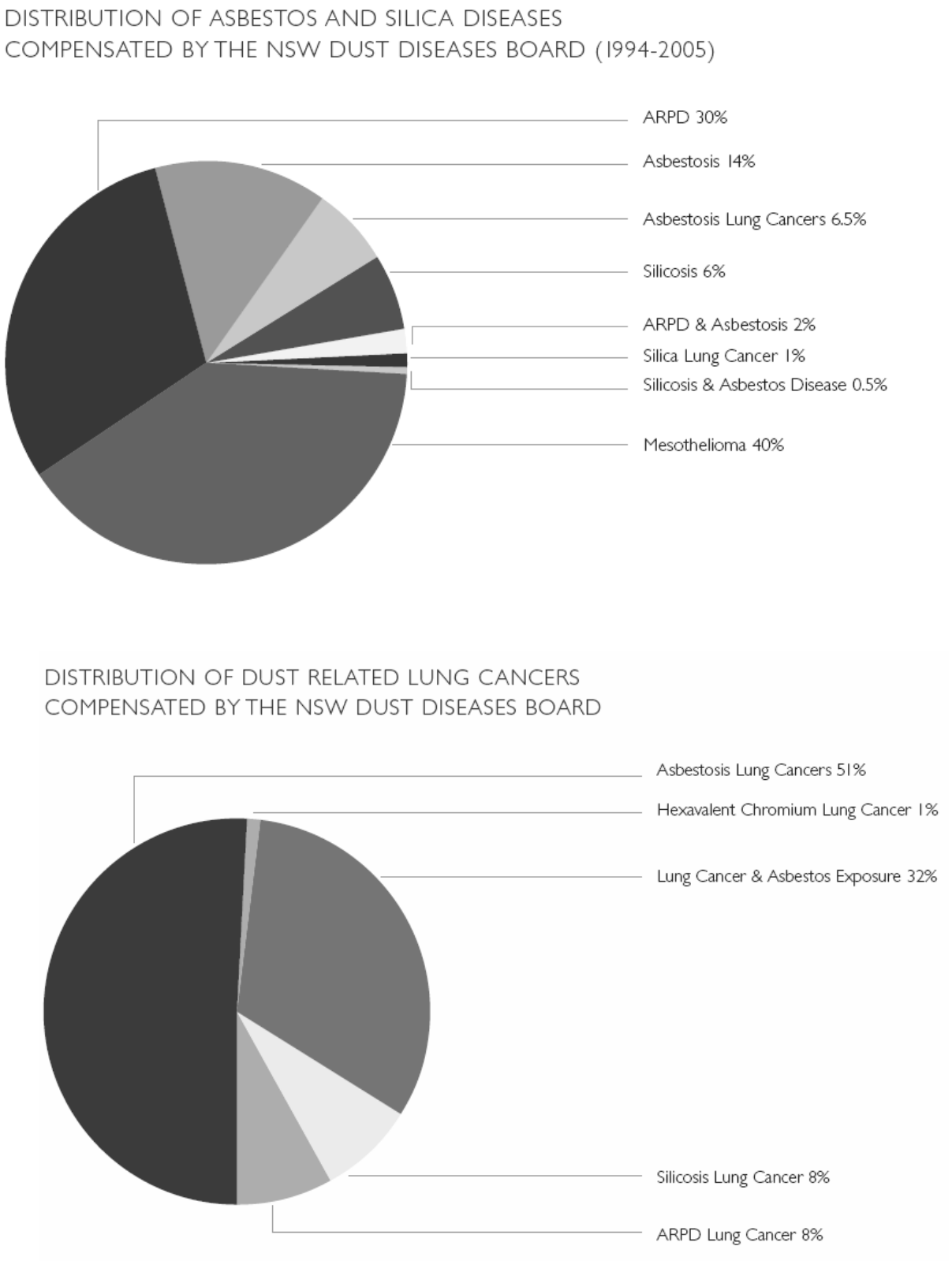
Disease	Death due to dust	Death not due to dust	Total	Average age of death due to dust
Asbestosis	402	241	643	72.57
Silicosis	435	944	1 379	70.98
Byssinosis	11	19	30	71.83
Hard Metal Pneumoconiosis	2	3	5	63.43
Farmer's Lung	1	2	3	61.17
Aluminosis	0	1	1	-
Bagassosis	0	1	1	-
ARPD	168	89	257	75.70
Silico-Tuberculosis	8	12	20	62.80
Asbestosis/ARPD	32	25	57	76.83
Emery Pneumoconiosis	0	1	1	-
Talcosis	1	2	3	65.74
Silico-asbestosis	10	4	14	67.31
Mesothelimoa	1 812	8	1 820	67.98
Peritoneal Mesothelimoa	2	0	2	63.45
Carcinoma of the Lung*	213	2	215	68.69
Silicosis/Lung Cancer	25	0	25	71.41
Silicosis/Mixed Dust Fibrosis	3	0	3	72.60
Mixed Dust Pneumoconiosis	1	0	1	61.47
Lung Cancer in Association with Asbestos Exposure	109	4	113	68.35
TOTAL	**3 235**	**1 358**	**4 593**	**68.37**

* includes Hexavalent Chromium Associated Lung Cancer, Asbestosis/Lung Cancer and ARPD/Lung Cancer

Source: Dust Diseases Board of NSW, *Making a Difference Annual Report 2004/2005*, Appendix 5, p.70.

3.23 The Dust Diseases Board also provides information on the proportion of compensation payments made for asbestos and silica diseases and all lung diseases. Figure 3.1 shows that asbestos-related compensation accounted for 90 per cent of the compensation payments made by the Board from 1994 to 2005. Silicosis lung cancer accounted for 8 per cent of the dust related lung cancers compensated by the Board in the same period.

Figure 3.1: NSW Dust Diseases Board Compensation payments 1994-2005



Source: Dust Diseases Board of NSW, *A Guide to Compensated Occupational Lung Disease in NSW,* p.15.

3.24 Information from the Dust Diseases Board only shows data for cases where compensation has been paid. Therefore, these figures do not include other lung diseases or other diseases caused by occupational exposure to dust, or unsuccessful cases for compensation.

3.25 A further source of data is the SABRE notification scheme. For Victoria and Tasmania, the most common condition reported by physicians is asthma (33 per cent of occupation respiratory events reported). The asthma incidence rate is 30.9 per million workers per year with a 2.4 times higher incidence rate in men compared to women. However, DEWR noted that SABRE in Victoria and NSW has incomplete coverage of physicians who see cases. The two most commonly reported causative agents for asthma in the SABRE (Victoria) notification scheme are wood dust and isocyanates (13.5 per cent and 5.8 per cent respectively). The finding of asthma as the most commonly reported occupational respiratory disease is similar to that found in overseas physician notification schemes. The next most commonly reported condition in Victoria and Tasmania is non-malignant pleural disease from asbestos exposure.[20]

3.26 DEWR also provided rates compensation and hospitalisation arising from inorganic dusts other than asbestos. For pneumoconioses other than asbestos, there was a decrease in the hospitalisation rate. This may be because the curves reflect different time periods in the history of the disease; or there may be better treatment available, which means less hospitalisation. In 2001-02 there were 72 hospitalisations, with 20 workers' compensation cases accepted. The hospitalisation numbers may include the same individual presenting for multiple hospitalisation during the year. Workers' compensation cases slightly increased, from 1.8 cases per million employed in 1998–1999 to 2.2 cases per million employed in 2001-02.[21]

3.27 While asbestos exposure in the workplace has decreased over the last 40 years, asbestos related disease has a period of long latency and it has been estimated that the incidence of asbestos related disease will continue for the next ten to fifteen years. Data provided by DEWR showed that asbestos-related workers' compensation cases increased from 10.1 cases per million employees in 1998-99 to 16.0 cases per million employees in 2001-02. Compensation cases for mesothelioma during the same period increased from 5.4 cases per million to employees to 7.4 cases. Hospitalisations for mesothelioma were higher.[22]

Incidence of disease related to exposure to respirable crystalline silica

3.28 Submissions noted that health problems associated with exposure to crystalline silica dust have been under investigation and control in Australia for more than a century. In 1905, investigation of the hard rock mining industry in Western

20 *Submission* 11, p.7 (DEWR).

21 *Submission* 11, p.9 (DEWR).

22 *Submission* 11, p.8 (DEWR).

Australia was carried out. In 1914 a Royal Commission was appointed to investigate safety issues in Broken Hill mines. Surveillance by the NSW Silicosis Board (now the Dust Diseases Board) and NSW Health Department resulted in the investigation and control for Sydney sandstone workers.[23] Regulations to control dust disease were enacted in Western Australia and New South Wales by the 1920s. Dust disease was largely due to silica dust and tuberculosis.[24]

3.29 An exposure standard was set for silica in 1983-84 with the National Health and Medical Research Council (NHMRC) recommending exposure standards specifically for quartz (0.2 mg/m^3), cristobalite (0.1 mg/m^3) and tridymite (0.1 mg/m^3). In 1988 the exposure standard was reconsidered and a reduction to 0.1 mg/m^3 for respirable fraction of quartz, silica (fused) and tripoli and 0.5 mg/m^3 for cristobalite and tridymite was recommended. Following public comment, it was agreed that further examination of the issue was warranted. Between 1988 and 1996 no formal national exposure standard for crystalline silica existed although some mining and OHS authorities issued their own. From 1996, NOHSC reinstated the original NHMRC exposure standard. On 1 January 2005, a revised national exposure standard of 0.1 mg/m^3 for quartz, cristobalite and tridymite came into effect.[25] (The new exposure standard is discussed further in chapter 5).

3.30 While regulations were introduced to control silica dust and appear to have had an impact on silica-related disease, NOHSC has noted that 'due to a long lag time between exposure and symptoms, it is difficult to ascertain how many people develop silica-related conditions, and when the causative exposure occurred'. In addition health statistics do not readily identify health problems related to exposure to RCS due to poor diagnosis and lag times and, as noted above, compensation data relates only to cases for which compensation has been paid.[26] (Diagnosis of dust related health problems is discussed in chapter 4).

Silicosis

3.31 It was acknowledged in evidence that regulation has had an impact on the exposure of workers to RCS, however, there was considerable discussion on the incidence of silicosis in Australia today and the incidence in particular industries. Some witnesses stated that silicosis was now not a problem while other witnesses argued that silicosis was 'the new asbestosis'.

3.32 Witnesses pointed to a number of reviews and research papers on the incidence of silicosis which indicated a decrease in the number of cases of silicosis. In 1993, a review by the National Occupational Health and Safety Commission of the

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23 *Submission* 20, p.11 (AIOH).

24 *Submission* 14, p.6 (CCAA).

25 NOHSC *Regulation Impact Statement on the Proposed Amendments to the National Exposure Standards for Crystalline Silica*, October 2004, p.25.

26 NOHSC Regulatory Impact Statement, p.19.

state by state silicosis records indicated that there were probably less than 20-30 new cases per year and the generality was that these cases arose from uncontrolled exposure situations (that is, industries and occupations where there was minimal or negligible adherence to the legislative exposure standard and control requirements).[27]

3.33 Reviews of data on new cases of silicosis from the mining industry have indicated that the incidence of silicosis has fallen. In Western Australia, for example, there were only three cases where the person had commenced employment after 1968 and none after 1994. It was concluded that the absence of cases 'corresponds to the implantation of the 0.2 mg/m^3 respirable crystalline silica exposure standard in Western Australia…when the new cases still arising as a legacy of the past have all been accounted for, new incidences of this disease will have been virtually eradicated.'[28] Coal Services NSW also noted that for the last decade there had been no incidence of silicosis that has been brought to its attention. This reflected the safety management of companies and the educational program that has been given to coalminers.[29]

3.34 AIOH also commented that a review of the statistics commissioned by Worksafe Australia in 2004 substantiated the small number of new cases of silicosis arising from Australian industries.[30]

3.35 WHS also provided a review of known compensable cases of silica related disease in Queensland. Between 1992 and 2004 there were six claims for silicosis provided by the Queensland Employee Injury Data Base. WHS stated that the evidence related to incidence of compensable silicosis is rare and extremely limited for Queensland workers as a whole and for abrasive blasting workers in particular.[31] It noted that some early exposures to crystalline silica (prior to 1995) in sandblasting are likely to have been excessive in modern day terms, though the compensation data do not reflect any cases of silicosis.[32]

3.36 AIOH noted that silicosis numbers had declined. This was due to a combination of regular medical surveillance, and reduction in exposures such as compliance with a regulatory exposure standard, the prohibition of specific tasks associated with high risk (such as sandblasting and the use of silica flour in foundry operations) and the use of adequate dust suppression systems such as ventilation and wetting down.[33] AIOH concluded:

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27 *Submission* 20, p.11 (AIOH).

28 Wan KC and Lee E, 'Silicosis in Western Australia from 1984 to 1993', *Journal of Environmental Medicine*, 1:27-35.

29 *Committee Hansard* 20.9.05, p.53 (Coal Services).

30 *Submission* 20, p.12 (AIOH).

31 *Submission* 26, p.6 (WHS).

32 *Submission* 26, p.22 (WHS).

33 *Submission* 20, p.12 (AIOH).

> Media headlines often imply that silica is "the new asbestos". However examination of the data suggests otherwise. Silica has been under surveillance for many decades, and the morbidity and mortality of large populations of heavily exposed individuals have also been studied over many decades. Clinical silicosis is now a rarity, and elevated risk of lung cancer appears to be confined to cases where the silica exposure is of such a level that it results in clinical silicosis. Based on the number (say 10-30) of new cases of silicosis, this would amount to only 1 or 2 additional lung cancer cases per year across Australia.[34]

3.37 The Cement Concrete and Aggregates Association (CCAA) also stated that in the heavy construction materials industry 'even very early or mild cases have been very rarely seen in this industry over the past 10 years. Those which have been diagnosed in that time all result from exposures from at least 10 years ago.' CCAA concluded:

> It is CCAA's view that in the heavy construction material industries, substantial reduction of potential exposure has occurred, with predicted and proven advances in dust control. In addition, the improved use of personal respiratory protection has also reduced the risk of silicosis to workers to its present extremely low level in Australia.[35]

3.38 Dr John Bisby remarked that in Australia in the last 50 years silicosis 'has been a fairly mild disease…But it can cause incapacity, so it may reduce quality of life as opposed to reducing life expectancy, although it can reduce life expectancy particularly in severe cases'.[36] Dr Bisby, while conceding problems in certain instances like sandblasting, also stated:

> The silica issue is, in medical terms, basically over. It is a great success story. Australian industry is free of silicosis, by and large. That is not to say an occasional case may not happen, just like a truck accident happens when somebody does the wrong thing. Basically it is historical.[37]

3.39 Professor E Haydn Walters responded to this evidence and stated that:

> I suppose it is true as far as it goes, I would say. In very well regulated industries in which the conventional standards of dust exposure are maintained, I would agree that interstitial lung problems, the traditional pneumoconiosis, are now probably largely a historic issue. However, I think those industries where the regulations are not vigorously upheld – and I think a number of people have made rather off-the-cuff comments about cowboys in sandblasting and that sort of stuff – still exist, and silicosis will still appear in time because it is related to the amount in the atmosphere and

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34 *Submission* 20, p.12 (AIOH).

35 *Submission* 14, pp.2, 7 (CCAA).

36 *Committee Hansard* 30.9.05, p.6 (Dr J Bisby).

37 *Committee Hansard* 30.9.05, p.7 (Dr J Bisby).

> the length of time that you are exposed. If you are above the current threshold, then I think you are still in danger of getting silicosis.[38]

3.40 In its Regulation Impact Statement, NOHSC sounded a note of caution on the impact of the then exposure standard:

> As diseases caused by exposure to RCS are of long latency, current cases of adverse health effects could reflect the effect of past exposures, when exposures were potentially greater than they are now under the current standard. Therefore current cases may be an over-estimate of the effect of the current NES [National Exposure Standard].
>
> Conversely, the current NES…may be achieving their objectives, which is why there are few incidents of adverse health effects recorded in statistics. In addition, this could be a reflection of the under-reporting of adverse health effects resulting from RCS exposure in official health statistics.[39]

3.41 Other witnesses commented that silicosis is still a significant disease. The CFMEU pointed to data from the Dust Diseases Board which indicated that there were 200 cases each year and 'those are the ones that are actually accurately diagnosed by the medical profession as having silicosis'.[40]

3.42 Munich Holdings of Australasia provided the Committee with a recent publication from the Munich Re Group on the impact of silicosis. The paper noted that US insurers had been observing an increase in silica-related claims. It was also noted that while claims were rising strongly, the number of deaths from silicosis is declining steadily which reflected the increased workplace safeguards from the 1970s on.[41]

3.43 Other researchers have also stated that 'it is generally well known that the majority of workers exposed to crystalline silica in Australia work outside the mining industry'.[42] The particular concerns of sandblasting were raised in evidence. WHS stated that there was some evidence that during the period up to the late 1980s that some silica exposures would have been occurring during abrasive blasting operations which did not comply strictly with the regulatory requirements of the time. WHS also commented that:

> How much the silica dust exposure which did occur during the 1960s, 70s and 80s is likely to have contributed to silicosis cannot be fully identified as reliable compensation statistics have been provided only as far back as

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38 *Committee Hansard* 10.11.05, p.27 (Prof E Walters).

39 NOHSC Regulatory Impact Statement, p.21.

40 *Committee Hansard* 30.9.05, p.24 (CFMEU).

41 *Submission* 29, *Silicosis – A new claims complex in liability insurance*, p.20 (Munich Holdings of Australasia).

42 de Klerk NH, Ambrosini GL, Pang SC and Musk AW, 'Silicosis Compensation in Western Australian Gold Miners Since the Introduction of an Occupational Exposure Standard for Crystalline Silica', *Annals of Occupational Hygiene,* Vol 46, No 8, pp.687-692, 2002.

> 1992. Given that the latency of silicosis will be around 20 to 30 years (depending on years of first exposure and other factors), radiological confirmed cases ought to have been appearing from 1990 through to the present.[43]

3.44 There are now various prohibitions in place relating to free silica in abrasive blasting (NSW, WA, Tasmania); more than 5 per cent free silica in abrasive blasting (SA, WA, Tasmania, NT) and more than one per cent crystalline silica for abrasive blasting in Victoria and 2 per cent in Western Australia.[44] Mr Nickolas Karakasch noted that the United Kingdom was one of the first countries to prohibit sandblasting. NSW prohibited sandblasting in 1959, with the other States following some time later. Victoria did not prohibit this activity until 2002.[45] Blasting media that could be substituted include garnet, metal shot and aluminium oxide.

3.45 Mr Karakasch also stated that a 1987 report by the International Agency for Research into Cancer (IARC) indicated that sandblasters in the USA had the highest potential exposure to silica content of respirable dust. This ranged from 4.8 – 12.2 per cent. Mr Karakasch concluded:

> Considering the sandblasting methods in Australia and throughout the world were basically the same, it would not be unreasonable to assume that sand blasters throughout Australia were exposed to similar levels as reported in the 1987 USA report. In comparison to the Victorian figure it is between 5 to 12 times the allowable limit.[46]

3.46 AIOH also commented that the impact of the prohibition on eliminating the use of silica/silica containing materials in sandblasting is unknown. However they pointed to a 2001 report on the results of a blitz by the Department of Workplace Health and Safety on abrasive blasting operations throughout Queensland. This survey found that of 49 operations audited, two (4%) were using dry sand. Other than the two (4%) using sand, they also found that garnet was used as a major blasting medium while others used ilmenite, different types of metal refinery slags and metal shot. One operator used sodium bicarbonate. A small number were using glass. WHS concluded that 'use of quartz bearing sands is now low, but the 2 cases observed were found to contain silica between 58 – 78% free silica. These operations were issued with Prohibition Notices.'[47] AIOH also commented that most industries are now using substitutes such as garnet.[48]

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43 *Submission* 26, p.6 (WHS).

44 NOHSC Regulatory Impact Statement, pp.17-18.

45 *Submission* 19, p.3 (Mr N Karakasch).

46 *Submission* 19, p.4 (Mr N Karakasch).

47 *Submission* 20, p.10 (AIOH).

48 *Committee Hansard* 29.9.05, p.26 (AIOH).

3.47 AIOH provided details of a review of silicosis sufferers who had received compensation in NSW. This showed that only just over one per cent (less than one case per year) of people, who were receiving compensation prior to 1970 and were still alive in 1970 and those who were awarded compensation from 1970 to 1994, indicated that they did sandblasting as part of their work. Most of these sandblasting cases were exposed around 1970 or earlier.[49]

3.48 CCAA commented on the unsatisfactory practices in some industries and stated that 'the level of exposure that an unprotected sandblaster might be exposed to is several hundred times the level of the standards'.[50]

Airway disease

3.49 Professor Trevor Williams concurred that there had been 'substantial reductions in classic silicosis'. However, he stated that 'it has become apparent…that a new pattern of disease is emerging'.[51] People who have been exposed to silica are now presenting with diseases including obstructive lung diseases and pulmonary fibrosis. There is also propensity for dust such as silica to increase the risk of the development of lung cancer and stomach cancer. He commented:

> I am also concerned that many patients with so called idiopathic pulmonary fibrosis may have the genesis of their disease in exposure to fine dust such as silica and that causal link is not made because of a long delay from exposure to overt disease.
>
> I don't believe we have sufficient information to even start to understand the extent of these problems in Australia and well designed studies are urgently needed.[52]

3.50 Professor Walters also raised concerns about the incidence of COPD due to dust. He stated that the contribution of dust, particularly in occupational settings, to subtler forms of respiratory disease, and particularly to COPD, has been ignored. The Professor also stated that as cigarette smoking becomes less, and also as more vulnerable groups, particularly women, move into the workplace, the impact of these dusts upon airway disease and the acceleration of the natural ageing process of the lungs by exposure to dust is now becoming a significant feature, and that is not being represented.[53]

3.51 The Professor informed the Committee that research data are emerging that shows that these conditions of COPD related to dust, particularly in the workplace, are perhaps more common than people have thought. Research published in June 2005 in

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49 *Submission* 20, p.12 (AIOH).

50 *Committee Hansard* 30.9.05, p.3 (CCAA).

51 *Submission* 7, p.1 (Prof T Williams).

52 *Submission* 7, pp.1-2 (Prof T Williams).

53 *Committee Hansard* 10.11.05, p.27 (Prof E Walters).

the journal *Thorax* by Professor Walters and a research group in Victoria found in a random survey of 4 000 or 5 000 people working and living in the suburbs of Melbourne, aged between 45 and 65, that there was about 10 per cent COPD in the population. The Professor stated:

> …particularly amongst the women, it was quite evident that occupational exposure, particularly to biological substances but also to mineral dust, was having an impact. It was a fairly subtle impact, but a definite statistically significant impact upon their lung function. That included people like nurses and those working in bakeries and so on who were exposed to dust.[54]

3.52 However, AIOH commented that removing the smoking component from airways disease and the reduced contemporary silica dust exposures would mean only a few additional cases of airways disease per year in Australia.[55]

Costs associated with adverse health effects

3.53 NOHSC, in undertaking the review of the crystalline silica exposure standard in 2004, provided costs associated with adverse health effects. It was estimated , using NSW and national data, that the annual cost of disease related to past exposure to crystalline silica in Australia is in the order of:

- $14,022,857 in compensation payments (including medical costs, an indicator of potential cost) per annum;
- 305 hospital days per annum; and
- 60 lives per annum.[56]

NOHSC noted that health statistics used did not include non-fatal conditions, such as disease or a restriction of function that does not result in hospitalisation as these data are not available.[57]

Incidence of disease associated with beryllium

3.54 Workers in Australia have been exposed to beryllium dust. However, Mr John Edwards commented that the number who may have Chronic Beryllium Disease (CBD) is unknown as until very recently there has been no dedicated Beryllium Blood Lymphocyte Proliferation Testing (BeLPT) laboratory.[58] Workers most at risk are those in the aviation industry as well as Navy personnel as a result of the descaling of ship surfaces and workers in the alumina industry.[59]

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54 *Committee Hansard* 10.11.05, p.31 (Prof E Walters).

55 *Submission* 20, p.12 (AIOH).

56 NOHSC Regulatory Impact Statement, p.2.

57 NOHSC Regulatory Impact Statement, p.21.

58 *Submission* 45, Additional information, 19.12.05 (Mr J Edwards).

59 *Submission* 24, pp.4-5 (Dr G Pain).

3.55 In the United States, the Department of Energy (DOE) is compensating DOE workers for exposure to airborne beryllium. As at March 2006 DOE had approved 3034 beryllium claims and paid out US$303.5 million in worker compensation in addition to $91 million in medical costs. Mr Edwards argued that the exposure of Australian workers to dusts, fumes and aerosols containing beryllium materials is no different from the USA so that cases are expected to be identified in Australia with the establishment of a testing laboratory.[60]

Conclusions

3.56 Evidence received by the Committee points to a need to improve the data available for identifying the incidence of disease related to toxic dust. At the present time, there is a lack of comparability of datasets and a reliance on workers' compensation data which may not indicate the true incidence of toxic dust-related disease in Australia. Workers' compensation data only includes those workers who have had five or more days off work with a successful claim of a work-related illness. Where diagnosis occurs after a worker has left work, the connection to work is unlikely to be established and a workers' compensation claim is unlikely to be made. This may lead to significant under representation of dust disease.

3.57 Witnesses called for a more comprehensive collection system including the establishment of a national medical registry of dust diseases cases. A national registry would assist in tracking workers as they move from job to job. It would also provide more timely data to improve identification of trends in disease. One possible means suggested to the Committee was to make the SABRE system compulsory.

3.58 The Committee agrees that there is need to improve data collection. Without reliable data, the true extent of dust-related disease is unknown, trends cannot be identified in a timely manner and decision-making by government, industry, unions and the medical profession is hampered.

Recommendation 1

3.59 That the Australian Safety and Compensation Council review the National Data Action Plan to ensure that reliable data on disease related to exposure to toxic dust is readily available.

Recommendation 2

3.60 That the Australian Safety and Compensation Council extend the Surveillance of Australian Work-Based Respiratory Events (SABRE) program Australia-wide and that the program provide for mandatory reporting of occupational lung disease to improve the collection of data on dust-related disease.

60 *Submission* 45, Additional information 19.12.05, 21.3.06 (Mr J Edwards).

3.61 The incidence of toxic dust-related disease in Australia today was debated extensively in evidence. Some witnesses commented that cases of silicosis now emerging reflect past exposures and past work practices and that silicosis is now a mild disease. However, other witnesses argued that silicosis is the 'new asbestosis'. The Committee acknowledges that while the data may under represent the incidence of disease, the available data suggests that systems now in place to control dust related disease, particularly silicosis, appear to have had a positive impact on the incidence of disease. Workers' compensation cases of pneumoconioses other than asbestosis have increased only slightly since 1998-99 from 1.8 cases per million to 2.2 cases per million in 2001-02.

3.62 However, the Committee notes that with apparently low mortality from exposure to toxic dust, the economic cost of this level of disease is still significant. NOHSC estimated in 2004 that compensation costs for disease related to exposure to crystalline silica is in the order of $14 million per annum. The compensation costs for asbestos are substantially higher. Compensation costs related to exposure to other dusts such as beryllium are unknown but may be significant in the future.

CHAPTER 4

HEALTH SERVICES

Diagnoses and medical services

> There is no curative treatment for the diseases caused by exposure to coal dust and silica, in most cases early removal stops progressing with minimal long term effects.[1]

4.1 Witnesses noted that there were problems with the diagnoses of toxic dust-related ill health, particularly where there is a long latency period, for example with crystalline silica and if other lifestyle factors are involved, for example smoking. The Australian Lawyers Alliance (ALA) commented:

> I was surprised, when we surveyed our members, by the number of potential exposures there were. I think it is a hazard and a problem that has largely gone unrecognised because of problems with identification, diagnosis, confusion with other lung conditions – including smoking related conditions and so on – and I do not think we know the extent of the hazard.[2]
>
> Inevitably, in relation to dust diseases, if there is smoking difficulty will arise in determining what the contributions of the parts are. Often that problem, we identify in our submission, leads to a failure to identify the dust disease at all but, rather, have its ascription to tobacco smoking or other problems than to relate it back to the exposure.[3]

4.2 The Australian Council of Trade Unions (ACTU) commented that silicosis is difficult to detect in its early stages because of the absence of symptoms and cited comments by Mr Richard Gun, Senior Lecturer, Occupational and Environmental Health, University of Adelaide, that a miner 'who has been exposed to silica dust for five years can take little comfort from a normal chest film, as it provides no guarantee that they will be free of silicosis in another five years'.[4]

4.3 Professor Trevor Williams commented that while classic silicosis is likely to be accurately diagnosed:

> …other consequences of silica exposure such as small airways disease, emphysema, stomach and lung cancer may be attributed to other causes such as asthma or exposure to cigarette smoke when in fact the predominate cause may be silica dust. Patients may also be erroneously diagnosed as

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1 *Submission* 21, p.9 (Coal Services).

2 *Committee Hansard* 29.9.05, p.46 (ALA).

3 *Committee Hansard* 29.9.05, p.50 (ALA).

4 *Submission* 28, p.7 (ACTU).

> idiopathic pulmonary fibrosis when their lung disease is due to fine particle dust exposure such as silica.[5]

4.4 In the Regulation Impact Statement for crystalline silica, the National Occupational Health and Safety Commission (NOHSC) noted that health effects arising from respirable crystalline silica (RCS) exposure are not obvious until the manifestation of illness. Once illness is manifest, it is commonly not possible to identify when the RCS exposure occurred and at what level. Problems with attributing adverse health effects to exposure include:

- the familiarity of RCS exposure. People who have worked in dusty environments may not appreciate the risk of exposure to RCS as the adverse health effects are not immediate;
- as with asbestos and mesothelioma, irreversible and cumulative lung damage caused by RCS is hidden, until it manifests as illness; and
- damage to the lungs can worsen after exposure ceases.[6]

4.5 The need for an accurate diagnosis was acknowledged in evidence. The Australian and New Zealand Society of Respiratory Science (ANZSRS) noted that the critical factor is early identification of deteriorating lung function. It stated that:

> One of the difficulties in respiratory medicine is that the lungs have a large reserve in function, about 33% that can be eroded before there is any symptomatic evidence of deterioration. There is good evidence linking excess loss of lung function to cumulative dust and fume exposure…Regular lung function testing will provide early detection of loss of function well before the results fall to 80% of predicted. This is important for people with lung function at the high end of the reference range for whom a 20% fall is very significant indeed.[7]

4.6 Coals Services stated that in the NSW coal mining industry, accurate diagnosis of disease resulting from exposure to toxic dusts is via the International Labour Organisation's international X-ray interpretation system.[8] Cement Concrete and Aggregates Australia (CCAA) noted it is accepted and recommended internationally that the earliest and best indicators of any signs of effects of RCS relate to scar tissue in the lung detectable by chest X-ray. Lung function tests can also be used to measure the effect of silica in the lungs. In the early stages of silicosis, the diagnosis may be uncertain, even with the extensive medical diagnostic facilities available today such as computerised tomography (CAT scanning) and lung biopsy. These services are widely available and used in Australia. However, CCAA did not

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5 *Submission* 7, p.2 (Prof T Williams).

6 NOHSC, *Regulation Impact Statement on the Proposed Amendments to the National Exposure Standards for Crystalline Silica*, October 2004, p.20.

7 *Submission* 9, p.6 (ANZSRS).

8 *Submission* 21, p.9 (Coal Services).

see that such in-depth and invasive techniques as being appropriate for health surveillance of workers.

4.7 CCAA submitted that:

> …the only rational approach to diagnosis of silicosis and other pneumoconioses (occupational dust diseases) is to follow established international criteria for these diagnoses. To do otherwise would be to prevent any contribution of Australian information to international efforts to control occupational lung disease and distort Australian health information. Australia has been an important contributor to work in this area of UN agencies such as the International Labour Organisation and World Health Organisation.[9]

CCAA commented that the present international recommendations on diagnosis of silicosis and screening of workers potentially exposed to silica dust are appropriate for use in Australia. These are presently established in Australia under Hazardous Substances Regulations and NOHSC Guidelines on Health Surveillance (1995). These are consistent with comparable economies including the USA, UK and Western Europe. CCAA also stated that as silicosis and other toxic dust diseases are at such low levels in Australia, that no additional or special facilities are warranted in the context of public health priorities.[10]

4.8 Witnesses pointed out that as some patients would not be accurately diagnosed with diseases arising from toxic dust, further research is required to fully understand the extent of diseases caused by fine dust.[11] The ACTU recommended that government adequately fund research into improving medical tests for dust diseases, particularly silica and asbestos related diseases, with a focus on early detection and commented:

> At the moment I think that we struggle. We do not have research into early detection, nor do we have enough research dollars going towards looking for cures. They are very difficult and long-term projects, but the longer we leave it the greater the number of workers who will die, so money needs to be pushed into those areas, especially if you consider the long latency period of toxic dust diseases.[12]

4.9 The Construction, Forestry, Mining and Energy Union (CFMEU) noted that the medical profession was for many years reluctant to accept white asbestos (Chrysotile) as a carcinogen or cause of lung disease. The CFMEU saw an urgent

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9 *Submission* 14, p.6 (CCAA).

10 *Submission* 14, p.6 (CCAA).

11 *Submission* 7, p.2 (Professor T Williams).

12 *Committee Hansard* 29.9.05, p.88 (ACTU).

need for an effective education program to ensure this is not repeated with crystalline silica.[13]

4.10 Dr Thomas Faunce, Senior Lecturer at the Medical School and Law Faculty, Australian National University stated:

> The message that is coming through from people like Richard [White], if I could break it down, is that there are potentially enormous numbers of Australians out there who have something wrong with them. They know something is wrong with them, they know they have worked in an industry where they have been exposed to something, whether it is silica or nanotechnology in the future, but they just do not know where to go. They go to the GPs, but the GPs do not have the expertise to diagnose it so they pass them off and say, 'You've got a bit of smoking,' a bit like the High Court did. Richard is saying that you want some centre where people know that, if they have something like this, if they have a history of industrial exposure, they can go there and get to the bottom of the problem quickly. I have mentioned enforcement standards and the importance of having medical centres of excellence.[14]

Employee health surveillance

4.11 There was discussion in evidence on the need for health surveillance of employees exposed to toxic dust. Witnesses noted the importance of monitoring of workers who are exposed to toxic dust so that loss of lung function can be detected before symptoms are noticeable.[15] The ANZSRS commented:

> …monitoring should be part and parcel of everybody going into an environment where there is a risk of exposure. There is no point waiting until exposure has occurred and deleterious changes have occurred. It is too late. We have to monitor everybody and get measurements on people when they are fit and healthy, not just when they are starting to get sick. The starting point is very critical.[16]

4.12 WHS noted that research has indicated that workers exposed to respirable crystalline silica who are regularly monitored present, on average, for compensation at a less severe stage of disease.[17]

4.13 Mr Bruce Ham noted the need for a register of workers and to have them undertake pre-employment and periodic health assessments: 'this does not prevent

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13 *Submission* 13, p.3 (CFMEU).

14 *Committee Hansard* p.39 (Dr Faunce).

15 *Committee Hansard* 29.9.05, p.68 (ANZSRS).

16 *Committee Hansard* 29.9.05, p.68 (ANZSRS).

17 *Submission* 26, p.3 (WHS).

disease, but permits some understanding of the occurrence of disease and progression of disease in current workers'.[18]

4.14 The ACTU supported regular screening in industries where workers are exposed to toxic dust and suggested that as well as a lung capacity test, chest X-rays every two years of workers in those industries should be considered.[19] The ACTU also raised particular concerns about practices in sandblasting and recommended that government establish a screening program for all former workers from the sandblasting industry for dust diseases at no cost to the workers:

> I think that the government and business need to take the lead on this and provide those workers with, if not peace of mind, at least detection of the disease if it has affected them. We are talking about thousands of workers here. I would suggest that it needs to be a government initiative and it needs to be done now.[20]

4.15 The States and Territories have all adopted hazardous substances regulations based on the national model regulations produced by the Commonwealth in 1994. The model regulations set out the requirements for health surveillance where:

- an employee is at risk from one of the 16 listed hazardous substances (including asbestos, crystalline silica and vinyl chloride); and
- an employee could be exposed to a hazardous substance and there is a disease or health effect that can be caused by that exposure; there is a reasonable likelihood that the disease or health effect could occur under the conditions of work; and there are valid ways of detecting the disease or health effect.

4.16 The health surveillance must be performed under the supervision of a legally qualified medical practitioner who is adequately trained in the tests or procedures necessary. In the case of the listed hazardous substances, the type of surveillance is specified including medical tests. For example, the requirements for crystalline silica are occupational and medical history, demographic data, completion of a standardised respiratory questionnaire, standardised respiratory function test and chest X-ray. For those working with asbestos, the health surveillance is to be conducted every two years and every five years for crystalline silica. The employee is advised of the results and the health surveillance records must be kept by the employer as a confidential record for at least 30 years.[21]

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18 *Submission* 22, p.4 (Mr B Ham).

19 *Committee Hansard* 29.9.05, p.94 (ACTU).

20 *Committee Hansard* 29.9.05, p.88 (ACTU).

21 NOHSC, *National Model Regulations for the Control of Workplace Hazardous Substances,* [NOHSC: 1005 (1994)]; *Guidelines for Health Surveillance*, [NOHSC: 7039(1995)]. See also *Committee Hansard* 10.11.05, p.9 (DEWR).

4.17 The Department of Employment and Workplace Relations (DEWR) noted that when the health surveillance guidelines were first released NOHSC worked with physicians to make them aware that the information was available.[22]

4.18 In some industries health surveillance for workers coming into contact with hazardous substances is well established. In NSW and Queensland there is provision for a centralised health surveillance program for the coal mining industry.[23] For example, Coal Services noted that periodic medicals are undertaken about every three to five years, and at every second medical an X-ray is taken for coal miners in NSW. Coal Services pointed to the success of their program by referring to the USA where, although the threshold level for coal dust is lower than in New South Wales, the incidence of pneumoconiosis is costing the American coal industry $US1 billion per annum in workers' compensation.[24]

4.19 In NSW, the Dust Diseases Board is able to test for a range of possible diseases including asbestosis and silicosis. The service is provided free of charge to NSW workers who fall under the Dust Diseases Board compensation protocol. In addition, the Board offers an on-going commercial screening service to industry to facilitate compliance with occupational health and safety legislation. Workers can be screened at the Respiratory Assessment Centre in Sydney or on the Lung Bus. The Lung Bus provides respiratory assessment services 'on-site' for up to 64 employees per day.[25]

4.20 CCAA also stated that the cement, concrete and aggregates industry also conducted regular screening as required by regulation. The industry tended to undertake screening four yearly rather than five yearly to ensure that all employees are examined. However, CCAA went on to state that the five year time frame is based on the national exposure standards. If an employee was in an industry where there was very high exposure, for example, sandblasting with exposures around 15 or 20 mg/m^3 the worker may need an X-ray every six months.[26]

4.21 The Minerals Council of Australia (MCA) informed the Committee that companies generally considered legislative requirements to be the minimum and most companies completed additional health assessments.[27]

4.22 However, in other sectors, for example the building industry, workers are not likely to be regularly tested or do not have a centralised scheme for the data collected. The problem is exacerbated as in some industries workers change employers

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22 *Committee Hansard* 10.11.05, p.9 (DEWR).

23 *Submission* 23, p.3 (MCA).

24 *Committee Hansard* 30.9.05, pp.52, 55 (Coal Services).

25 *Submission* 32, p.5 (Dust Diseases Board of NSW).

26 *Committee Hansard* 30.9.05, pp.8, 11 (CCAA).

27 *Submission* 23, p.4 (MCA).

frequently. The Australian Manufacturing Workers Union (AMWU) commented that while certain regulations require that health surveillance be carried out, it is 'patchy and has its difficulties, in that it is only related to a couple of particular issues, like asbestos and if the silica levels are up at a particular rate'.[28]

4.23 A further problem noted by the CFMEU is the lack of a central repository for the records so that they could be accessed easily.[29] The Minerals Council of Australia also noted the mining industry had identified a need for a central data scheme so that data can be analysed to establish trends and allow following of individuals. The MCA further commented:

> There is limited exposure data held electronically and little or no correlation between health information and exposure data either at the Government or company level. The limited exposure data that is currently collected in an electronic dataset makes it difficult to establish a relationship between occupational exposure and disease particularly when there may be lifestyle factors that also affect the likelihood of disease. The data currently held in electronic data sets limits both the following of individuals and the identification of tends. If electronic data capture is to be widely established, consideration needs to be given to privacy concerns, costs and resources and the potential use of information for litigation.[30]

4.24 The ANZSRS also commented on the need for high quality testing and monitoring. Those doing the testing need to be highly trained and the equipment used needed to be regularly checked and calibrated for quality assurance. However, the Society indicated that 'it is well established that the quality of spirometry performed in the primary care sector is not good'. The ANZSRS also recommended that lung function reports contain certain information including flow/volume and volume/time graphics and must be of sufficient size that all information is easily read and can form part of a permanent record.[31] The ANZSRS concluded:

> It is in the area of serial monitoring that quality assurance plays a very critical role. The physician reviewing the test results must be able to have absolute confidence that the tests have been performed to the same standard every time. The data quality must be independent of any changes in equipment, changes of staff or the time since the person doing the testing has had refresher training. Only with these guarantees can the physician concerned know that any changes are due to changes in the patient's profile. Furthermore, it is the serial changes that are crucial to successful early detection and management of any disease process that may result from workplace exposure. Negative trends can be apparent even though the absolute measures are still within the reference ranges.

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28 *Committee Hansard* 29.9.05, p.82 (AMWU).

29 *Committee Hansard* 30.9.05, p.30 (CFMEU).

30 *Submission* 23, p.4 (MCA).

31 *Submission* 9, p.7; *Committee Hansard* 29.9.05, p.68 (ANZSRS).

> The need for consistency of approach is becoming increasingly important as the workforce becomes more mobile. Data from one area should be able to be compared with data from another area in the interest of gaining long term trending and separating pre-existing trends from current trends.[32]

4.25 Witnesses commented that pre-employment screening was important. Pre-employment screening was necessary to establish a baseline for the employee and to establish if there are any existing conditions that may make an employee more susceptible than usual to hazards in the workplace.[33] Witnesses advocated the need for a lung function test and a chest X-ray. The ANZSRS commented that spirometry should be seriously considered as a minimum in pre-employment screening where there are work place exposure risks. The ANZSRS added that pre-employment spirometry would also help address the questions of contributions to airway and parenchymal lung dysfunction due to volitional practices, such as smoking, from workplace exposure to dusts.[34]

4.26 While acknowledging the need for health monitoring, the AMWU warned that too much effort on health surveillance often means that the focus on control at source and stopping the problem before it affects employees is lost:

> The problem that may well be showing up in certain sectors in terms of silicosis is not because we did not know the problem was there. We have known about silicosis…for over 50 years. The concern is that if you put a lot of effort into surveillance but then do nothing about it, what is the point? You are just picking up a lot of 'had it' lungs.[35]

4.27 Mr John Edwards raised with the Committee the problems of detecting Chronic Beryllium Disease (CBD). Mr Edwards noted that blood testing using the Beryllium Blood Lymphocyte Proliferation Test (BELPT) had only recently become available at the John Hunter Hospital in Newcastle. Some airline workers commenced testing in mid February 2006.[36]

Employee records

4.28 A number of witnesses discussed the issue of employee records. CCAA noted that under the hazardous substances regulations the employer is responsible for keeping the records. However, records are made available to workers in the concrete industry on request.[37] Coal Services also commented that it held the records of health

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32 *Submission* 9, p.8 (ANZSRS).

33 See for example, *Committee Hansard* 30.9.05, p.8 (CCAA); p.32 (CFMEU); p.53 (Coal Services).

34 *Submission* 9, p.5 (ANZSRS).

35 *Committee Hansard* 29.9.05, p.82 (AMWU).

36 *Submission* 45, p.2 (Mr J Edwards).

37 *Committee Hansard* 30.9.05, p.10 (CCAA).

testing on all coal miners who enter the NSW coal mining industry and those who present for health surveillance screening assessments:

> We hold onto those X-rays, but we make them available. If an individual wants to have access to them, say, to discuss them with his GP, we provide them. The reason we hang onto them is that people in the coalmining industry tend not to leave. They get paid a lot of money, and it is very difficult for them to earn as much money doing something else. So if we are going to measure the health of an individual over a period of time, we need access to these X-rays to contrast where they were 10 years ago with where they are today.[38]

4.29 However, some witnesses suggested that employees should hold their own records. The ANZSRS, for example commented:

> If they change job or anything else, that data goes with them. It is serial history. With the increasing mobility in the work force, that is very important.[39]

Conclusions

4.30 The early diagnosis of dust-related disease is difficult. Dust-related disease may be confused with other lung conditions or may be attributed to lifestyle factors such as smoking. There also appears to have been slow acceptance that exposure to crystalline silica causes health conditions other than silicosis. However, early diagnosis is important to limiting the extent of disease and ensuring that adequate treatment is provided.

4.31 While there are guidelines in place to ensure that employees working with toxic dust receive adequate and timely health checks, it appears that not all industries comply with this standard. Some employees, particularly in the non-mining industries or those who work for small companies, may not receive the level of health surveillance that their occupational exposure to toxic dust warrants.

4.32 A further problem highlighted in evidence was the need for accurate testing as without quality assurance programs for testing, the results of monitoring, particularly over time, may be questionable and of little value to the worker and their treating physician. Lung function tests should also be performed on a regular basis so that deterioration can be identified as early as possible.

4.33 The Committee considers that adequate medical services are available for those suffering the effects of toxic dust-related disease. However, the Committee considers that the particular problems of exposure to toxic dust are not well understood by medical practitioners and that subsequently not all workers with dust-related disease will be identified.

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38 *Committee Hansard* 30.9.05, p.55 (Coal Services); see also *Submission* 21, p.9 (Coal Services).

39 *Committee Hansard* 29.9.05, p.68 (ANZSRS).

Recommendation 3

4.34 That the Australian Safety and Compensation Council, in conjunction with the Heads of Workplace Safety Authorities, consider mechanisms to improve health surveillance of employees, particularly those exposed to toxic dust.

Recommendation 4

4.35 That the Australian Safety and Compensation Council promote the dissemination of information concerning the health effects of exposure to toxic dust to the medical profession.

Recommendation 5

4.36 That the Australian Safety and Compensation Council examine the need for improvements in testing regimes for lung disease associated with exposure to toxic dust including the training of those conducting tests and equipment requirements.

CHAPTER 5

REGULATIONS GOVERNING WORKPLACE EXPOSURE TO TOXIC DUST

> In the early days, protection usually consisted of a handkerchief across the nose and mouth just to stop the irritation and discomfort of the dust. There was never any suggestion that the dust might be injurious to health, in fact, we were often told that it (the dust) was OK. Later, when there was some murmuring about asbestos, we were given a paper nose mask for general dust and when working in areas where the dust was constantly thick, if we asked for one, we would be given a basic dust mask covering the nose and mouth with twin filters.[1]
> *(Dimet worker 1971-77)*

> They'd be gasping for air, covered with sand and metal particles and paint particles…coughing and wheezing…there was no actual face mask, gas mask type things on 'em at all.[2]
> *(Sandblaster NT 1970s)*

> A lot of the times we just used to have to wear a piece of rag around out mouths…occasionally we had to argue to get em [in relation to dusk masks].[3]
> (*Pink Batt Insulation 1970s*)

Occupational health and safety regulation in Australia

5.1 The Department of Employment and Workplace Relations (DEWR) provided the Committee with an overview of occupational health and safety (OHS) regulation in Australia. The Commonwealth has responsibility for regulating and enforcing workplace health and safety in Commonwealth government workplaces while the State and Territory Governments do so for all other workplaces. The national OHS regulatory framework comprises Commonwealth and State and Territory legislation and related instruments.[4]

5.2 The National Occupational Health and Safety Commission (NOHSC) (now the Australian Safety and Compensation Council) maintain sets of national OHS standards and related materials. The national standards are advisory only unless other laws give them a different character. These standards and related materials aim to improve the health and safety of work environments by providing a means of:

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1 *Submission* 17, p.1 (Mr RE Devlin).

2 *Submission* 25, p.5 (Mr R White et al).

3 *Submission* 25, p.6 (Mr R White et al).

4 *Submission* 11, p.2 (DEWR).

- facilitating improvement of the regulatory framework by promoting prevention solutions;
- enabling the consolidated national review of priority regulatory requirements; and
- focusing on the extent of national consistency in relevant areas, particularly where it is considered essential for employers and employees.

5.3 There are standards and related material supporting the regulatory framework in five identified priority areas. The five priority areas are to:

- reduce high incidence/severity risks;
- develop the capacity of business operators and workers to manage OHS effectively;
- prevent occupational disease more effectively;
- eliminate hazards at the design stage; and
- strengthen the capacity of government to influence OHS outcomes.[5]

Workplace Chemicals Framework

5.4 The National Hazardous Substances Regulatory Framework (HSRF) was developed by NOHSC as national standards and codes of practice that provide a 'risk-based, outcomes-focused framework for determining the workplace requirements for all substances hazardous to health'. At the centre of the HSRF is the *National Model Regulation for the Control of Workplace Hazardous Substances* (the national model regulations). The national model regulations apply to all workplaces in which hazardous substances are used or produced, and to all persons with potential exposure to hazardous substances in those workplaces.[6]

5.5 The national model regulations detail how hazardous substances should be controlled in the workplace to minimise the risk of adverse health effects. The two principal components of the national model regulations are:

- information provision; and
- assessment and control provisions.

The information provision includes hazard communication through labels and Material Safety Data Sheets (MSDS). Assessment and control provisions include identification, assessment and control of hazardous substances in the workplace and those hazards which arise out of the work activity.

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5 *Submission* 11, p.2 (DEWR).

6 *Submission* 11, p.2; see also Additional information, 10.11.05 (DEWR).

5.6 Manufacturers and importers are required to determine whether a substance is a hazardous substance under the *Approved Criteria for Classifying Hazardous Substances*. The Hazardous Substances Information System (HSIS) provides hazard information for substances classified according to the Approved Criteria.

5.7 DEWR stated that the HSRF risk-based approach is complemented with specified requirements to be applied to specific substances or groups of substances. These include prohibitions, national exposure standards and national codes of practice and guidance material.[7]

Prohibitions

5.8 When no other form of control of a hazardous substance is adequate, use of the substance is prohibited. Prohibition is used where the risks to the health of workers are significant and safer alternatives are available. The specific substances and uses that are prohibited are set out in national model regulations. Prohibitions are given effect by inclusion in each jurisdiction's regulations.

National exposure standards

5.9 National exposure standards have been declared as guidance to assist in ensuring that workers are adequately protected from exposures to hazardous substances. Exposure standards detail airborne concentrations which should neither impair the health of, nor cause undue discomfort to, nearly all workers.

5.10 The national model regulations require that no worker be exposed to hazardous substances at levels above the national exposure standards, as listed in the Adopted National Exposure Standards for Atmospheric Contaminants in the Occupational Environment and declared amendments.

5.11 Exposure standards do not represent a 'no-effect' level, and are best used to assess the quality of the working environment and indicate where control measures are required. The national exposure standards have been consolidated within HSIS.[8]

National Codes of Practice and Guidance Information

5.12 NOHSC national codes of practice and other guidance materials are developed to assist stakeholders in recognising the relevance of legal requirements to their operations and to support their application of risk management principles in their workplaces. For example, the *National Code of Practice for the Control of Workplace Hazardous Substances* provides a practical guide on how to comply with the national model regulations, such as applying the hierarchy of controls (elimination, substitution, isolation, administrative controls, safe work practices and personal protective equipment), risk assessments and hazard communication.

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7 *Submission* 11, p.3 (DEWR).

8 *Submission* 11, p.3 (DEWR).

5.13 The *National Code of Practice for the Labelling of Workplace Substances*, the *National Code of Practice for the Preparation of Material Safety Data Sheets* and the *National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition* provide practical guidance on the preparation and provision of critical hazard information to workers.[9]

State and Territory regulations

5.14 The national model regulations for the control of workplace hazardous substances have been implemented in all jurisdictions under various Acts and regulations. For example, the *Queensland Workplace Health and Safety Act 1995* and the *Victorian Occupational Health and Safety Act 2004*. DEWR noted that compliance strategies are a policy decision for each jurisdiction.[10]

Implementation of the regulatory regime

5.15 Witnesses noted that prevention of disease in the workplace is paramount as once damage is sustained from toxic dust it cannot be cured.[11] However, it was argued that problems with the timeliness of regulations, enforcement of regulations and the level of the present exposure standard for crystalline silica impact adversely on efforts to protect the health of workers.

Timeliness

5.16 Evidence was received concerning the implementation of standards for certain toxic dusts in the workplace, particularly crystalline silica. It was noted that the review of the exposure standard for crystalline silica took nearly 10 years. Prior to the promulgation of NOHSC standard, general direction or advice given to industry was based on National Health and Medical Research Council (NHMRC) recommendations which had no legislative standing 'though it must be argued that industry often attempted to comply with the recommendations made'.[12]

5.17 A further matter of concern was that while many jurisdictions have had long-standing regulation of crystalline silica dust exposure in mining, the regulation of exposure in the non-mining industry for example sandblasting, has only been achieved recently in some States and Territories. Many witnesses noted that regulations for the prohibition of sandblasting using materials containing more than one per cent crystalline silica did not come into force in Victoria until January 2002.

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9 *Submission* 11, pp.4-5 (DEWR).

10 *Committee Hansard* 10.11.05, p.11 (DEWR).

11 *Committee Hansard* 29.9.05, p.24 (AIOH).

12 *Submission* 26, p.15 (WHS).

5.18 WHS, in commenting on the review of the national exposure standard for crystalline silica, pointed to a number of matters which it considered had undermined the development of effective exposure standards:

> …the Australian government disbanded the resources necessary to coordinate the research, indicates that this process is perhaps fatally flawed. There is no longer any federal agency with the capacity to act in the national interest in such fundamental areas as occupational health research and data collection and analysis, all of which are critical to the establishment of occupational health exposure standards.[13]

> The ability to investigate compliance with existing exposure standards and to develop new standards and methods of measurement for toxic materials has been diminished due to the loss of a national body of expertise and the focus on legislative compliance. Increasingly burdensome administration and consultation have exacted a time penalty on the rate at which new initiatives could be developed and delivered.[14]

5.19 DEWR acknowledged that in the past there had been inconsistency in adoption of standards for example, the silica standard was in place in the mining industry before it was introduced in general OHS legislation.[15] DEWR also commented on the lack of national approach:

> One of the rationales for developing Worksafe Australia and the National Occupational Health and Safety Commission in the first place was to bring some consistency and timeliness to a lot of these issues so that they would be addressed in a timely and consistent manner across Australia. Certainly since the commencement of NOHSC we now have workplace chemicals legislation throughout Australia fairly consistently, whereas before, in some jurisdictions, there was very little, except perhaps in the mining industry. I think we have come quite a long way in the last 10 years or so.[16]

5.20 The introduction of national model regulations for the control of workplace hazardous substances had 'led to a relatively consistent framework across Australia for the regulation of workplace chemicals, including those that may lead to occupational disease'.[17] DEWR concluded:

> The elements are consistent with current good practice from around the world, and include classifying chemicals on the basis of their health hazards and establishing national exposure standards.[18]

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13 *Submission* 26, p.10 (WHS).

14 *Submission* 26, p.14 (WHS).

15 *Committee Hansard* 10.11.05, p.6 (DEWR).

16 *Committee Hansard* 10.11.05, pp.6-7 (DEWR).

17 *Committee Hansard* 10.11.05, p.1 (DEWR).

18 *Committee Hansard* 10.11.05, p.1 (DEWR).

In addition, DEWR indicated that where the silica standard and the asbestos standard have been reviewed, 'those have been picked up across the country within a matter of months of each other'.[19]

5.21 However, DEWR also noted the concerns raised in evidence about the rate and consistency of adoption of changes into regulation and enforcement, and therefore compliance of national standards and codes of practice and commented:

> The office [Office of the Australian Safety and Compensation Council] is currently looking at ways to improve the timing and consistency of adoption of declared standards and codes by the jurisdictions, and agreed time frames for the uniform implementation of new and revised standards and codes across all Australian jurisdictions will be developed during the consultative process. A recent example of this was the coordinated implementation of a national prohibition of the import and use of asbestos under NOHSC.[20]

5.22 DEWR also stated that a review of the Workplace Chemicals Framework is being undertaken.[21] A preliminary draft of the new workplace chemicals standard has been released to key stakeholders for review and consultation. Some of the features of this draft standard include: the standard brings together and simplifies the current separate requirements for hazardous substances and dangerous goods; risks arising from the handling of chemicals in the workplace will be controlled in an holistic way rather than under systems that separately deal with health and physical hazards; the standard is performance based, identifying outcomes to be achieved, such as exposure standards, and ensuring its applicability across the widest possible range of occupational circumstances. The standard is based on the features of the Globally Harmonised System for Classification and Labelling of Chemicals. Once the final draft is developed, the Australian Safety and Compensation Council (ASCC) will be asked to endorse and release the draft for public comment in 2006.

5.23 The review of this framework also includes a review of the national exposure standards and health surveillance guidance, including biological exposure indices. This work will consider the process for setting exposure standards, what exposure standards it should represent, how exposure standards should be regulated, and international developments.[22]

5.24 The Minerals Council of Australia (MCA) commented that there was a need not only for a uniform approach across Australia but also internationally. MCA informed the Committee that it had initiated, through the International Council of Mining and Metals, a workshop in London that had brought together regulators from

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19 *Committee Hansard* 10.11.05, p.6 (DEWR).

20 *Committee Hansard* 10.11.05, p.2 (DEWR).

21 *Committee Hansard* 10.11.05, p.2 (DEWR).

22 *Committee Hansard* 10.11.05, pp.2-3 (DEWR).

around the world, as well as the mining industry, to investigate the way occupational exposure limits are currently set and reviewed and how these can be harmonised in a global way. MCA noted that:

> We will be looking at trying to establish common definitions across the country, ensuring that the approach is underpinned by scientific evidence and the best available science. We are looking for consistent application of risk assessment. We wish the approach to recognise that any science based value should be achievable technically and also in terms of socioeconomic impact. There is not much point establishing a standard if no one can deliver on it because it is far too difficult or it has such an impact on the community that they suffer in some way as well. We are also looking for an approach that is open and transparent to all stakeholders.[23]

Enforcement

5.25 Changes to regulations have increased protection for workers. However, the effectiveness of the regulatory regime, particularly its enforcement, was debated in evidence. WHS commented that although the use of sand in abrasive blasting was limited in Queensland in early regulations, 'there continued to be cases of both open and clandestine use of different kinds of sands containing quartz or free silica but diminishing in frequency up to the present'. WHS went on to state that it believed that:

> …the move towards the Code of Practice under the umbrella of the Hazardous Substances Regulation has reduced the extent to which beach or river sand is employed in dry abrasive blasting and the respirable crystalline silica exposures of its workers.[24]

5.26 Other witnesses argued that the regulatory regime is not effective. For example, Mr Nickolas Karakasch stated:

> As far as enforcement, there was an Australian standard for monitoring of dust. I have never ever seen that in any of the sandblasting or abrasive blasting companies that I have visited in the last 40 years, although I do believe it does occur in some government facilities. It is certainly not in the private sector, yet we have a standard for it. We have health and safety acts Australia-wide and we have individual ones in individual states, and the primary focus is duty of care. Where is the duty of care? Nobody enforces it.[25]

5.27 The Australian Council of Trade Unions (ACTU) stated that its members reported very little enforcement from the regulators while Mr Lindsay Fraser of the Construction, Forestry, Mining and Energy Union (CFMEU) pointed to a worksite that he had observed on his way to the hearing:

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23 *Committee Hansard* 10.11.05, p.16 (MCA).

24 *Submission* 26, pp.17, 22 (WHS).

25 *Committee Hansard* 29.9.05, p.41 (Mr N Karakasch).

> …at the corner of William Henry Street and Wattle Street, I passed a massive excavation going on in one of the old wool stores. You cannot see across it. The dust is absolutely everywhere. As a matter of fact, I rang our New South Wales branch OH&S officer to get him to get WorkCover to go down there and do something about it. There is no monitoring by law in any state of Australia on construction sites. There are no records kept. Nobody knows who has been affected and who has not.[26]

5.28 The CFMEU commented that on big building sites in Sydney, which are unionised and have an occupational health and safety committee, significant contamination from dust is the exception. However, smaller sites are a major concern and while the CFMEU attempts to stop dangerous practices, 'we cannot be everywhere all day every day'.[27] The situation is also exacerbated by policies adopted by WorkCover authorities:

> Nearly every WorkCover authority in Australia now has adopted the policy of no proactive work by their inspectors. Inspectors are told specifically that they are not to go around to building sites at random and have a look; they are only to respond to requests from employers or employees or members of the public.[28]

5.29 The Construction Materials Processors Association (CMPA) pointed to a lack of trained regulators and suggested that a concerted effort by government agencies was required to ensure that adequately trained regulators are available to manage sites identified as having toxic dust exposure. This would also mean that the regulators are able to pass on their knowledge to those that they regulate.[29] The Australian Institute of Occupational Hygienists (AIOH) also supported the need for adequate numbers of regulators and noted that while OHS inspectorates assisted industry in understanding how to control exposures, 'due to downsizing and restructuring, such assistance is now severely limited or non-existent'.[30] In addition, departments are not resourced to go out to the workplaces and assess dust levels.[31]

5.30 AIOH also noted that while there are adequate standards in place, the enforcement of regulation of toxic dust in the workplace is weak and mainly confined to the issuing of improvement notices. In part, this is due to the difficulty in prosecuting employers under existing rules of evidence required under workplace health and safety legislation and noted that 'this situation will not change until

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26 *Committee Hansard* 30.9.05, p.23 (CFMEU).

27 *Committee Hansard* 30.9.05, p.26 (CFMEU).

28 *Committee Hansard* 30.9.05, p.28 (CFMEU).

29 *Committee Hansard* 29.9.05, p.13 (CMPA).

30 *Submission* 20, p.20 (AIOH).

31 *Committee Hansard* 29.9.05, p.24 (AIOH).

legislation can be amended to allow for prosecution of dust disease created by exposure to toxic dusts in the workplace'.[32]

5.31 AIOH also commented that a further hindrance to prosecution is the employment of fewer occupational hygienists by regulatory bodies. Occupational hygienists undertake work to recognise, assess and control hazards in the workplace that can affect people's health. Without adequate numbers of hygienists, it is difficult to monitor and regulate industry.[33]

5.32 AIOH recommended that in order to both conduct prosecutions and to prevent exposure to toxic dusts in the workplace, OHS authorities must recruit more occupational hygienists. In addition, occupational hygienists provide a valuable source of information for employers and information on the nature of the workplace environment to assist in the accurate diagnosis of a worker's condition.[34] AIOH recommended that any information in government publications relevant to control of toxic dusts should refer employers to the use of competent practitioners, that is certified occupational hygienists.[35]

5.33 The Australian Medical Association (AMA) concurred with the view that unless employers know that regulators will take action, workers will still be exposed to unsafe practices:

> Only when the industries believe they will be held to account will they take the necessary action to ensure their workers comply with legislation/regulation and safety standards…The sooner such legislation/regulation is implemented the sooner adequate precautions will be implemented. All evidence at the moment would suggest that workers continue to be exposed to particulate matter in an unacceptable fashion.[36]

5.34 The Australian Lawyers Alliance (ALA) commented that some problems with enforcing regulations arise from employment of private occupational health and safety officers:

> The problem most often encountered by Lawyers Alliance members in the context of the enforcement of regulations (insofar as they exist) is that officers practicing in corporate Industrial Hygiene and Health (and sometimes those in private practice in such disciplines), often identify too readily with their employer, and fail to take sufficiently stringent or timely action to enforce compliance with such regulations. This results in the exposure of many workers to toxic hazards and greater quantities thereof.[37]

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32 *Submission* 20, p.19 (AIOH).

33 *Committee Hansard* 29.9.05, p.28 (AIOH).

34 *Submission* 20, p.21 (AIOH).

35 *Submission* 20, Additional information 18.11.05 (AIOH).

36 *Submission* 33, p.2 (AMA).

37 *Submission* 27, p.3 (ALA).

5.35 Both the ACTU and CFMEU called for more rigorous enforcement of exposure standards across the jurisdictions and improved monitoring of workplaces where workers are exposed to silica and other toxic dusts.[38] The CFMEU stated:

> Even though we do not agree with the 0.1 [exposure standard for crystalline silica], it has to be enforced. It is not enforced now in the building and construction industry. Nobody goes around and monitors. It is only if our members contact us and we complain that we get WorkCover down to the site and WorkCover will try to do something about it. The reality of life on small building sites is that workers are scared to complain. They worry that, if they complain, they are going to be put off. We will not go into all of the side story there with the industrial relations. You have this situation where people are going to be exposed. There is no monitoring regime and there are no records kept of it. Doctors are unsure of it. We believe that you must have the regulators enforcing it.[39]

5.36 AIOH and Construction Materials Processors Association (CMPA) also supported the need for regulators to more closely monitor those sites which are identified as having toxic dust to ensure that the health and wellbeing of those on site is being managed to best practice. Further monitoring was seen as being preferable to more regulation.[40]

5.37 While concerns were raised by some witnesses about enforcement of exposure standards and monitoring, both Cement Concrete and Aggregates Australia (CCAA) and Coal Services provided information on their monitoring regimes in their industries. CCAA noted that records of activities during that day are kept so that employees' dust levels are monitored. This monitoring was carried out by occupational hygienists following the Australian standard for the calibration of equipment.[41] CCAA concluded that the best outcomes would be achieved through appropriate management of the risk by both employers and employees:

> The Robens principle that is built in to each state occupational health and safety act rests on the principles of self-regulation, where it is recognised that the best control can only be achieved by workers and employers working together to identify risks and manage those risks out of existence to provide better health outcomes. We support that principle continuing in legislation.[42]

5.38 Coal Services indicated that it independently monitors the exposure to coal dust and silica dust in coalmines:

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38 *Committee Hansard* 29.9.05, p.87 (ACTU); *Submissions* 13, pp.3, 4 (CFMEU) 28, p.6 (ACTU).

39 *Committee Hansard* 30.9.05, p.24 (CFMEU).

40 *Committee Hansard* 29.9.05, p.31 (AIOH); p.13 (CMPA).

41 *Committee Hansard* 30.9.05, p.16 (CCAA).

42 *Committee Hansard* 30.9.05, p.2 (CCAA).

> It is regulated that an underground coalmine has to have samples undertaken twice per year for each working face – and by that I mean that in an underground coalmine there could be four, five or six different faces being worked concurrently, and you have to take samples of the dust exposure at each of those sites at six-monthly intervals.[43]

5.39 Coal Services also commented that it is committed to continual improvement and has recently commissioned a trial of a ground breaking real-time system of airborne dust sampling, the tapered element oscillating microbalance (TEOM), currently under development and testing in the USA. An interim report on the TEOM was provided to industry in July 2005, and a more comprehensive report will be made within the coming year.[44]

5.40 DEWR noted that national standards and codes of practice are only legally enforceable if they are adopted into State and Territory regulations or codes of practice under their principal OHS Acts. Regulatory powers relating to compliance or enforcement of the OHS Acts and Regulations rests with the various jurisdictional OHS authorities. The ASCC has no regulatory powers relating to compliance or enforcement of the provisions in these documents.[45]

Notification of risks

5.41 Evidence was received during the inquiry which clearly indicated that in the past in some industries little effort was made to ensure that workers understood the risks of toxic dust exposure and could thus implement appropriate OHS strategies. Mr Richard White provided graphic examples of the conditions under which he worked in the Northern Territory in the 1970s:

> They would float barges in on the tide, and they would be on 44-gallon drums. They would take off the inspection plate underneath and we would go in there. They would often blast and then I would go in and clean it all out, which was just shovelling it out. We were not given any masks of any kind. I would be shovelling out the sand to the inspection hole and you could not see from one end of the barge to the other.[46]

5.42 Changes to occupational safety and health legislation since the 1970s in all jurisdictions now impose an obligation upon employers to provide information to employees to enable them to perform their work in such a manner so as not to expose them to hazards. The Hazardous Substances Regulations specify requirements for the provision of information by manufacturers and importers (in the form of labelling and Material Safety Data Sheets (MSDS)) and requirements for employers to provide accessible information, instruction and training to employees on health risks and use

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43 *Committee Hansard* 30.9.05, p.51 (Coal Services).

44 *Submission* 21, p.8 (Coal Services).

45 *Committee Hansard* 10.11.05, p.2 (DEWR).

46 *Committee Hansard* 10.11.05 pp.40-41 (Mr R White).

of control measures. The regulatory framework also requires employers to undertake risk assessments and to control the risk in accordance with the outcome of a proper risk assessment.

5.43 The Victorian Workcover Authority also noted that in situations where the Hazardous Substance Regulations do not apply, other legislation imposes obligations on employers. In Victoria, the *Victorian Occupational Health and Safety Act 2004* requires employers to 'provide such information, instruction, training or supervision…as is necessary to enable those persons to perform work in a way that is safe and without risks to health'.[47]

5.44 The Committee was provided with extensive evidence of the programs offered by government agencies, unions and industry groups to assist in informing workers of health risks. For example, WorkSafe Western Australia produces a range of publications in relation to various types of dust (abrasive blasting, concrete and masonry cutting and drilling, wood dust, flour and fibreglass). WorkSafe informed the Committee that it has also planned an information campaign relating to the new exposure standards in which workplaces will be informed of their duty to comply with the new standard.[48] AIOH also noted that WorkSafe has a very good web site that is available to the public.[49]

5.45 Industry groups provide workers with information on ways to minimise exposure to Respirable Crystalline Silica (RCS) and other dusts. Coal Services commented that it provides information to employees through:

- provision of results of personal dust sampling to each mine;
- provision of advice regarding methods to better control personal exposure to toxic dusts through Coals Services staff, and through the meetings of the Standing Dust Committee;
- publication of educational material on coal dust and silica;
- one-on-one counselling of employees during health surveillance assessments and dust sampling, provided by Coal Services Health's staff; and
- tool-box talks to work teams.[50]

5.46 CCAA also stated that its member companies had moved from basic controls and awareness to a comprehensive management systems approach focusing on prevention of exposure through engineering controls, improved work practices, changing work technologies, and backed by improved Personal Protective Equipment

47 *Submission* 35, p.2 (Victorian Workcover Authority).

48 *Submission* 12, p.2 (WorkSafe WA); see also *Submission* 26, p.24 (WHS) for information available from the Queensland Government.

49 *Committee Hansard* 29.9.05, p.24 (AIOH).

50 *Submission* 21, p.8 (Coal Services).

(PPE) systems when exposures cannot be controlled entirely by engineering or administrative means. In addition, the industry has developed Material Safety Data Sheets (MSDS), product warnings and labels consistent with the National Code on Labelling and product information sheets which have been widely available to the users of its products.[51]

5.47 CCAA also noted that the concept of product stewardship has also been embraced by many companies in the industry, resulting in:

- MSDSs for RCS prepared and broadly distributed throughout the quarry and pre-mixed concrete industry. These were distributed to all customers and related suppliers and were included in all trade account approvals; and
- product warning labels on pre-mixed concrete and quarry materials delivery documentation.

CCAA concluded that 'with the movement towards quality management systems approaches in the early to mid nineties, hazards such as silica dust were increasingly managed in a more systematic manner'.[52]

5.48 AIOH also commented that more responsible manufacturers view the provision of information on labels and MSDSs as a minimum standard. Some companies have implemented voluntary product stewardship schemes, in which they exercise a cradle-to-grave responsibility for their products at every stage in their life cycle. AIOH saw this as a very effective means of improving workplace safety and recommended that product stewardship be promoted as an appropriate model for disseminating information.[53]

5.49 Unions are continually working to improve awareness of the dangers of toxic dust. Unions provide members with information and support awareness programs. One such program was introduced in the 1990s in Victoria. The AWU and building unions worked with employer and industry associations to build awareness of the health risks associated with unprotected exposure to RCS. The program involved the development of a number of training and awareness resources that were used throughout industry and included videos, brochures and training in work practices designed to reduce RCS dust generation, and ensure the correct use and maintenance of PPE.[54]

5.50 With the resources now available, particularly online and from government information centres, the ACTU commented 'no employer can claim that the information is not available'. However, some problems were observed in ensuring that

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51 *Submission* 14, p.3 (CCAA).

52 *Submission* 14, p.3 (CCAA); see also *Submission* 14, pp.4-5 (CCAA) for detailed information on controls and management systems.

53 *Submission* 20, p.20 (AIOH).

54 *Submission* 14, p.3 (CCAA).

the information was received by all workers.[55] AIOH for example, commented that anecdotal evidence indicated that information is not filtering down into many small to medium enterprises.[56] Evidence from the CFMEU pointed to continued problems in the building industry particularly on small sites.

5.51 WHS reported that a blitz program in 2000 to assess abrasive blasting media, respiratory protection and hearing protection in a range of industries in Queensland found:

> Knowledge about the actual performance of respiratory protection is universally lacking, and most workplaces have not assessed the quality of breathing air. Training in the use of the respiratory protection had been given to only 64% of users, and respiratory fit testing was recorded by only 27% of users. The industry has not yet been involved in either air monitoring or health surveillance to any extent.[57]

5.52 The ACTU supported the development of a national community education campaign to alert the public and workers to the adverse health effects of exposure to toxic dust:

> …we recommend that a national community education campaign be developed by NOHSC, now the ASCC…with public health and OH&S authorities to alert the public and workers to the adverse health effects of exposure to the toxic dust. I think that is fairly self-explanatory. We have put in there that maybe the government could set up an information help line. The unions do that anyway, but on a national level the federal government perhaps could look at that, or perhaps it could be done through the ASCC as well, which is a tripartite body. Maybe there could even be a web site or something along those lines, as well; there needs to be much more information out there to protect workers who are exposed to this. Also, business needs to be educated, I think. Business needs to be better informed about the dangers.[58]

5.53 An education and training campaign was supported by the CMPA as training has a 'profound' effect on the skills of the workforce. It also recognised that training is one method whereby industry may be able to participate and stay in the 'game'. CMPA concluded that if industry 'does not take on board and educate its work force, it is not going to be able to manage all its obligations'.[59]

5.54 DEWR responded to comments on the need for an education campaign by stating that the responsibility for such programs rest with the States and Territories as

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55 *Submission* 28, p.7 (ACTU).

56 *Submission* 20, p.20 (AIOH).

57 *Submission* 26, p.22 (WHS).

58 *Committee Hansard* 29.9.05, p.87 (ACTU); see also *Committee Hansard* 30.9.05, p.24 (CFMEU).

59 *Committee Hansard* 29.9.05, p.17 (CMPA).

they are the regulators and compliance agencies for dealing with the industry specific sectors in their jurisdictions and are able to tailor those particular campaigns for the sectors relevant to their jurisdictions. DEWR noted that it has a role in broad community education and it funds the ACTU and Australian Chamber of Commerce and Industry (ACCI) to provide education on OHS issues.[60]

5.55 A further problem identified by Professor Trevor Williams was that the reduction in the incidence of classic silicosis, coupled with a lack of focus on other potential health risks of exposure to fine dust such as silica, may have led to a degree of complacency by both employers and employees.[61]

Exposure standard for crystalline silica

5.56 As noted above, part of the Australian regulatory framework are national exposure standards which have been declared as guidance to assist in ensuring that workers are adequately protected from exposure to hazardous substances. In evidence there was much debate about the current national exposure standard for crystalline silica.

5.57 There has been a recommended exposure standard for quartz, cristobalite and tridymite since 1983-84 when the NHMRC set the standard at 0.2 mg/m^3 for quartz and 0.1 mg/m^3 for cristobalite and tridymite. The standard was reconsidered by the Exposure Standards Expert Working Group (ESEWG) in 1988. ESEWG recommended a reduction of the exposure standards to 0.1 mg/m^3 respirable fraction for quartz, silica (fused) and tripoli (as quartz). For cristobalite and tridymite, it was proposed that the exposure standard be set at 0.05 mg/m^3.

5.58 Following the release of the draft exposure standard for public comment, the ESEWG believed that a more thorough examination of the issue was warranted. An expert working group and reference group were established. A draft technical report was produced in 1996.[62]

5.59 Between 1988 and 1996, no formal national exposure standard for crystalline silica existed in Australia, although some mining and OHS authorities issued their own standard. Following release of the draft technical report in 1996, NOHSC reinstated the original 1983-84 NHMRC exposure standard.[63]

5.60 A review of the reinstated exposure standard was referred to the Hazardous Substances Sub Committee of NOHSC which agreed in 1998 to recommend an independent review of the crystalline silica exposure standard. In 2002 as part of the

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60 *Committee Hansard* 10.11.05, pp.12-13 (DEWR).

61 *Submission* 7, p.2 (Professor T Williams).

62 NOHSC, *Draft Technical Report on Crystalline Silica,* 1996, AGPS, Canberra.

63 NOHSC, *Regulation Impact Statement on the Proposed Amendments to the National Exposure Standards for Crystalline Silica*, October 2004, p.25.

review, the University of Western Australia published an independent review which recommended changes to the existing standards. This formed the main scientific documentation that supports the amendments to the national exposure standard.

5.61 Representations from interested parties to identify issues of concern and those requiring attention, were invited between August 2003 and November 2003. NOHSC established the tripartite Crystalline Silica Review Group to review representations received and relevant scientific literature published since the University of Western Australia review was finalised. NOHSC also organised industry workshops in conjunction with the ACCI to identify cost implications of the exposure standards recommended by NOHSC.

5.62 In October 2004, NOHSC published its *Regulation Impact statement on the Proposed Amendments to the National Exposure Standards for Crystalline Silica* which recommended a revised national exposure standard for quartz, cristobalite and tridymite of 0.1 mg/m^3. These came into effect in January 2005. NOHSC stated that the University of Western Australia report and peer reviews, reviews of more recent, comprehensive studies and experience in Western Australia 'indicate there would be significant improvements in health effects at occupational exposure standards of 0.1 mg/m^3 for all three forms of crystalline silica'. Further that:

> This approach is consistent with the agreed NOHSC objective to reduce adverse health outcomes associated with exposure to chemicals. Updating the exposure standard will enable industry and workers to align with international practice in terms of exposure control, and the related flow of benefits to the worker and the community. Government OHS objectives are supported by this action. As well as direct benefits, indirect benefits include establishment of standards against which future monitoring can take place.
>
> The amended NES [national exposure standard] will assist in bringing Australia into line with international exposure standards, including those set by Australia's major chemical trading partners, such as the USA and Europe.[64]

5.63 The national exposure standards for quartz, cristobalite and tridymite are each to be measured in accordance with the methodology in Australian Standard AS 2985-2004 Workplace Atmospheres – Method for sampling and gravimetric determination of respirable dust sets. AS 2985-2004 provides a method to assess personal exposure to respirable dust by sampling in a worker's breathing zone and is consistent with international measurement methodologies. DEWR noted that silica standards have been consistently adopted across jurisdictions.[65]

5.64 There was both support for the national exposure standard and evidence from others arguing that the exposure standard should be reduced further. The ACTU informed the Committee that it recommended a prohibition on the use of crystalline

64 NOHSC Regulatory Impact Statement, p.67.

65 *Submission* 11, p.4 (DEWR).

silica in any abrasive or other processes which could give rise to silica dust; that the jurisdictions adopt a 0.05 mg/m^3 exposure standard for all forms of crystalline silica; and that an action level of half the national exposure standard, that is 0.025 mg/m^3 be implemented.[66] The ACTU, as well as the CFMEU, noted that the American Conference of Governmental Industrial Hygienists (ACGIH) has recommended a standard of 0.05 mg/m^3, 'and it is also a precedent that has been set in some European countries...Ultimately, there is no safe exposure level to any form of carcinogen, so what we will be pushing for is the lowest possible exposure levels for workers in those industries that are exposed to that'.[67]

5.65 The Australian Manufacturing Workers Union (AMWU) and CFMEU also commented that opposition to lowering the standard had arisen from the mining industry.[68] The CFMEU stated that in the mining industry there are control measures, however in the construction industry or the brick, tile and pottery manufacturing industry 'there are nowhere near those control measures. Therefore they should be lowered to 0.05, as the rest of the world is, and it should be monitored to ensure that that is the level that we work at.'[69]

5.66 WHS also pointed to the varying Threshold Limit Values (TLVs) for respirable crystalline silica in other countries. In the USA, the Occupational Safety & Health Administration (OSHA) TLV is 0.1 mg/m^3. WHS commented that 'this TLV is based on outdated toxicological data from the 1960s'. The limit recommended by the ACGIH (0.05 mg/m^3) is equal to the recommended exposure limit imposed by the National Institute of Health (NIOSH) in 1974. In the UK, the maximum exposure limit is 0.3 mg/m^3. In the Netherlands it is 0.075 mg/m^3. WHA also noted that researchers have asserted that the OSHA standard of 0.1 mg/m^3 is not low enough to prevent silicosis and that the NIOSH standard of 0.05 mg/m^3 is not low enough to protect against silica-induced lung cancer. Other researchers (Verma et al) believe that some jurisdictions are locked into outdated standards because the process of changing them is too convoluted and difficult. The OSHA standard is one example. In addition, the current standards are based on the assumption that silica-induced lung cancer is only a risk to those with silicosis, and therefore preventing silicosis will prevent silica-induced lung cancer. This assumption is still being debated.[70]

5.67 Mr Anthony Jennings noted that the exposure standard recommended by the University of Western Australia was 'primarily to control the onset of cancer'. The Health and Safety Executive (HSE) in the UK have claimed that at a level of 0.1 mg/m^3 there is a 2.5 per cent likelihood of developing silicosis. At a level of

66 *Submission* 28, p.5 (ACTU).

67 *Committee Hansard* 29.09.05 (ACTU); see also *Committee Hansard* 30.9.05, p.23 (CFMEU).

68 *Submission* 15, Additional information p.2 (AMWU); *Committee Hansard* 30.9.05, p.27 (CFMEU).

69 *Committee Hansard* 30.9.05, p.27 (CFMEU).

70 *Submission* 26, p.4 (WHS).

0.3 mg/m^3 this becomes 20 per cent. Mr Jennings concluded 'so 0.1 seems to be a very sharp cut-off. After that it really takes off quite exponentially'. However, in the USA the ACGIH has reduced its exposure standard to 0.05 mg/m^3:

> What they are saying is a vast majority of cases may be undiagnosed in workers who are working at 0.1 milligrams per cubic metre but they are showing signs or symptoms that are detectable at autopsy. This is based on South African work, I believe, where miners are routinely autopsied. This was South African mine workers data. That is one thing but we are currently not sure if 0.1 milligram per cubic metre is an adequate standard.[71]

5.68 Mr Jennings went on to state that he supported a reduction in the exposure standard as NOHSC had reduced the standard to prevent lung cancer when 'in fact, silicosis precedes lung cancer, so I think at a level of 0.1 you are still going to see some cases of silicosis. You might not actually see the cancers but you will still see silicosis'.[72] The Committee notes that although Mr Jennings appeared on behalf of the AIOH, the AIOH has indicated its support for maintaining of the 0.1 mg/m^3 exposure standard based on:

- the very low incidence of silico-pneumoconiosis in Australia; and
- issues involved in accurately quantifying exposures at concentrations below 0.1 mg/m^3.[73]

5.69 CMPA also noted that the reduction to 0.1 mg/m^3 was low with businesses aiming to engineer their work environments so as to reduce dust and concurred that a further reduction of the exposure standard may be difficult to achieve:

> …of the people monitored to get under 0.05, I think that for over half of the sample it would be difficult to bring about that sort of outcome. Most of the people being monitored in these environments are wearing PPE anyway, but the reality is that I aim to engineer it out and most other owners of businesses aim to engineer it out, too. We have to get to a point where we can ask, 'Can we actually engineer it out?'[74]

5.70 CCAA also expressed its belief that the current exposure standard has been revised in line with all of the evidence that was put before NOHSC at the time and 'we believe that the appropriate outcome was reached'. CCAA commented that the process recognised the input of employers, employees and government. It concluded that:

> We believe that a further reduction to 0.1 milligrams, which occurred by the end of 2004, will effectively eliminate any risk in the industry provided those standards are adhered to. We do not believe that any further reduction

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71 *Committee Hansard* 29.9.05 p.24 (Mr Jennings).

72 *Committee Hansard* 29.9.05, p.27 (Mr Jennings).

73 *Submission* 20, Additional information, p.1 (AIOH).

74 *Committee Hansard* 29.9.05, p.17 (CMPA); see also p.20 (CMPA).

> in occupational exposure standards will provide any further benefit from a health perspective and we are particularly concerned that it would substantially increase cost both to industry directly, certainly, but also through government in the areas of compliance and the like.[75]

5.71 The Minerals Council of Australia also commented that it supported the adoption of the exposure standards 'based on scientific evidence'.[76]

5.72 Coal Services expressed the view that exposure standards should not be used as 'a pass:fail dividing line, but rather as a driver for workplace management of hazards and the imposition of various levels of controls…Compliance with an exposure standard can be considered as an outcome of a system of work that is in control.' There is a need to support the competing demands of practicability and acceptable risk within exposure standards:

> Practicability ensures that any exposure standard can reasonably be met. The level of acceptable risk is that level that the community finds acceptable for the amenity that the exposure to the risk provides. This approach is taken to guard against unnecessary health effects from industry hazards through inappropriately lax health and safety requirements or unworkably stringent regulation – both of which inevitably fail.[77]

5.73 Coal Services concluded that there was no need for a further amendment of the exposure standard:

> So I do not think it is a matter of reducing threshold levels downwards. I think the way to effectively manage this area is to have a number of subsidiary systems in place that regularly monitor and ensure that workers are not being exposed to unrealistically high levels of dust; and, where that is the case, appropriate action should be taken to make sure that employers rectify the problem and reduce the dust levels.[78]

5.74 DEWR stated that the national exposure standards for both crystalline silica and asbestos are 'now consistent with the majority of developed countries'.[79] It noted that there had been a number of reviews before the new exposure standard was implemented however the issue of measurement technique for silicosis 'was only resolved when the new Australian standard was issued early in 2004, which enabled us to make a meaningful recommendation on the exposure standard and how it should it measured'. DEWR agreed that the level in the USA at the moment set by ACGIH is 0.05 mg/m^3 but pointed out that this uses 'yet another sampling methodology, which is

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75 *Committee Hansard* 30.9.05, p.2 (CCAA).

76 *Committee Hansard* 10.11.05, p.15 (MCA).

77 *Submission* 21, p.6 (Coal Services).

78 *Committee Hansard* 30.9.05, p.52 (Coal Services).

79 *Committee Hansard* 10.11.05, p.1 (DEWR).

roughly equivalent to 0.07 milligrams per cubic metre using the Australian methodology. We have 0.1; they have roughly 0.07 on an equivalence basis.'[80]

5.75 In relation to the arguments for an exposure standard of 0.05 mg/m^3, DEWR commented that based on the evidence that was before the expert group it was felt that it was difficult at that stage to validate going to a 0.05 mg/m^3 exposure standard. The group considered the public comment, the recommendation from the expert researchers and the peer review of that and international research.[81]

Exposure standard for beryllium

5.76 At the present time the exposure standard for beryllium set by NOHSC is 0.002 mg/m^3 or 2.0 ug/m^3. Mr John Edwards noted that in 1999 the ACGIH had issued a Notice of Intended Change for the beryllium exposure standard to 0.2 ug/m^3. On 3 February 2006, the ACGIH voted to adopt their Notice of Intended Changes for Beryllium proposing that it include a TLV-TWA of 0.00005 mg/m^3 (inhalable), a TLV-STEL of 0.0002 mg/m^3 plus skin notations and an A1 carcinogenicity classification in their 2006 draft document.

5.77 Mr Edwards concluded that 'the current worker Beryllium Exposure Standard used by OHSA, NOHSC and OASCC are totally inappropriate and outdated'. Mr Edwards called for an urgent review of Beryllium national exposure standard.[82]

5.78 National Industrial Chemical Notification and Assessment Scheme (NICNAS) is reviewing data on beryllium and beryllium compounds. The review is being conducted by the Office of the Australian Safety and Compensation Commission (OASCC). This will form the basis of the occupational exposure standard for beryllium and beryllium compounds. The review of the exposure standard requires examination of health effects derived from both animal and human data, and exposure data on beryllium and beryllium compounds. NICNAS will also consider international beryllium reviews.

5.79 NICNAS has also published in the *Chemical Gazette* of 7 March 2006 a Voluntary Call for Information notice seeking use and exposure information from individuals, industry associations and government organisations who may have information on beryllium and beryllium compounds.[83]

Conclusions

5.80 All occupational lung disease is preventable by eliminating exposure through safe work practices, regular monitoring to ensure that dust exposure is minimised,

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80 *Committee Hansard* 10.11.05, p.10 (DEWR).

81 *Committee Hansard* 10.11.05, p.11 (DEWR).

82 *Submission* 45, p.3 (Mr J Edwards).

83 *Submission* 45, Additional information 21.3.06 (Mr J Edwards).

understanding the dangers of exposure and training of workers. In the past workers were exposed to unacceptable levels of dust because the regulatory regime did not adequately address these issues. The control of hazardous substances in workplaces, particularly crystalline silica, was not uniform across or within jurisdictions. The National Hazardous Substances Regulatory Framework has now been instituted to address these problems. The national model regulations have been adopted by all jurisdictions and a relatively consistent regulatory framework for the regulation of workplace chemicals now exists. Unions and industry have also played a significant role in reducing hazards through improved training of workers, improved management systems and the development and use of engineering controls and safety equipment.

5.81 While the regulatory regime has lead to significant reduction in health hazards, evidence was received that indicated that further improvements can be made. One problem highlighted in evidence is the timely introduction of changes to the declared standards and codes by all jurisdictions. The Committee considers that it is imperative that once the need to amend the regulatory regime is identified, the changes are implemented expeditiously. The Committee considers a responsive regulatory system will be imperative as workers are exposed to new hazards through emerging technologies such as nanotechnology. The Committee welcomes DEWR's commitment to seeking ways to improve implementation processes.

5.82 Of major concern in evidence was the poor enforcement of regulations in some jurisdictions and industries. It was noted that the hazards of toxic dust exposure are now well known and systems to control hazards and to monitor workers' exposure are readily available. However, it appears that not all workers enjoy the same level of protection. It was argued that this is due, in part, to the lack of enforcement of regulations by State and Territory agencies. In some instances, it appears that there is a lack of regulators. It also appears that inspections are only carried out if a complaint has been made rather than on a routine basis. It was argued that regulators are unwilling or unable to issue to the employer more than an improvement notice.

5.83 Regulators also appear to be hampered by the lack of trained specialists such as occupational hygienists. Occupational hygienists are able to assist in prosecutions through the recognition and assessment of workplace hazards. At the same time occupational hygienists are a valuable source of information for employers working to limit hazards.

5.84 It also appears that while there is much information available on risks of toxic dust exposure not all workers are able to access this information. The ACTU supported development of a national education campaign to alert the public and workers to the adverse health effects of toxic dust.

5.85 The Committee agrees that hazardous substances regulations must be enforced in all workplaces and information should be readily accessible to ensure that employers and employees know how to minimise hazards. The health of workers should not depend on whether they are employed by a large company operating in a

well organised industry with a well resourced industry association committed to worker safety. All workers should enjoy the same degree of protection and safety.

Recommendation 6

5.86 That the Australian Safety and Compensation Council undertake a national campaign to raise awareness of the hazards associated with toxic dust.

Recommendation 7

5.87 That the Minister for Employment and Workplace Relations raise with the Workplace Relations Ministers' Council the need to ensure enforcement of hazardous substance regulations and the need to enact nationally consistent standards in a more timely manner.

Recommendation 8

5.88 That the Australian Safety and Compensation Council, in conjunction with the Heads of Workplace Safety Authorities, consider mechanisms to increase the number of occupational hygienists being trained and employed by regulators.

5.89 In relation to evidence received on the crystalline silica exposure standard, the Committee notes the long time lag, some 10 years, for the review to be carried out and for the new exposure standard finalised. The Committee, while noting DEWR's comments in relation to issues with measurement technique, considers that this was an unacceptably long period for a review of a significant workplace hazard. The Committee anticipates that any further reviews will not take such a length of time to finalise.

5.90 The Committee is not in a position to comment on the arguments put forward that the standard should be lowered to 0.05 mg/m^3. However, the Committee notes the comments from Coal Services that the standard should be 'a driver for workplace management of hazards' and that an approach which guards against lax health and safety requirements but does not impose unworkably stringent regulation is desirable but the latter not always avoidable.

CHAPTER 6

COMPENSATION

Access to compensation

6.1 Access to compensation as a result of workplace exposure to toxic dust is a complex issue. All Australian workers, excluding employees of the Commonwealth who are covered by the *Safety, Rehabilitation and Compensation Act 1986*, may access workers' compensation via separate legislation in every State and Territory as well as having the ability to apply for compensation under common law entitlements. The lack of a uniform compensation system results in inconsistent application of legal standards and precedence in compensation proceedings. The Australian Manufacturing Workers Union (AMWU) stated:

> The predominant difficulty we have with [dust-related compensation] claims is the definition of what is eligible under workers compensation schemes, where the definition will be a significant and contributing factor related to people's work. For instance, there are issues around how much someone's work contributed versus how much someone's cigarette consumption contributed et cetera. We have dealt with that and sorted that out much better in the asbestos area, just because we have killed so many people. We do not know how that all works out in terms of other toxic dusts. That is very difficult to work out. There are problems about eligibility. There are then problems about causation and we do not know who has been exposed and all of those things...[1]

6.2 The NSW Government established the Workers' Compensation (Dust Diseases) Board, a statutory authority that grants awards of compensation to all persons disabled for work as a consequence of a dust disease reasonably attributable to exposure to the inhalation of dust in a NSW occupation. Compensation may also be available to the dependents of these victims and their widows.

6.3 As well as compensation under the *Workers' Compensation (Dust Diseases) Act 1942*, victims of dust diseases may be entitled to damages at common law. Those claims are conducted before the Dust Diseases Tribunal of NSW, a highly specialised tribunal that deals solely with diseases caused by dust.[2]

6.4 In Victoria, the *Victorian Accident Compensation Act 1985* provides compensation for persons who have sustained an injury or health condition due to workplace injury or exposure. The Victorian Workcover Authority stated that 'the onset of a work-related disease (resulting from exposure to toxic dust) is treated no differently from an acute injury. Injured persons are entitled to be compensated for

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1 *Committee Hansard* 29.9.05, p.84 (AMWU).

2 *Submission* 32, pp.8-9 (Dust Diseases Board).

loss of earnings and medical expenses and also have common law rights that can be exercised'.[3]

6.5 In November 2005, the Dust Diseases Bill was introduced into the South Australian Parliament. The Bill provided for a new regime for compensation for people injured as a result of dust disease, defined in the Bill as including asbestos related diseases or other diseases or pathological conditions resulting from exposure to dust. Following amendments, both in the Legislative Council and the House of Assembly, the operation of the Act was restricted solely to diseases resulting from exposure to asbestos.[4] Workers affected by exposure to other dusts will remain covered by the South Australian *Workers Rehabilitation and Compensation Act 1986.*[5]

6.6 The AMWU provided the following comments on the Workers' Compensation (Dust Diseases) Board:

> The current common law damages system that operates in New South Wales through the Dust Diseases Tribunal of New South Wales (the Tribunal) has been acknowledged as "world's best practice" by numerous commentators. Accordingly, extensive reform of the existing system for compensating victims of dust disease through the Tribunal is…both unnecessary and inappropriate.[6]

6.7 The Dust Diseases Board of NSW has been commended for assisting workers to gain compensation for exposure to toxic dust. However, Dr Thomas Faunce, Senior Lecturer at the Medical School and Law Faculty, Australian National University and the Construction, Forestry, Mining and Energy Union (CFMEU) highlight some restrictions of this State-based model:

> Although organisations such as the Dust Diseases Board in New South Wales have done a good job and have a certain amount of money to fund resources, obviously that is limited by the financial restrictions of the fact that it is just a state.[7]
>
> Authorities such as the Dust Diseases Board of NSW are instrumental in gaining compensation for workers. However, they are able to help only if the worker approaches them.[8]

6.8 The complexity surrounding State-based compensation schemes is confirmed by Dr John Bisby's, a consultant on Medical, Toxicology and Control Systems representing Cement Concrete and Aggregates Australia, statement on dust monitoring and medical testing processes:

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3 *Submission* 35, p.2 (Victorian Workcover Authority).

4 Ebrief, www.normans.com.au/news/empl_issue37_jan2006.html

5 The Hon P Holloway, *Legislative Council Hansard,* 1.12.05.

6 *Submission* 15, Additional information, p.2. (AMWU).

7 *Committee Hansard* 10.11.05, p.49 (Dr T Faunce).

8 *Submission* 13, p.4 (CFMEU).

> The Dust Diseases Board has various functions. They have a branch that does medical testing of workers. The WorkCover Authority of New South Wales has people who do dust monitoring, so both are done in New South Wales. To a certain extent this applies in all states. Each state really organises things differently. For example, Western Australia has regulations that require slightly different medical testing to any of the other states - and, indeed, different to the Commonwealth national recommendations. All X-rays in Western Australia go to the state government and they are reviewed medically at the state level, which I do not think happens in any other state.[9]

6.9 To reduce the inconsistencies in each State, the Australian Sandblasting Diseases Coalition (ASDC) recommended the creation of a national regulatory body, a National Toxic Dust Diseases Board. This board would investigate, adjudicate and where appropriate provide financial compensation for employees and their families whose health has been adversely affected by toxic dust diseases.

6.10 The ASDC further recommended that the:

> National Toxic Dust Diseases Board would apply standards established on the best available scientific evidence by medical and epidemiological experts. In addition to this, the regulatory body would be in charge of distributing funds from the responsible employer corporations, to compensate for any medical, or other financial expenses, incurred by toxic dust associated diseases.[10]

6.11 The ability to seek compensation for exposure to toxic dust in the workplace is at times restricted by an employer structuring its corporate identity to protect assets from legal action and minimise liability. The AMWU provided this example:

> James Hardie exploited the Corporations Act for its own purposes. Unfortunately this practice has become all too common. The AMWU is aware of both large and small corporations who put in place asset protection schemes which result in their employees, or victims and potential victims as the case may be, being unable to access the full and true assets and resources of the company in the event that the company enters administration or liquidation.[11]

6.12 Dr Faunce recommended that the Committee consider the compensation improvements which are coming out of the British coal dust inquiry in terms of making it much more science based. Dr Faunce explained:

> The long latency periods of silica are similar to asbestos, even though it is only a small aspect of the inquiry. All of these things create capacity for companies that want to avoid liability, to delay actions, to wait until people die, to obfuscate, to put on delay motions and to keep pushing things away

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9 *Committee Hansard* 30.9.05, p.13 (Dr J Bisby)

10 *Submission* 25, p.2 (ASDC).

11 *Submission* 15, Additional Information p.4 (AMWU).

> because of this long period. We need to have a compensation system that does not facilitate that sort of tactical gaming by an industry that does not want to pay compensation.[12]

6.13 Accessing compensation for a work related exposure to toxic dust is often confounded by a worker having a prior history of cigarette smoking. The Committee heard from many witnesses on the effect of cigarette smoking when determining compensation claims for respiratory illness from workplace exposure to toxic dust.

> Over the past ten years Coal Miners Insurance (CMI) has not seen any cases of lung disease consistent with exposure to respirable coal dust or silica. The issue of workers' compensation for health effects from these two dusts is greatly confounded by self-inflicted exposures such as smoking.[13]

> One of the main areas of controversy in this area, responsible for denying compensation, involves health problems such as asthma, silicosis, emphysema or excess sputum being ascribed exclusively to uncompensable cigarette smoking in workers with that history, regardless of exposure to toxic dust. This conclusion is not in accordance with the best recent scientific evidence or the approach emerging from the recent UK coal mining disease litigation and enquiry.[14]

6.14 The Committee notes the evidence provided by Dr Faunce on a British coal compensation case where the court recommended an approach to addressing the effect of cigarette smoking in toxic dust claims:

> Disability in a toxic, dust-exposed cigarette smoker should not be regarded for compensation purposes as if it were entirely due to one cause or the other. Rather, [during the British coal litigation] the court decided that it should attempt to estimate as far as possible the contribution of each cause and then award compensation proportionally. A related recommendation was that compensation should prima facie be paid to any worker with chronic obstructive airways disease who had worked underground for 20 years in coalmining. But you could apply that to 20 years in sandblasting, even in the absence of pneumoconiosis on a chest X-ray. In other words, if you work in sandblasting for 20 years you are entitled to compensation if you have something wrong with your lungs. You do not have to go through this process. That is one approach that at least needs to be considered.[15]

6.15 To assist workers with the complexity as well as reduce the traditional adversarial nature of common law actions, Professor E Haydn Walters commented on the option of establishing a neutral expert panel to aid workers' access to compensation.

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12 *Committee Hansard* 10.11.05. p,39 (Dr Faunce).

13 *Submission* 21, p.7 (Coal Services).

14 *Submission* 25, p.3 (ASDC).

15 *Committee Hansard* 10.11.05, p.38 (Dr Faunce).

> In these situations, it is always difficult if you are advocating for somebody. I think it would probably be much better if the courts in some way could have a fairly neutral group who could try to dissect these issues. As you say, it is complex…A professional body, perhaps, which could give information to the courts, and perhaps in a neutral way to the plaintiffs themselves, would be quite useful...I think what you need is not confrontation with people being hired on one side or the other; what you need is neutral professional commentary from people who are aware of all the facts.[16]

Limitations in seeking legal redress

6.16 All Australian States have Limitations of Actions legislation which limit the time within which proceedings can be issued in relation to claims for damages for personal injuries. Limitation legislation is intended to prevent a plaintiff from taking an unreasonable length of time to commence proceedings to enforce a right or rights claimed by the plaintiff.

6.17 The ASDC noted that for cases where exposure to dust have occurred in NSW, there is no statute of limitation. If the exposure to dust occurred in other States, then the limitation laws of those States will apply.[17] As silicosis has a latency period of anywhere between 10 to 30 years, this could dramatically effect the outcome for employees across Australia affected by the exposure of toxic dust and negligent work practices/regulations. The ASDC recommended that the Senate establish a regulatory body to allocate compensation claims nationally for those employees affected by toxic dust related diseases.[18]

6.18 Each jurisdiction in Australia now has a provision that allows for a limited extension of time in certain circumstances for civil claims. The circumstances in which extensions will be granted are, however, extremely restrictive in most jurisdictions. Generally a number of factors must be considered before leave can be given to issue proceedings out of time. These include the reasons for the delay, the prejudice that the defendant has suffered by the delay and the merit of the substantive claim.

6.19 Applications for an extension of time within which to issue proceedings are costly (in the range of $10 000 to $15 000 for each side) and there is no guarantee that leave to issue proceedings will be granted. If the application is unsuccessful, the applicant in addition to his or her own legal costs will be liable for the other side's legal costs.

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16 *Committee Hansard* 10.11.2005. p,30 (Prof Walters).

17 *Submission* 25, p.10 (ASDC).

18 *Submission* 25, p.10 (ASDC).

6.20 Mr Fraser Hobday provided an example of problems in Western Australia with Statute Limitations and applications for extensions.

> The proposal to change the current Limitations Act may assist some toxic substance victims, but the WA State Solicitor's Office argues against full discretionary extension powers to the judiciary that are exercised in nearly all other Australian States. So in this case, only plaintiffs that fit the fixed criteria will be granted an extension of time from a 3-year limitation period.
>
> Unfortunately this will prevent the judiciary from being informed of all the reasons causing delay and acting in any discretionary manner. Therefore circumstances will arise where plaintiffs would have legitimate cause for a damages claim in other states in Australia, but not WA.[19]

6.21 The Australian Lawyers Alliance (ALA) identified the main barriers to legal redress for workers injured as a consequence of workplace exposure to toxic dust:

- the inadequacy of workers compensation benefits (including limits on compensation, inadequate provision for lump sums for permanently disabled workers and recovery of only a percentage of usual weekly income);
- the statutes of limitation;
- thresholds to the access of common law benefits both in employee and public liability claims (insofar as such claims are work-related through the use of defective products or injury at the premises of others);
- that damages available to an injured worker in lifetime do not enure for the benefit of their estate or dependants after death; and
- the abolition of claims for exemplary damages.[20]

6.22 One barrier encountered by many witnesses when claiming compensation for occupational toxic dust exposure included the high cost of legal representation and process. The AMWU suggested that:

> Necessary reforms should be directed to improving the delivery of damages to victims of dust disease in the most timely and cost effective manner possible. Procedures should be streamlined so as to reduce legal costs. The reduction of legal costs in the processing of compensation claims is a fundamental principle that UADFA supports. A reduction in legal costs, long term, maintains the pool of money available to compensate victims of dust disease. UADFA's primary aim is to ensure that the pool of money necessary to compensate victims remains available indefinitely into the future.[21]

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19 *Submission* 42, p.6. (Mr AF Hobday).

20 *Submission* 27, p.4 (ALA).

21 *Submission* 15, Additional Information, p.2 (AMWU). The UADFA is collectively, the Asbestos Diseases Foundation of Australia, the Queensland Asbestos Related Diseases Support Society, the CFMEU (Construction Division – NSW), Maritime Union of Australia (NSW) and AMWU.

Alternative models of financial support

6.23 The Dust Diseases Board offers compensation to two types of categories of injured worker applicants including those still working and those who have retired. Retired workers certified by the Board as being disabled by a dust disease as a result of employment in New South Wales receive a compensation payment for the actual disability suffered, rather than for loss of earnings caused by the dust disease. These workers are paid according to the level of disability experienced, as assessed by the Medical Authority. Workers who are below retirement age or still in the workforce and who have been certified as being disabled by the dust disease will be paid according to the economic loss suffered.

6.24 Workers are entitled to receive weekly benefits which include an amount to acknowledge dependants as well as medical, hospital, ambulance, home care, palliative care and any other associated costs reasonably and properly incurred in the treatment of a dust disease.

6.25 The weekly amount varies, according to degree of disability, as certified by the Medical Authority. This normally ranges from 10 per cent disablement to 100 per cent disablement and is based upon the medical evidence provided. The Dust Diseases Board has a policy of reviewing the medical condition of all workers on a two to three year basis to monitor the level of their disability and ensure that the correct compensation entitlements are being distributed. Workers whose condition has deteriorated and who are able to produce supporting medical evidence can have their level of disability reviewed by the Medical Authority at their request.[22]

6.26 Mr Richard White recommended a compensation scheme based on the 'Bernard Collaery model, which is basically the Veterans' Affairs model, including pension and entitlement with lump sum and flow-on entitlements that go with that'.[23]

6.27 The ACTU provided the following comments relating to alternative models of financial support:

> Statutory benefit schemes must be adequate to compensate workers for loss of income, medical expenses and ongoing care, dependants' support, travel, funeral and other expenses as well as projected superannuation entitlements up to retirement age. The provisions contained in statutory schemes ought to ensure that a claimant is entitled to weekly payments of compensation for total incapacity in situations where a worker may have some residual capacity for work like activity but is genuinely unable to obtain suitable employment.
>
> In addition most schemes provide for lump sum payments for permanent impairment. It is critical to ensure that the assessment methods utilised by Compensation Schemes adequately assess the extent of impairment and

22 *Submission* 32, p.9 (Dust Diseases Board of NSW).

23 *Committee Hansard* 10.11.05, p.35 (Mr R White).

> disability. Most schemes rely on the various editions of the American Medical Association Guides for the Evaluation of Permanent Impairment. These Guides are notorious for under assessment of respiratory conditions (other than for advanced conditions). Modification of the Guides, as is currently under consideration in Victoria, may be necessary.[24]

6.28 The Committee discussed the value of having a scheme to compensate people for their medical expenses associated with getting diagnoses and treatment when they have been exposed to toxic dust. Mr Nickolas Karakasch, who has worked in sandblasting and protective coating industry for 40 years, supported the idea of such a scheme and stated:

> At the moment it is a very long drawn-out process. The legal profession probably rub their hands and make a lot of money out of it, but if you can take that aspect out of it – there will always be the legal profession involved but I think that is a good idea – that would short-circuit all of these long delays, grief and heartache imposed on individuals and families associated with this sort of litigation.[25]

6.29 The ALA provided their opinion on an alternative model of financial compensation being a levy scheme which would include no-fault arrangements and limited compensation paid to affected workers. The ALA stated:

> As a fall-back, if all the other potential areas of compensation were exhausted without being able to be accessed and a worker was then left only with an ability to access medical costs because of the problems in accessing compensation, then I think it has merit. But there is no doubt the best means of addressing compensation is a combination of a statutory scheme and common law entitlements, which have been significantly restricted in recent years but, nonetheless, still serve a useful purpose.[26]

6.30 Workers who become ill after working in occupations exposing them to toxic dust face many issues. Perhaps the most pressing are the need for accurate diagnosis, appropriate treatment and the ability to access a consistent, fair and clear compensation process. Evidence suggests that access to compensation for toxic dust exposure is difficult and vastly different depending on the State in which the claim is made. Various limitations, not only legislatively, exist to prevent access to compensation. A further factor causing confusion for these workers, who require help and need assistance, is the fact that a number of models for financial support exist. Each of these models differ in the way they compensate either the worker or their dependents for economic loss, non-economic loss, treatment and medical costs as a result of occupational exposure to toxic dust. There is a compelling case for compensation mechanisms to be available other than through litigation, and in circumstances that are more nationally consistent.

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24 *Submission* 28, p.8 (ACTU).

25 *Committee Hansard* 29.9.05, p.43 (Mr N Karakasch).

26 *Committee Hansard* 29.9.05, pp.50 (ALA).

Recommendation 9

6.31 That State and Territory Governments move as soon as possible to set up nationally consistent identification, assessment and compensation mechanisms for persons affected by workplace related exposure to toxic dust and their families to at least the current New South Wales standard.

Recommendation 10

6.32 That the State and Territory Governments use the New South Wales *Workers' Compensation (Dust Diseases Act) 1942* as the model for this mechanism.

Recommendation 11

6.33 That the State and Territory Governments, other than New South Wales, move as soon as possible to adopt the approach of New South Wales to remove statutes of limitation that restrict legal proceedings for claims for personal injuries resulting from exposure to toxic dust.

CHAPTER 7

NANOTECHNOLOGY

7.1 With scientists now able to manipulate atoms one at a time, new atomic structures are available. These new structures sometimes have unique and novel properties, far removed from those of the material at normal scale. The control of individual atoms and molecules is known as nanotechnology. The technology is already being used in some sectors of industry: in manufacturing ultra-fine powders are used for electronics and metal composites and corrosion and wear resistant coatings. Consumer goods incorporating nanoparticles are now also available including sunscreens and cosmetics.

7.2 Many consider that the further development of nanotechnology and nanoscience will have enormous potential in research and industrial applications with some suggesting that nanotechnology has the potential to change lives as much as the discovery of electricity or the microchip. The Prime Minister's Science, Engineering and Innovation Council (PMSEIC) Working Group on Nanotechnology stated:

> [Nanotechnology] could give rise to a whole new set of industries as well as transform current technologies in manufacturing, healthcare, electronics and communications.[1]

7.3 Investment in nanotechnology is expanding rapidly and has more than quadrupled between 2001 and 2005.[2] Given its potential application to many fields, nanotechnology will have significant economic, environmental and social implications and will create new challenges for safety and regulatory regimes.

Nanoscience and nanotechnology

7.4 Nanoparticles are ultrafine particles with aerodynamic diameters less than 100 nanometres. A nanometre (nm) is one billionth of a metre. For comparison, a single human hair is about 80 000 nm wide and a water molecule is almost 0.3 nm across. Nanoparticles can comprise a range of different morphologies including thin films, nanotubes, nanowires, nanodots and a range of spherical or aggregated dendritic forms. Nanotechnology involves structures in the range 1 to 100 nanometres.[3]

7.5 Interest in nanoparticles is increasing significantly as the properties of materials in nanoparticle form can have very different or enhanced properties

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1 Prime Minister's Science, Engineering and Innovation Council Working Group, *Nanotechnology: Enabling technologies for Australian innovative industries*, 11.03.05, p.3.

2 PMSEIC, p.9.

3 PMSEIC, p.8; for more detailed information on examples of nanotechnology, see PMSEIC, p.13-17.

compared with the same material at a larger scale. Advances in technology have also allowed atoms and molecules to be examined and probed with great precision leading to the expansion and development of nanoscience and nanotechnologies.

7.6 The properties of materials at nanoscale vary significantly from those at bulk size for two main reasons. First nanomaterials have a relatively larger surface area when compared to the same mass of material produced in a larger form. This can make materials more chemically reactive and affect their strength or electrical properties. Second, quantum effects can begin to dominate the behaviour of matter at the nanoscale – particularly at the lower end – affecting the optical, electrical and magnetic behaviour of materials.[4]

7.7 Nanoscience is concerned with understanding these effects and their influence on the properties of materials. Nanotechnologies aim to exploit these effects to create structures, devices and systems with novel properties and functions due to their size.

7.8 These materials have application in a wide range of industries including electronics, pharmaceuticals, chemical-mechanical polishing and catalysis. For example, very thin coatings are used in electronics and active surfaces (self-cleaning windows). Carbon nanotubes have great tensile strength and are considered to be 100 times stronger than steel whilst being only a sixth of its weight thus making them potentially the strongest, smallest fibre known.[5] Titanium dioxide is used in sunscreens and self-cleaning glass and as a photo catalyst. Nanoscale silicon is used in semiconductor manufacturing while metal core coated particles are used to create quantum nano-dots that allow high sensitivity labelling in a range of chemical or environmental settings.[6] Stain and wrinkle-free fabrics incorporating 'nanowhiskers' and longer lasting tennis balls using butyl-rubber/nanoclay composites are now being marketed.[7]

7.9 Nanoparticles are mostly fixed or embedded in nanoscale components. In some instances, free nanoparticles are used, for example in cosmetics.

7.10 Certain industrial by-products can be considered to contain nanoparticles, for example from combustion engines (diesel particulate material), furnaces and welding. There are also naturally occurring nanoparticles associated with sand storms and forest fires. Most debate centres around the new field of engineered nanoparticles.

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4 The Royal Society & The Royal Academy of Engineering, *Nanoscience and Nanotechnologies: opportunities and uncertainties,* London, July 2004, p.2.

5 Institute of Occupational Medicine for the Health and Safety Executive, *Nanoparticles: An occupational hygiene review,* Research Report 274, 2004, p.10. www.hse.gov.uk/research/rrhtm/rr274.htm

6 *Hazards Magazine*, 'Dangers come in small particles', Issue 87. www.hazards.org/nanotech/safety.htm

7 NIOSH, *Nanotechnology and Occupational Safety and Health Research* www.cdc.gov/niosh/topics/nanotech/faq.html

Investment in nanotechnologies

7.11 Worldwide the investment in nanotechnology research and development has increased dramatically over recent years. Governments in many countries are funding research and manufacturers are already marketing a wide range of products. The United States invests approximately US$3 billion annually in nanotechnology research and development, which accounts for approximately one-third of the total public and private sector investments worldwide.[8]

7.12 In the United Kingdom there are some 370 companies currently involved in nanotechnologies.[9] Some 1500 companies internationally have announced nanotechnology research and development plans, 80 per cent of which were start-up companies.[10]

7.13 The Woodrow Wilson International Centre for Scholars in the USA has established the Project on Emerging Nanotechnology to encourage discussion about nanotechnology's benefits as well as its safety and environmental impacts. As part of this project it has established the Nanotechnology Consumer Products Inventory which, at March 2006, contained more than 200 manufacturer-identified nano products.[11]

7.14 In Australia, there are over 50 Australian companies focussed on nanotechnology. Australian nanotechnology research spans materials, biotechnology, energy, environment, electronics, photonics, computing and surveillance. The Australian Research Council currently funds more than 200 nanotechnology research projects. Australian universities, CSIRO, the Australian Nuclear Science Technology Organisation and the Defence Science Technology Organisation are also active in nanotechnology research and development.[12] The PMSEIC Working Group estimated that at 2003, government and the private sector were investing up to A$100 million per annum in nanotechnology, with at least half from government sources.[13]

7.15 It has been estimated that the sales of products incorporating emerging nanotechnologies will rise from 0.1 per cent of global manufacturing output in 2004 to 15 per cent in 2014, totalling US$2.6 trillion.[14]

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8 Woodrow Wilson International Centre for Scholars, *New Nanotechnology Consumer Products Inventory*, www.wilsoncenter.org

9 The Royal Society-Science Council of Japan, *Report of a Joint Workshop on impacts of nanotechnologies,* July 2005, p.2.

10 PMSEIC, p.11.

11 Project on Emerging Nanotechnologies, *A Nanotechnology Consumer Products Inventory,* www.nanotechproject.org/consumerproducts

12 *Submission* 10, p.7 (Friends of the Earth).

13 PMSEIC, p.11.

14 PMSEIC, p.9.

7.16 The United States National Institute for Occupational Safety and Health (NIOSH) reported that there is no current comprehensive data from official survey sources on the number of people employed in the US in occupations or industries in which they might be exposed to engineered nano-diameter particles in the production or use of nanomaterials. However, a 2004 survey estimated that some 24 300 people were employed in companies engaged in nanotechnology (this included all people employed in the company).[15]

7.17 Friends of the Earth estimated that there are as many as 700 people in Australia who are currently employed in activities in which they may be regularly exposed to synthetic nanoparticles in some form. Friends of the Earth commented that this figure 'seems reasonable' as there are now over 50 Australian companies focussed on nanotechnology and the Australian Research Council is currently funding more than 200 nanotechnology research projects. It was estimated that this number is likely to at least double over the next five years.[16]

7.18 The National Science Foundation estimated that in 2015 there will be 2 million workers employed in nanotechnology-related industries worldwide; the number of people in secondary industries using nanotechnology-related materials and devices will be orders of magnitude greater.[17]

Health and safety concerns

> …nanotechnology presents new and very serious risks that are currently affecting workers and the public and, as industrial expansion continues, will impact further upon the environment. There is early evidence of serious harm and there are warnings from the world's most eminent scientific body in relation to nano risks. We also have warnings from the world's second-largest reinsurer that, in order to prevent a repeat of the asbestos experience, we need conservative regulation that puts safety first now and that catches up to the industry expansion.[18]

7.19 Various studies and reports point to the lack of information concerning the human health and environmental implications of manufactured nanomaterials. However, it is generally considered that there is an inverse relationship between toxicity of insoluble materials and particle size, irrespective of parent material.[19] The UK Health and Safety Executive noted that 'the toxicity of insoluble materials increases with decreasing particle size, on a mass for mass basis'.[20] It was also noted

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15 NIOSH, *Nanotechnology and Occupational Safety and Health Research*, http://www.cdc.gov/niosh/topics/nanotech/faq.html

16 *Submission* 10, p.12 (Friends of the Earth).

17 *Submission* 10, p.6 (Friends of the Earth).

18 *Committee Hansard* 29.9.05, p.58 (Friends of the Earth).

19 *Submission* 10, p.8 (Friends of the Earth).

20 UK Health and Safety Executive, p.12.

that unlike larger microparticles, nanoparticles are highly mobile and readily enter the blood stream following inhalation or ingestion. Nanoparticles may also penetrate human skin.[21]

7.20 It is generally believed that the principal determinants of toxicity of nanoparticles are:

- chemical reactivity of the surface (including any surface components such as transition metals or coatings and particularly any ability to take part in reactions that release free radicals);
- total surface area presented to the target organ;
- physical dimensions (which could influence penetration and removal in the body); and
- solubility (soluble particles may disperse before initiating a toxic reaction).[22]

7.21 The Minerals Council of Australia noted that significant research has identified that inflammation is a primary health effect and oxidative stress can be identified as a dominant mechanism in the production of this inflammation.[23]

7.22 Friends of the Earth also cited a research report which showed that inhaled nanoparticles penetrate the protective mucus lining of human lungs and have high rates of deposition in the deeper lungs. Scavenger cells usually intercept foreign bodies and larger sized particles that make it past the mucus lung lining and into the deeper lung. However studies have shown that these cells have difficulty recognising nanoscale particles, they are readily overloaded, and their action is impaired.[24] Reports also indicate that nanoparticles are associated with inflammatory lung injury and laboratory studies have shown that nanoparticles are transported around the body and are absorbed by organs and tissues including the brain, heart and liver. Ingested nanoparticles can be absorbed into the lymphatic system.[25] Friends of the Earth commented:

> The effect of [the] characteristics [of nanoparticles] is that nanomaterials have an unprecedented access to the body through inhalation, ingestion and dermal contact, so all the ways that material can have access into our bodies, and also to the bloodstream by other dermal contact. Once in the body, nanomaterials have unprecedented access to vital organs and tissues, including the heart and liver, bone marrow and reproductive organs. They even have access to the brain along the olfactory nerve and across the

21 UK Health and Safety Executive, pp.12-14.

22 The Royal Society-Science Council of Japan, p.3.

23 *Submission* 23, p.4 (MCA).

24 *Submission* 10, p.8 (Friends of the Earth) citing Wichmann HE and Peters A, 'Epidemiological evidence of the effects of ultrafine particle exposure', *Philosophical Transactions of the Royal Society*, London, 2000, A 358:2751-2769.

25 *Submission* 10, p.9 (Friends of the Earth).

> blood-brain barrier. Unlike larger particles, because nanomaterials are very small particles, they gain access to individual cells. The toxicological impact on organs and individual cells is still poorly understood, but some preliminary research has come out in the last couple of years, the results of which we believe are very concerning.[26]

7.23 Friends of the Earth also noted that the duration of deposits of nanoparticles in vital organs is unknown, 'although there is some evidence to suggest they may accumulate in organs such as the liver'.[27]

7.24 The Australian Council of Trade Unions (ACTU) informed the Committee that there are concerns that nanoparticles may possibly cause Alzheimer's disease. *Rachel's Environmental and Health News* in 2003 reported that nanoparticles combined with metals can pass directly into the brain where they can promote the formation of waxy amyloid plaques which are the signature feature of Alzheimers. *Rachel's Environmental and Health News* has also warned of the risks of industrial production of nanoparticles 'similar to those old-style ultrafines already established to be prolific killers'. Rachel's concluded 'clearly, in the case of nanoparticles, we have reasonable suspicion of harm, and we have some remaining scientific uncertainty. There we have an ethical duty to take preventive (precautionary) action. If there ever was a proper time to invoke the precautionary principle, this is it.'[28]

Occupational health and safety issues

7.25 A number of key concerns with the developments in nanotechnology have been identified in evidence:

- lack of knowledge about key aspects of how nanoparticles impact on health;
- lack of effective methods to measure and assess workplace exposure to nanoparticles;
- poor understanding of existing workplace exposure;
- lack of consistent nomenclature and terminology for describing nanoparticles (for example whether to define nanoparticles by physical dimensions or behavioural properties);
- no effective control methods to safeguard against exposure to nanoparticles and other nanomaterials;
- problems with regulatory regimes unable to meet the demands of a rapidly emerging new field of products and technologies; and
- the small investment in occupational health and safety aspects of nanotechnology.

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26 *Committee Hansard* 29.0.05, p.55 (Friends of the Earth).

27 *Submission* 10, p.10 (Friends of the Earth).

28 *Submission* 28, p.9, Additional Information, p.2 (ACTU).

Impact on health of workers

7.26 As noted above, nanoparticles appear to have the potential to cause harm. The US National Institute for Occupational Safety and Health (NIOSH) noted potential health concerns including exposure routes; effects seen in animal studies indicating adverse health effects; and observations from epidemiological studies involving fine and ultrafine particles indicating adverse lung and respiratory outcomes.[29]

7.27 The Australian Institute of Occupational Hygienists (AIOH) noted that reports by the UK Health and Safety Executive indicated how limited the available data was and the difficulty of reading across from existing data and that the hazards from nanoparticles and fibres are sufficiently different from bulk materials to require further careful study. They also indicated that the areas of initial occupational health concern should be:

- potential for enhanced toxicity;
- potential to cross the skin barrier;
- existing control measures are unproven; and
- possible persistence in the workplace.[30]

7.28 Witnesses drew parallels between nanoparticles and asbestos. The Australian Manufacturing Workers Union (AMWU) commented that asbestos had exacted a very high toll in Australia, as we now have the 'unenviable distinction of having the highest mesothelioma rate in the industrialised world'. Furthermore:

> It would be an act of negligence to future generations if we did not heed the concerns now being raised in the research community about the health effect of nanotechnology.[31]

7.29 Friends of the Earth also commented on the parallels between workplace exposure to asbestos and nanoparticles in that exposure to nanoparticles has the potential to cause serious pulmonary disease. Friends of the Earth commented further:

> We are not just talking one asbestos; we could be talking five, 10, 100, 1,000, 10,000. No-one knows, because serious harm to health will only manifest over the long terms and it is an omnipresent risk. As I mentioned earlier, nanomaterials are already in the environment.[32]

7.30 Friends of the Earth noted that the international insurer, Swiss Re has stated that the most important similarity between asbestos and nanoparticle exposure may be the lag time before the potential onset of serious harm to health – resulting in

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29 NIOSH, *Approaches to Safe Nanotechnology: An Information Exchange with NIOSH* www.cdc.gov/niosh/topics/nanotech/nano_exchange.html

30 *Submission* 20, p.24 (AIOH).

31 *Submission* 15, p.2 (AMWU).

32 *Submission* 29.9.05, p.55 (Friends of the Earth).

significant human and financial cost. To safeguard against a repeat of the asbestos experience, Swiss Re has advocated a strict application of the precautionary principle in the regulation of nanotechnology and that health and safety first must be foremost in any regulatory regime:

> Swiss Re emphasised that there is a really clear economic impetus to pursuing a precautionary approach to the regulation of nanotechnology. It warned that delayed action and inadequate regulation of workplace risk will result in a repeat of the asbestos experience. It is particularly concerned about liability for the insurance sector.[33]

Measurement and monitoring of nanoparticles

7.31 The AIOH raised concerns about how dust samples are collected and measured:

> …we have a 21st century technology there but we are still thinking in 20th century terms about how we collect dust samples, how we measure them and how we use things like respirators and ventilation or enclosures to contain the dust. These nanoparticles are so fine that we cannot use existing monitoring methods to assess how much exposure a worker is receiving. If we do tell workers to wear a respirator, we have no real means of telling if the respirator can protect them, because if these particles are so fine they will just go straight through any filter or around the side of the face seal. We do not know if ventilation is going to capture dusts containing nanoparticles. We really are in the dark at the moment about the hazards and the means of controlling the hazards, if there are any, from nanotechnology.[34]

7.32 Friends of the Earth also echoed these concerns and noted for example that at the moment 'we are in a situation where, for instance, you look at zinc dioxide and five different measuring instruments come up with five different sizes. One will say it is 10 nanometres, the next one will say it is 100 nanometres. Which one is it? And the size will have a very important effect'.[35] There is also no internationally agreed nomenclature: 'If you cannot describe nanoparticles, how can you measure them? How can you do the safety assessments and how can you set the workplace exposure standards?'[36]

7.33 NIOSH has also pointed to the difficulties of measuring nanoparticles in the workplace:

> …nanomaterials differ in significant ways from traditional materials for which established measurement procedures and equipment exist. One factor involves instrumentation: in general, available devices and methods are not

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33 *Committee Hansard* 29.0.05, p.56; *Submission* 10, p.4 (Friends of the Earth).

34 *Committee Hansard* 29.9.05, p.31 (AIOH).

35 *Committee Hansard* 29.9.05, p.60 (Friends of the Earth).

36 *Committee Hansard* 29.9.05, p.57 (Friends of the Earth).

> designed to take and analyse samples at the nano-scale. Another factor involves uncertainties regarding the appropriate parameters for sampling and analysis. Procedures for measuring traditional materials are based on the particles' mass and bulk chemistry as characteristics that most determine whether the material is likely to have adverse effects. For nanomaterials, current research suggests that mass and bulk chemistry may be less important than particle size, surface area and surface chemistry (or activity) as the most relevant parameters for measurements.[37]

7.34 In November 2005, the International Organisation for Standardisation (ISO) established the Nanotechnologies Technical Committee. The national standards institutes of 24 member countries are participating, while another eight have observer status. Specific tasks for the Technical Committee include developing standards for: terminology and nomenclature; metrology and instrumentation, including specifications for reference materials; test methodologies; and science-based health, safety and environmental practices.[38]

Regulatory regimes

7.35 GeneEthics pointed to the novel features of nanoparticles and the need for these to be addressed in regulatory regimes:

> Nanoparticles…are largely unresearched at this point. Our regulators are assuming that nano sized particles of minerals and chemicals that are already approved by them are going to behave in the same way as the approved substances. It is now becoming clear that those assumptions are incorrect and yet there is no mechanism for ensuring that the nano sized particles of those substances are re-evaluated, that new scientific data be generated and available for assessment when there are applications for its use. The use of nanoparticles in cosmetics, for example, logically ought to be regulated by the Therapeutic Goods Administration but, as it is cosmetics, is not regulated by anybody.[39]

7.36 Workplace Health and Safety Queensland (WHS), noted that some nanoparticles exposures already occur from aerosols in existing Queensland industries such as pharmaceutical manufacturing, aluminium smelting, welding processes, soldering, metal grinding and thermal coating. However, WHS went on to state that it 'possesses no capacity to assess accurately the health impacts from particle sizes specifically in the nanometre range or the possible preponderating influence of their massive numbers'.[40]

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37 NIOSH, www.cdc.gov/niosh/topics/nanotech/faq.html

38 ISO, *ISO launches work on nanotechnology standards*, 16.11.05, www.iso.org/iso/en/commcentre/pressreleases/archives/2005/Ref980.html

39 *Committee Hansard* 29.9.05, p.8 (GeneEthics Network).

40 *Submission* 26, p.25 (WHS).

7.37 Friends of the Earth also commented on the difficulties of regulatory regimes addressing the particular characteristics of nanoparticles:

> Each and every nanomaterial is different from the next one, so there is a nanomaterial that is zinc oxide, titanium dioxide, various carbon formations, and the list goes on and on. There will be literally tens of thousands of different nanomaterials. Each and every one of them is going to be different from the next one because each and every one will be manufactured in a slightly different way. It will have a different shape, different surface properties, different surface areas.
>
> While we have a general indication that they have particular characteristics in common, some of them will be just fine and others will not be nice at all.[41]

7.38 Friends of the Earth also informed the Committee that the European Union and the US have decided not to require new safety testing for certain products that are now used in nanoscale, based on the known safety of those substances at a macroscale. These products included titanium dioxide and zinc oxide which at the nanoscale are used in sunscreen: 'that same sunscreen has been shown to cause DNA damage and to have a carcinogenic impact in human skin cells in in-vitro studies, and in human colon cells as well'.[42]

7.39 The lack of regulatory activity 'is in no small part related to the huge gaps in knowledge that still exist around nanotechnology and that confound our ability to adequately assess risk and to bring in regulations that will guarantee workplace safety'. Friends of the Earth commented that there are no mechanisms in place to enable risk assessment to be undertaken and regulations to be developed to protect workers in the workplace 'yet we have many thousands of workers…in Australia who may be exposed to nanoparticles, who are working in a wholly unregulated environment'.[43]

Occupational health and safety research funding

7.40 GeneEthics proposed that a minimum of 25 per cent of the budgets of all nanotechnology research and development, both privately and publicly funded, be allocated to experiments on worker, public and environmental health and safety.[44] In support of this view, GeneEthics stated:

> There is some small research being done [on safety] but, in our view, a substantial amount – and we have suggested a quarter, though it is really quite an arbitrary figure – should be expended on finding out in advance what the impacts are likely to be. The behaviour of each kind of

41 *Committee Hansard* 29.9.05, pp.59-60 (Friends of the Earth).

42 *Committee Hansard* 29.9.05, p.61 (Friends of the Earth).

43 *Committee Hansard* 29.9.05, p.57 (Friends of the Earth).

44 *Submission* 31, p.1 (GeneEthics Network).

> nanoparticle, though it will be different from larger particles of the same substance, will vary, and so there is a substantial amount of research that needs to be done to understand where these things bioaccumulate, if they do, and how mobile they are in the environment.[45]

7.41 Friends of the Earth also noted that there was a very small amount of investment in research on occupational health and safety compared with the amount invested in other research:

> The amount of money that has been invested into looking at its potential health and safety implications, its toxicological impacts and its environmental implications is extremely small. There is a dearth of peer reviewed toxicological literature looking at this stuff, and yet, of the stuff that has been published, the overwhelming majority of the studies have rung serious alarm bells. There are very few studies that have been undertaken into the impact of nanotechnologies that have not pointed to serious problems.[46]

Response to concerns

7.42 The AIOH concluded that the lack of knowledge about the possible health impacts of nanotechnology placed a great responsibility on those involved in the development, import, marketing and distribution of emerging technology products to ensure that workers will not suffer any adverse response from being exposed to these products in their workplaces. AIOH saw a need for those involved in the development of products to ensure that adequate information is provided to users to ensure they are able to use the technology safely. AIOH considered that further product testing may be required and there are parallels with existing schemes for controlling the introduction of new chemicals, such as the National Industrial Chemicals Notification and Assessment Scheme (NICNAS). AIOH recommended that nanoparticles should be referred to NICNAS for assessment.[47]

7.43 The AMWU identified key areas for action including:

- government needs to ensure that the risks of nanomaterials are identified before they are incorporated into products for commercial production, for example through NICNAS;
- funding for research on health and environmental implications of nanotechnology, including collaborative research ventures with overseas bodies, to ensure that critical research is conducted to identify potential risks;
- comprehensive management of the risks that are identified including identifying changes needed to address current gaps and uncertainties that may be creating regulatory 'nano-loopholes';

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45 *Committee Hansard* 29.9.05, p.5 (GeneEthics Network).

46 *Committee Hansard* 29.9.05, p.60 (Friends of the Earth).

47 *Submission* 20, p.25 (AIOH).

- urgent investigation and regulation of nanoparticle exposure levels to the lowest possible level, until a safe and healthy exposure standard can be adopted particularly in scientific research and commercial research and development departments;
- industry itself needs to develop and drive widespread adoption of 'standards of care' for responsible nanotechnology development; and
- engagement of stakeholders outside government and industry whose constituencies stand to be both beneficiaries of this technology and those most likely to bear any risks that arise.[48]

7.44 The ACTU also echoed these concerns and recommended that urgent research be undertaken into the risks posed to workers and the public by nanomaterials and into techniques to eliminate the risk of exposure.[49] It also called for a national conference on nanotechnology at which regulators, hygienists, scientists, lawyers, researchers, unions, business, medicos, and community groups could be brought together to discuss the impact of nanotechnology. In particular it could look at regulating the exposure levels of workers to nanoparticles; how to label products that contain nanoparticles; monitoring the workplaces that expose workers to nanotechnology and nanoparticles; and screening workers. The ACTU commented that workers and consumers are already being exposed to nanoparticles:

> These products are out there at the moment. They are currently being used potentially by millions of Australians. We use a lot of sunscreen. We need to know what impact these products are having on consumers and we also need to look at who is producing these things and how prevalent they are. There is no regulation about what products are being produced using nanotechnology. We do not know. It is a minefield. If – a worse case scenario – nanotech and nanoparticles cause serious harm to people, we are sitting on a bit of a time bomb. Let's face it! We do not know enough.[50]

7.45 Friends of the Earth, supported by the GeneEthics Network, called for a moratorium on all research, development, commercial production and sale of synthetic nanotechnologies, nanoparticles, and other nanomaterials and products that contain them. The moratorium should remain in force, at a minimum, until new laws and a regulatory system are developed and implemented. This should include a nomenclature, a way of measuring risk, a way of assessing risk and until safety assessments have been undertake so that there is a better understanding of the toxicological interaction between nanoparticles in the body; and until there is a

48 *Submission* 15, pp.2-3 (AMWU).

49 *Submission* 28, p.10 (ACTU).

50 *Committee Hansard* 29.9.05, p.90 (ACTU).

regulatory framework for assessing risk and protecting health and safety.[51] Friends of the Earth concluded:

> The need to regulate workplace exposure is particularly urgent. There are tens of thousands of Australian workers who are likely to be exposed to synthetic nanoparticles, hundreds of thousands of workers exposed to incidentally produced nanoparticles, and a growing body of evidence that such exposure may relate in serious harm. Given the many uncertainties that continue to plague the development of adequate nanotechnology regulation, a moratorium on the research, development and manufacture of synthetic nanoparticles is essential until a comprehensive regulatory regime is developed and implemented.[52]

7.46 GeneEthics Network also proposed the development of a comprehensive, innovative regulatory framework including the establishment of an Office of New Technology Assessment and Regulation with responsibility for the registration, assessment, licensing and monitoring of all new technologies. This office would be established under a Council of Australian Governments agreement and be responsible to a New Technology Ministerial Council, composed of Commonwealth, State and Territory health ministers.[53]

7.47 The Department of Employment and Workplace Relations (DEWR) stated:

> DEWR's view is that a full picture of the potential health and safety implications and risks of nanotechnology, if any, remain unknown. The office will closely monitor international research on this topic and ensure that key government agencies are kept informed of relevant developments. DEWR is of the view that the current OHS regulatory framework is appropriate for dealing with the potential risks associated with nanotechnology.[54]

Studies and reports into the potential impact of nanotechnology

7.48 Interest in the potential impact of nanotechnology has increased over the last two to three years with the release of major reports by international organisations. Studies into the implications of current and future developments in nanoscience and nanotechnologies and their impacts have been undertaken overseas. The following provides an overview of some of the major reports and studies.

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51 *Submissions* 10, p.17 (Friends of the Earth); 31, p.1 (GeneEthics Network); seel also *Committee Hansard* 29.9.05, p.61 (Friends of the Earth).

52 *Submission* 10, p.17 (Friends of the Earth).

53 *Submission* 31A, p.2 (GeneEthics Network).

54 *Committee Hansard* 10.11.05, p.2 (DEWR).

The Royal Society and Royal Academy of Engineering – United Kingdom

7.49 In July 2004, the Royal Society and Royal Academy of Engineering reported on current applications of nanotechnologies and examined the health, safety and environmental implications and uncertainties that may arise from nanotechnologies.[55]

7.50 The Royal Society examined evidence from exposure to quartz, asbestos, air pollution and medical applications of nanoparticles to understand the toxicity of nanoparticles and fibres. It stated that the understanding derived from this evidence had led it to the general conclusion that the principal determinants of the toxicity of nanoparticles were the surface area, chemical reactivity of the surface, the physical dimensions of the particle that allow it to penetrate to the organ or into cells or that prevent its removal; and possibly, its solubility.[56]

7.51 The Society concluded that whilst many applications of nanotechnologies pose no new health or safety risk, manufactured nanoparticles and nanotubes in a free form may pose health and safety risks. The Society saw the main risk of human exposure to manufactured nanoparticles and nanotubes as being in a few work places (including academic research laboratories) and through the use of a small number of skin care preparations which contain free nanoparticles. It commented however that 'the current lack of available research means that the scale of this risk cannot be fully determined'. [57] In addition, the Society stated:

> There is virtually no evidence available to allow the potential environmental impacts of nanoparticles and nanotubes to be evaluated. With the exception of some experiments on laboratory animals…and one small study on one species of fish, little information is available about the toxicity of nanoparticles to non-human species.[58]

It was concluded that:

> There are uncertainties about the risk of nanoparticles currently in production that need to be addressed immediately to safeguard workers and consumers and support regulatory decisions.[59]

7.52 The Society made 21 recommendations. These included, that given the lack of evidence about the risk posed by manufactured nanoparticles and nanotubes is resulting in considerable uncertainty, that:

- an interdisciplinary centre be established to research nanoparticles and nanotubes including toxicity and exposure pathways, and to develop

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55 The Royal Society & The Royal Academy of Engineering, *Nanoscience and Nanotechnologies: opportunities and uncertainties,* London, July 2004.

56 The Royal Society & The Royal Academy of Engineering, p.41.

57 The Royal Society & The Royal Academy of Engineering, p.80.

58 The Royal Society & The Royal Academy of Engineering, p.80.

59 The Royal Society & The Royal Academy of Engineering, p.81.

methodologies and instrumentation for monitoring them in the built and natural environment;

- until more is known about the environmental impacts of nanoparticles and nanotubes, that the release of manufactured nanoparticles and nanotubes into the environment be avoided as far as possible.

In relation to regulatory issues, it was recommended that consideration be given to whether existing regulations are appropriate to protect humans and the environment in relation to nanoparticles and nanotubes.

7.53 As a result of the novel properties of nanoparticles and nanotubes, it was recommended that:

- nanoparticles and nanotubes should be treated as new substances under existing UK and European regulations;
- that the adequacy of regulation of exposure to nanoparticles be reviewed and that in the meantime consideration be given to setting lower exposure levels for manufactured nanoparticles;
- that ingredients in the form of nanoparticles undergo a full safety assessment by the relevant scientific advisory body before they are permitted for use in consumer products;
- that manufacturers publish details of safety tests to show how they have taken into account the novel properties of nanoparticles in consumer products;
- that the list of ingredients of consumer products identify the use of manufactured nanoparticulate materials; and
- that an interdisciplinary research program be funded to investigate the social and ethical issues expected to arise from the development of some nanoparticles.[60]

7.54 The UK Government's response to the report was released in February 2005. The Government indicated that it supported the precautionary stance taken by the Royal Society.[61] As part of its response, it also announced the establishment of a Research Co-ordination Group with a wide-ranging membership to ensure that a comprehensive research program is developed that focuses on regulatory needs. The Government also identified two main priority areas for research:

- the development of robust and reliable measurement and detection technologies for nanoparticles and nanotubes; and

60 The Royal Society & The Royal Academy of Engineering, pp.8-10.

61 HM Government, *Response to the Royal Society and Royal Academy of Engineering Report: Nanoscience and Nanotechnologies: opportunities and uncertainties*, February 2005, p.5.

- work to underpin the robust assessment of potential risks associated with nanoparticles and nanotubes, particularly their toxicology.[62]

7.55 In relation to consumer products, the UK Government agreed that ingredients in the form of manufactured free nanoparticles should undergo a full safety assessment before being used in products and that the use of nanoparticles should be indicated on labels.[63]

7.56 In November 2005, the UK Government produced the first report on on-going and projected research on potential risks posed by engineered nanoparticles as foreshadowed in response to the Royal Society report.[64] Three key areas were identified where further research is needed to develop a risk management framework for nanoparticles:

- properties, characterisation and metrology, including standardisation;
- human and environment exposure; and
- hazard to human health and the environment.

A fourth area is understanding the societal and ethical dimensions of nanotechnologies as they arise. Overarching this is a need for the development of, and international agreement on, nomenclature and definitions.[65]

National Institute for Occupational Safety and Health – United States

7.57 The National Institute for Occupational Safety and Health (NIOSH) has noted that:

> There are still many knowledge gaps to be filled before we fully understand how to work safely with these materials. Until these and other research questions are answered, it is prudent to proceed with caution when working with nanomaterials.[66]

NIOSH has stated that the information gap is 'critical because of the unknown risk that nanomaterials pose to workers'. NIOSH pointed to studies in rats where ultrafine particles caused pulmonary inflammation and lung tumors and commented that 'if

62 HM Government, February 2005, p.10.

63 HM Government, February 2005, p.16.

64 HM Government, *Characterising the potential risks posed by engineered nanoparticles: a first UK Government research report,* December 2005. www.defra.gov.uk/environment/nanotech/nrcg/pdf/nanoparticles-riskreport.pdf

65 HM Government, December 2005, pp.5-6.

66 NIOSH, *Nanotechnology and Workplace Safety and Health,* www.cdc.gov/niosh/docs/2004-175/pdfs/2004-175.pdf

engineered nanoparticles involve the same characteristics that seem to be associated with ultrafine particles, they may raise concerns'.[67]

7.58 NIOSH has formulated strategic goals for its nanotechnology research agenda including the need to understand and prevent work-related injuries and illnesses possibly caused by nanoparticles/nanomaterials. To achieve this goal, NIOSH stated that there is a need to determine the toxicity of nanomaterials, identify possible health effects from the early uses of these materials and monitor the on-going health of individuals working with nanomaterials. There is also a need for research to develop and validate methods of exposure assessment. In order to promote healthy workplaces, there is a need to develop and evaluate engineering controls, personal protective equipment and guidance on safe handling of nanomaterials and to identify and improve safety issues in the workplace.[68]

7.59 NIOSH has identified the following critical occupational safety and health issues arising from nanotechnology:

- exposure and dose;
- toxicity;
- epidemiology and surveillance;
- risk assessment;
- measurement methods;
- controls;
- safety;
- communication and education;
- recommendations including evaluation and updating of occupational exposure limits; and
- applications: identification of uses of nanotechnology for application in occupational safety and health.[69]

OECD – Working Party on Nanotechnology

7.60 The OECD Working Party on Nanotechnology was established under the Committee for Science and Technology Policy (CSTP) in 2005. The Working Party is to identify what member countries are doing in nanotechnology and how members can cooperate to effectively use their nanotechnology investments. The latest meeting of CSTP was held in March 2006 in Sydney.

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67 NIOSH, *Approaches to Safe Nanotechnology: An Information Exchange with NIOSH,* www.cdc.gov/niosh/topics/nanotech/nano_exchange.html

68 NIOSH, *Strategic Plan for NIOSH Nanotechnology Research: Filling the Knowledge Gaps,* www.cdc.gov/niosh/topics/nanotech/strat_plan.html

69 NIOSH, *Strategic Plan.*

7.61 The OECD is also considering a proposal to create within the OEDC Environmental Directorate a working group focused on environmental, health and safety risk assessment and the management of nanomaterials.[70]

Royal Society-Science Council of Japan Workshop

7.62 In July 2005 the UK Royal Society and the Science Council of Japan held a joint workshop to consider the potential health, environmental and societal impacts of nanotechnology. The key issues identified by the workshop included:

- the need to develop new measuring technologies;
- the need for further research on exposure routes within the body;
- more research on nanomaterials and carcionogenesis;
- the need to develop internationally recognised standard protocols for toxicology testing of nanoparticles;
- to establish appropriate regulatory regimes funding for research is required and the engagement of stakeholders including the public; and
- international collaboration and coordination of research into toxicology of nanomaterials and the development of standardised safety assessments is needed.[71]

International Risk Governance Council

7.63 The International Risk Governance Council (IRGC) is undertaking a nanotechnology project intended to address the need for adequate risk governance approaches at the national and international levels in the development of nanotechnology and nanoscale products. The project is funded by the Swiss Federal Agency for Development and Cooperation, the US Department of State and the Swiss Reinsurance Company.

7.64 As part of this project, the IRGC conducted a survey on nanotechnology governance across 27 economies (including Australia).[72] A workshop was held in January 2006 to develop strategies and to review the survey. More than 45 recommendations were identified for how risk governance of nanotechnology may be improved in areas such as stakeholder engagement, communication and research. In July 2006, a meeting in Zurich will be held to discuss the recommendations of the survey and workshop.

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70 US Senate Commerce, Science and Transport Committee, *Testimony*, 15.2.06, EC Teague, Director, National Nanotechnology Coordination Office.

71 Royal Society-Science Council of Japan, pp.4-8.

72 IRGC, *Survey on Nanotechnology Governance*, December 2005 www.irgc.org/_cgidata/mhscms/_images/12384-3-2.pdf

Developments in Australia

Prime Minister's Science, Engineering and Innovation Council (PMSEIC)

7.65 In March 2005, the Prime Minister's Science, Engineering and Innovation Council (PMSEIC) working group on nanotechnology presented its report. The working group's terms of reference included:

- outline the importance and potential applications of nanotechnology as an enabling technology to many industries;
- examine what nanotechnology has delivered to date;
- scope Australia's international competitiveness; and
- identify major challenges and opportunities.[73]

7.66 The working group reported that there had been an explosion in technological development worldwide between 2000 and 2005, global investment had quadrupled (and exceeded US$8 billion per year) and important practical applications of nanotechnology are emerging. The working group found that Australia's research base is strong and globally competitive. It stated that:

> To capitalise on the opportunities presented by nanotechnology, the challenge is to enhance the coordination of Australia's nanotechnology effort, concentrate resources and accelerate industry uptake.[74]

Specific needs identified by the working group included:

- the need for a national nanotechnology strategy coordinated across all levels of government, to inform the public debate on social, health and environment issues, and to provide an appropriate regulatory framework;
- the need to address emerging issues concerning community awareness and acceptance of nanotechnology, as well as the considerable ethical, social and safety implications;
- the development of a comprehensive impact and risk analysis framework must be seen as a high priority. This framework must adopt a science-based risk identification, assessment and management process; and
- the development of a substantial Australian skills base in nanotechnology is of fundamental importance to our nanotechnology capability over the next decade.[75]

7.67 The working group made two recommendations:

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73 PMSEIC, *Nanotechnology: Enabling technologies for Australian innovative industries*, 11 March 2005, p.i.

74 PMSEIC, p.4.

75 PMSEIC, p.4.

- That the Australian Government examine the options for implementing a national nanotechnology strategy, with particular emphasis on the framework under which the objectives of a national nanotechnology strategy can be achieved.

This national strategy should provide a broadly based framework to ensure that Australia has a national and coordinated approach to nanotechnology; provision of high level advice to governments; well-informed public awareness activities and debate on social, health and environmental issues; and an appropriate regulatory framework which safeguards the health and safety of Australians.

- That an Australian nanotechnology business alliance be formed with government support whose role is to overcome the current fragmentation evident in the nanotechnology sectors, link business and researchers, and enhance industry application of nanotechnology.[76]

National Nanotechnology Strategy Taskforce

7.68 On 5 February 2006, the Minister for Industry, Tourism and Resources, the Hon Ian Macfarlane, announced the formulation of a National Strategy for the development and regulation of nanotechnology. The aim of the Strategy will be to best capture the benefits of nanotechnology for Australia whilst safeguarding health, safety and the environment. The Minister stated:

> Australia has an opportunity to be part of this world-wide movement towards smaller and greater efficiency in many aspects of our daily lives, no only as developer of the technology, but also as a responsible regulator of the field…
>
> It is hard to imagine areas of our lives that won't be impacted by nanotechnology so it makes sense to have a co-ordinated national approach, with the State and Territory governments, to make sure Australia is 'nanotech ready'.
>
> From an industry perspective we have to capture the commercial opportunities of developing this field but it is just as important that the environment, health and social issues are understood and properly monitored.[77]

7.69 The National Nanotechnology Strategy Taskforce was established to examine options for a coordinated national nanotechnology strategy across Commonwealth and State and Territory Governments by 30 June 2006. A broad array of issues will be examined including:

- community awareness;
- science capacity;

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76 PMSEIC, pp.6-7.

77 Minister for Industry, Tourism and Resources, 'A Big Strategy for Nanotech: The Industry of the Small', *Media Release*, 5.2.06.

- industry development and industry uptake;
- investment and infrastructure;
- regulation and metrology;
- skills and training;
- international engagement; and
- environmental, safety and ethical issues.[78]

7.70 A series of consultations are being undertaken with industry, science and the general community, as well as other Commonwealth government portfolios and State and Territory Governments. A Reference Group representing industry, science and community interests is working with the Taskforce. In addition, the Taskforce released a discussion paper on issues to be considered in a National Nanotechnology Strategy.

Office of the Australian Safety and Compensation Council

7.71 The Office of the Australian Safety and Compensation Council (see Chapter 1) currently maintains a watching brief on the OHS developments with respect to nanotechnology and reports to Australian Government (Comcare), State and Territory OHS authorities, ACCI and ACTU. The Office represents DEWR on an interdepartmental committee on nanotechnology, organised by the National Nanotechnology Strategy Taskforce within the Department of Industry, Tourism and Resources. The role of the Office on this committee is to provide input on OHS issues.[79]

National Industrial Chemical Notification and Assessment Scheme (NICNAS)

7.72 NICNAS commenced active consideration of nanomaterials and their regulation in 2004-05. NICNAS is a member of the OECD Steering Group for Nanotechnology.

7.73 In February 2006, NICNAS issued a voluntary call to companies to provide information on uses and quantities of nanomaterials imported or manufactured for industrial uses, or used in cosmetics and personal care products. NICNAS will prepare a report on the extent and scope of the use of nanomaterials in industrial, cosmetic and personal care products in Australia. In its call for information, NICNAS stated:

> It is important and timely that NICNAS considers nanomaterials, their potential health and environmental impacts, and the ability of the [industrial

78 Department of Industry, Tourism and Resources, *Nanotechnology*, www.industry.gov.au/content/itrinternet/cmscontent.cfm?objectID=E2FE4F8A-4E44-4785-A6A01BE137E0E524#Task_force_established

79 *Submission* 11, p.10 (DEWR).

chemicals national notification] scheme to adequately assess the potential risks of nanomaterials.[80]

7.74 NICNAS also stated that nanomaterials used exclusively as therapeutic goods (such as sunscreens), food or food additives and agricultural or veterinary chemicals, do not fall within the scope of NICNAS.

7.75 To March 2006, no nanomaterials had been assessed by NICNAS.

Therapeutic Goods Administration

7.76 The Therapeutic Goods Administration (TGA) has issued advice on their website about the safety of sunscreens. The TGA is keeping a watching brief on the scientific literature with regard to the safety of nanoparticulate materials used in medicines, for example zinc oxide in sunscreens.

Conclusion

7.77 At the nanoscale, materials exhibit novel properties that affect their physical, chemical and biological behaviour. The Committee considers that the use of nanomaterials has enormous potential in many areas from medicine to computing and electronics. Indeed, nanotechnology may be as significant as the discovery of electricity or the microchip. At the same time, the Committee is mindful that the application of nanotechnology will have implications for workers' health and safety, for individuals through consumer and medical products and for the environment.

7.78 How significant those implications will be, particularly the hazards to human health, is unclear at the present time. The adverse effects of nanoparticles cannot be predicted from their known characteristics at larger scale and there are still major gaps in current knowledge of how nanoparticles enter the human body and how they impact on health including disease-causing effects. There are also problems with how nanoparticle exposure can be measured and assessed in the workplace and the environment.

7.79 The Committee has noted the outcomes of studies and reports from overseas, which have identified areas were further research is required. A key priority for occupational health and safety is the measurement and assessment of nanoparticles so that adequate regulatory frameworks can be developed. For nanoparticles, the use of traditional exposure regimes based on mass concentrations alone are insufficient as the surface area and physical dimension of nanoparticles play a key role in toxicity. These characteristics will require modification of the present regulations on exposure standards, risk assessment and methodologies and equipment needed to undertake measurements to ensure worker safety.

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80 NICNAS, *Nanomaterials – call for information*, Commonwealth of Australia Gazette, No C02 7 February 2006.

7.80 Nanotechnology holds great opportunities but also great responsibilities. The Committee considers that there is a need for continued international cooperation to address concerns raised by nanotechnology and acknowledges the Government's contribution to international forums such as the OECD Working Party on Nanotechnology.

7.81 The Committee also welcomes the establishment of the National Nanotechnology Strategy Taskforce. A national nanotechnology strategy is required as a matter of priority: nanotechnology is a rapidly emerging field attracting more and more investment everyday with workers already being exposed to nanoparticles. Governments overseas have responded to concerns about nanotechnology and a number of authoritative reports and studies are available. Any delays in formulating an Australian national strategy will only impede the consideration of significant regulatory, environmental, safety and ethical issues that must be addressed.

7.82 The Committee does not agree that a moratorium on nanotechnologies is needed but considers that safety of workers and the community must be paramount. This means that the exposure of those workers already working with nanoparticles must be minimised and that new methodologies, means of assessment and equipment being developed in Australia and overseas must be incorporated into the regulatory framework as soon as they are available.

7.83 The Committee also considers that the Australian regulatory framework needs to be flexible to address the novel characteristics of nanoparticles and that mechanisms are required so that all Commonwealth Government regulatory agencies address regulatory developments overseas and their significance for the Australian regulatory framework.

Recommendation 12

7.84 That the National Nanotechnology Strategy be finalised as a matter of priority.

Recommendation 13

7.85 That a working party on nanotechnology regulation consisting of representatives of the Therapeutic Goods Administration, NICNAS and the Australian Safety and Compensation Council be established to consider the impact of the emerging field of nanotechnology on the regulatory framework including:

- **whether existing regulations are appropriate;**
- **how gaps and uncertainties in the regulatory framework can be addressed;**
- **how comprehensive management of risks of exposure to nanoparticles can be incorporated into the regulatory framework;**
- **whether Australia will require materials, already classified as safe at the macroscale, to be reassessed if they are to be used at the nanoscale; and**

- **whether there is a need for the establishment of a permanent body to regulate nanotechnology.**

The working party should consult with stakeholders including consumer groups, State and Territory governments, unions, industry, health organisations and the public and provide a public report on these issues by March 2007.

Recommendation 14

7.86 That Commonwealth agencies including the Office of the Australian Safety and Compensation Council and NICNAS actively pursue links to overseas regulatory and research bodies to ensure that they are kept fully informed of developments in the rapidly emerging field of nanotechnology.

Senator Claire Moore
Chair

May 2006

APPENDIX 1

LIST OF PUBLIC SUBMISSIONS AND TABLED DOCUMENTS AUTHORISED FOR PUBLICATION BY THE COMMITTEE

1 Whyalla Red Dust Action Group Inc (SA)

2 Wan, Dr K C

3 Walters, Professor E H (TAS)
Supplementary information
- Additional information provided following hearing 10.11.05, received 11.11.05

4 Construction Material Processors Association (CMPA) (VIC)
Supplementary information
- Additional information provided following hearing 29.9.05, received 4.10.05

5 Laver, Mr Colin (QLD)

6 Somersby Action Committee (NSW)
Supplementary information
- Supporting statements and papers provided at public hearing 30.9.05
- Additional information received following hearing 30.9.05, dated 12.10.05

7 Williams, Professor Trevor

8 Kele, Mr Gavin William (QLD)

9 Australian & New Zealand Society of Respiratory Science Inc (WA)
Supplementary information
- Key points paper provided at hearing 29.9.05

10 Friends of the Earth (TAS)
Supplementary information
- Presentation on nanoparticles and electronic copy of references provided at hearing 29.9.05

11 Department of Employment and Workplace Relations (ACT)
Supplementary information
Information on
- Information on type of occurrence classification system provided at hearing 10.11.05
- Information on current workplace chemicals framework provided at hearing 10.11.05
- Additional information received following hearing 10.11.05, dated 12.12.05
- Additional information received following hearing 10.11.05, dated 19.12.05

12 WorkSafe Western Australia (WA)

13 CFMEU Construction, Forestry, Mining and Energy Union (Construction & General Division) (NSW)
Supplementary information
- Abstracts from international symposium October 2002 provided at hearing 30.9.05
- Video - *Working Safely with Clay, Concrete and Quarry Products*, received 13.10.05

14 Cement Concrete and Aggregates Australia (NSW)
Supplementary information
- Additional information received following hearing 30.9.05, received 2.12.05

15 Australian Manufacturing Workers Union (AMWU) (VIC)
Supplementary information
- Supplementary submission received 18.8.05
- Additional information received following hearing 29.9.05, received 9.11.05

16 Gilbert, Ms Cecily (WA)

17 Devlin, Mr R E (SA)

18 Nolan, Mr E (VIC)

19 Karakasch, Mr Nickolas (VIC)

20 Australian Institute of Occupational Hygienists (VIC)
Supplementary information
- Additional information received following hearing 29.9.05, dated 6.10.05, 18.11.05 and 28.11.05

21 Coal Services Pty Limited (NSW)
Supplementary information
- Questions and Answers Booklets on respirable dust provided at hearing 30.9.05

22 Ham, Mr Bruce (QLD)

23 Minerals Council of Australia (ACT)

24 Pain, Dr Geoff (WA)

25 White, Mr Richard, Faunce, Dr Thomas and Flower, Ms Kate for the Australian Sandblasting Diseases Coalition (ACT)
Supplementary information
- Supplementary submission received 19.9.05
- Additional information provided at hearing 10.11.05

26 Department of Industrial Relations – Workplace Health and Safety Queensland (QLD)

27 Australian Lawyers Alliance (NSW)

28 Australian Council of Trade Unions (ACTU) (VIC)
Supplementary information
- Additional information received following hearing 29.9.05, dated 13.10.05

29 Munich Holdings of Australasia Pty Ltd (NSW)

30 Jotun Australia Pty Ltd (VIC)

31 GeneEthics Network (VIC)
Supplementary information
- Supplementary submission provided at hearing 29.9.05

32 Dust Diseases Board of NSW (NSW)

33 Australian Medical Association (ACT)

34 Phelps, Ms Christine (NSW)

35 Victorian WorkCover Authority (VIC)

36 Biviano, Mr Angelo (VIC)

37 Feather, Mr Albert

38 King, Mr Peter Arthur (NSW)

39 Mitchell, Ms Rosemary (VIC)

40 Fitzgerald, Ms Josephine (VIC)

41 Anvill Hill Watch Association Inc (NSW

42 Hobday, A. Fraser (WA)

43 White, Nathan and Daniel with the assistance of Kate Flower (ACT)

44 McIntyre, Mr Alan (VIC)

45 Edwards, Mr John (VIC)
Supplementary information
- Additional information received 21.3.06 and 22.12.05

46 Shepherd, Mr Ian (NSW)

APPENDIX 2

WITNESSES WHO APPEARED BEFORE THE COMMITTEE AT PUBLIC HEARINGS

Thursday, 29 September 2005
Conference Rooms 1 & 2, CMA Centre, Level 20, 500 Collins Street, Melbourne

Committee Members in attendance

Senators Moore (Chair)
Senator Humphries
Senator Adams
Senator Allison
Senator Carol Brown
Senator Polley

Witnesses

GeneEthics Network

Mr Bob Phelps, Executive Director

Construction Material Processors Association

Mr Ron Kerr, Honorary Chief Executive Officer

Mr Basil Natoli

Mr Donald Williams, consultant, Analytical Science Consultants Pty Ltd and X-Ray Vision Australia Pty Ltd

Australian Institute of Occupational Hygienists

Mr Anthony Jennings

Mr Nickolas Karakasch

Australian Lawyers Alliance

Mr John Gordon

Friends of the Earth

Ms Georgia Miller, Co-spokesperson

Dr Rye Senjen, Co-spokesperson

Australian & New Zealand Society of Respiratory Science

Professor David Johns, Tasmanian Board Member

Dr Kevin Gain

Australian Manufacturing Workers Union

Ms Deborah Vallance, National Health and Safety Coordinator

Australian Council of Trade Unions

Mr Steve Mullins, Occupational Health and Safety Officer

Friday, 30 September 2005
Hobart Room, Menzies Hotel, Carrington Street, Sydney

Committee Members in attendance

Senators Moore (Chair)
Senator Humphries
Senator Allison
Senator Carol Brown
Senator Polley

Witnesses

Cement Concrete and Aggregates Australia

Mr Ken Slattery, Chief Executive Officer

Dr John Bisby, Consultant, Medical, Toxicology and Control Systems

Mr David McKelvie, Manager, National Occupational Health and Safety, Rinker Australia Pty Ltd

Construction, Forestry, Mining and Energy Union (CFMEU)

Mr Lindsay Fraser, Assistant National Secretary

Somersby Action Committee

Mr Peter Donnelly, Chairman

Mrs Ruth Donnelly, Secretary

Mrs Glenys Morrison, Committee Member

Mr Kenneth Morrison, Committee Member

Coal Services Pty Ltd

Mr Ian Farrar, Managing Director and Chief Executive Officer

Thursday, 10 November 2005
Parliament House, Canberra

Committee Members in attendance

Senators Moore (Chair)
Senator Humphries
Senator Adams
Senator Allison
Senator Carol Brown
Senator Lundy

Witnesses

Department of Employment and Workplace Relations

Ms Sandra Parker, Group Manager, Office of the Australian Safety and Compensation Council

Mr Wayne Creaser, A/g Assistant Secretary, Standards Branch

Mr Peter Haynes, Director, Chemical Standards

Minerals Council of Australia

Mr Rob Rawson, Director, Safety and Health

Mr Andrew McMahon, Policy Officer

Mr Gavin Kele

Professor E Haydn Walters, Professor of Medicine, University of Tasmania and Clinical Chief of Medicine, Royal Hobart Hospital

Mr Richard White and Sandblasting Diseases Coalition

Dr Thomas Faunce, Senior Lecturer, Medical School and Law Faculty, ANU

Mr Richard White, Coordinator/convenor, Australian Sandblasting Diseases Coalition

Mrs Christine White

Ms Kate Flower