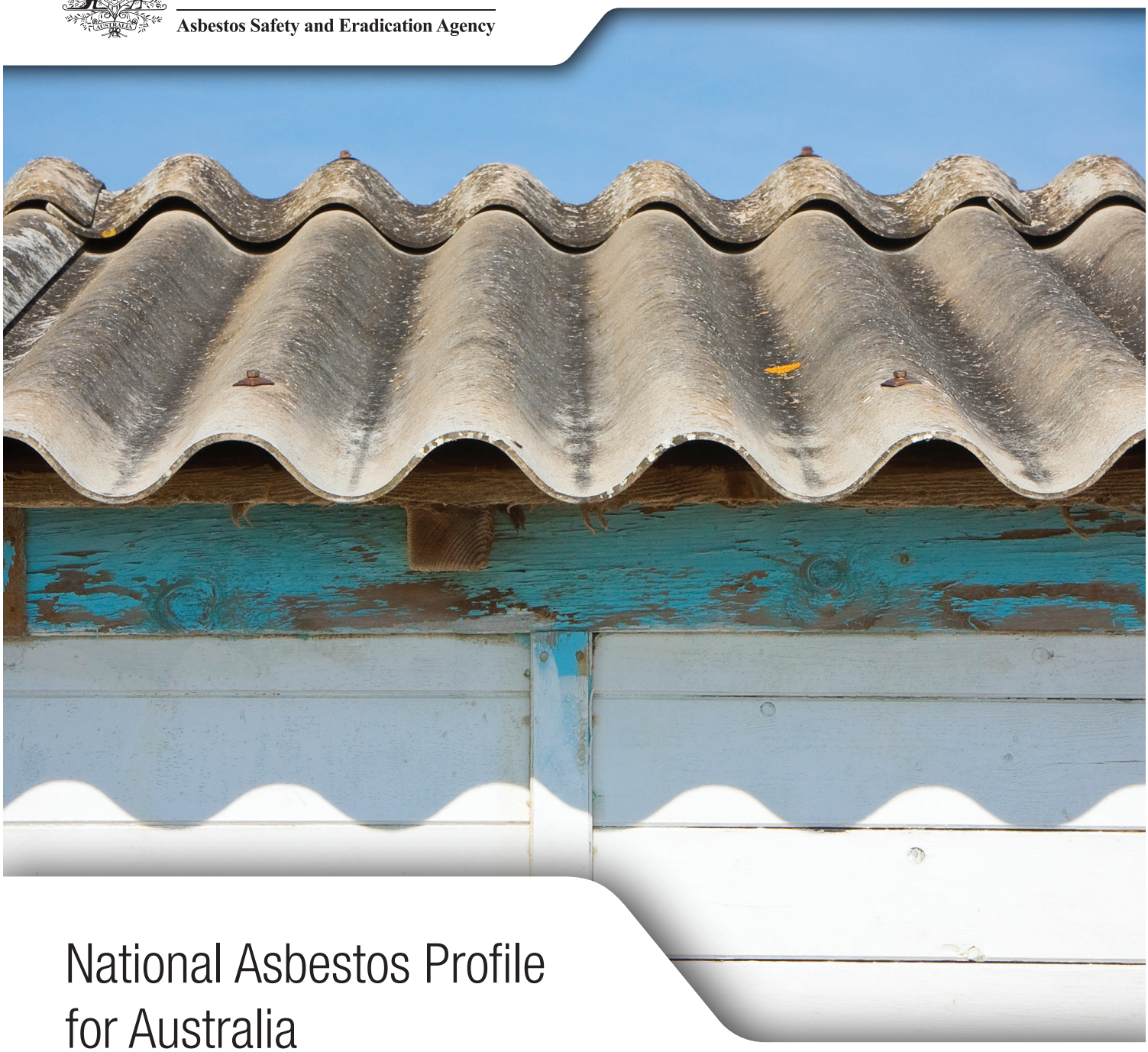
Australian Government
Asbestos Safety and Eradication Agency



National Asbestos Profile for Australia

NOVEMBER 2017

Asbestos Safety and Eradication Agency Report – 11-2017

This report has been prepared by the Asbestos Safety and Eradication Agency.

The Asbestos Safety and Eradication Agency (ASEA) would like to acknowledge the contributions of members of its Technical Research Advisory Committee, Julia Collins, Professor and Director Ken Takahashi of the Asbestos Diseases Research Institute (ADRI), Safe Work Australia, Department of Immigration and Border Protection (DIBP), the enHealth Committee, iCare Dust Diseases Care (NSW) and state and territory work health and safety (WHS) regulatory bodies.

Contents

Acronyms and abbreviations

ABS	Australian Bureau of Statistics
ACM	Asbestos-containing material
ACT	Australian Capital Territory
AIHW	Australian Institute of Health and Welfare
AMR	Australian Mesothelioma Registry
ASEA	Asbestos Safety and Eradication Agency
DALY	Disability adjusted life years
DIBP	Department of Immigration and Border Protection
DIY	Do-it-yourself
EPA	Environmental Protection Authority
Fibres/ml	number of asbestos fibres per millilitre of air
GBD	Global Burden of Disease
HWSA	Heads of Workplace Safety Authorities
NATA	National Association of Testing Authorities
NDS	National Data Set for compensation-based statistics
NOA	Naturally occurring asbestos
NSW	New South Wales
WHO	World Health Organization
WHS	Work Health and Safety
VSLY	Value of a statistical life year

Foreword

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Australia has one of the highest rates of mesothelioma and other asbestos-related diseases (ARDs) in the world due to the country's past heavy use of asbestos. Despite having adopted a total ban on the importation and use of all forms of asbestos since 31 December 2003, Australia continues to deal with a substantial asbestos legacy. It has been projected that there will be approximately 19,400 new cases of mesothelioma diagnosed in Australia before the end of the century. We are also witnessing an increasing number of ARDs presumably caused by non-occupational exposure to asbestos.

The National Asbestos Profile (NAP) collates a range of existing information and research data that reflect the significant impact of asbestos in Australia. It also highlights the control measures in place to reduce the current and future risks. The NAP was originally designed as an annex to the National Programme for the Elimination of Asbestos-Related Diseases developed jointly by the World Health Organization (WHO) and the International Labour Organization (ILO). As such, it has international significance, contributing towards the goal of the WHO and ILO on elimination of asbestos-related issues.

It is encouraging to see that all governments in Australia have endorsed the National Strategic Plan for Asbestos Management and Awareness 2014–18 and implemented programs and measures to facilitate the management and future removal of asbestos in the built environment. This approach is internationally regarded as leading the way in highlighting the importance of asbestos management and awareness in order to prevent ARDs.

The information contained in the following chapters have huge potential to assist other countries who are struggling to deal with their own asbestos issues, whether as a legacy or an on-going problem, by showing how measures will lead to improvements over time. However, what the Australian experience shows is that the negative impact of asbestos will persist for many years to come, highlighting that urgent action is needed to ban its use globally followed up by control measures to manage the risks which will linger into the future.

Do-It-Yourself (DIY) home renovators have been identified as an emerging group at risk of exposure to asbestos in the residential sector in Australia. Awareness and education are therefore key to ensuring homeowners and renovators remain vigilant to the risks.

I would like to acknowledge the work of all researchers and organisations in Australia who aspire to contribute to the effective prevention, diagnosis and treatment of ARDs. Also worthy of acknowledgement is the work of a network of ARD victim support groups operating throughout Australia. The selfless support they provide victims and their families each and every day and their tireless work to draw national attention on asbestos issues can only be commended. Through the committed work of all stakeholders we are constantly reminded that we cannot remain complacent about asbestos risks.

The following chapters are a culmination of the significant work that has been undertaken by all levels of government and stakeholders to address the issues associated with Australia's past heavy use of asbestos. It should be regarded as a benchmark that can and should be used to closely monitor changes into the future.

Introduction

Background

In 2010 at the Fifth Ministerial Conference on Environment and Health held in Parma, Italy, the Member States of the World Health Organization (WHO) European Region adopted a declaration to develop national programmes for the elimination of asbestos-related diseases in collaboration with the WHO and the International Labour Organization (ILO).

The National Asbestos Profile (NAP) is an instrument to provide information and define the baseline situation with regard to the elimination of asbestos-related diseases. This includes information on the consumption of the various types of asbestos, populations at risk from current and past exposures, the system for inspection and enforcement of exposure limits and the social and economic burden of asbestos-related diseases. The NAP for Australia follows the reporting structure proposed by the WHO for the national profiles.

The NAP for Australia draws on best available research and data sources to provide a historical perspective on past exposures to asbestos, as well as information on the current management of asbestos in Australia. This document supports Australia's National Strategic Plan for Asbestos Management and Awareness 2014–2018 and over time will be used to measure progress made towards eliminating asbestos related diseases in Australia. It is intended to be a living document and it will be reviewed and updated periodically to reflect new research and sources of data that become available.

The Australian context

Australia has a long history of asbestos use, and was one of the world's highest consumers of asbestos per capita. The material was mined for over a hundred years, with production only ceasing in 1983. Asbestos was also imported into the country and was widely used in the manufacturing and construction industries, including in many structures built up to the late 1980s. Use of amosite and crocidolite was phased out during the 1980s, with the use, re-use, import, export, and the sale of all forms of asbestos completely banned as of 31 December 2003. This ban does not apply to asbestos material already in place however, and as a result, Australia has a large amount of legacy asbestos-containing materials (ACMs) still remaining in the built environment.

As a result of this history and wide-ranging use, Australia has one of the highest incidences of mesothelioma in the world. It is estimated that Australia will reach 18,000 cases of mesothelioma by 2020, with another 30,000 to 40,000 cases other asbestos-related diseases predicted.[2] These have predominantly been cases associated with occupational asbestos exposure, comprising of the first wave of asbestos miners and manufacturers and the second wave of tradespeople using asbestos products. While occupational cases are expected to decline due to the ban on asbestos mining and use, the number of non-occupational cases is predicted to rise, constituting a third-wave of asbestos sufferers. This third-wave is largely associated with Do-It-Yourself (DIY) renovators undertaking repairs and improvements on homes without realising that they may be exposing themselves to asbestos in the process. It is estimated that the third-wave currently represents one in every three new cases of mesothelioma diagnosed in Australia.[3] This highlights that more must be done to raise awareness and educate Australian homeowners and DIY renovators about the likely presence of asbestos in the residential sector.

The need to regulate procedures for the safe management, removal and disposal of asbestos has become a priority in recent decades, as the incidence and awareness of asbestos-related diseases has increased, and as ACMs come to the end of their useful life. Past practices have resulted in widespread, uncontrolled disposal of asbestos waste throughout urban and rural environments.

[1] *Outline for the Development of National Programmes for the Elimination of Asbestos-Related Diseases* available at: **http://www.who.int/occupational_health/publications/Out_NPEAD_ENG.pdf**.

[2] Leigh,J., Driscoll, T., *Malignant Mesothelioma in Australia, 1945-2002*, International Journal of Occupational and Environmental Health, July 2003, p.206.

[3] Finity Consulting, *Future Projections of the burden of mesothelioma in Australia*, ASEA Report, 2016, p. 26.

While the work health and safety arrangements in place across Australia have resulted in strong protections for workers against the risk of exposure to asbestos fibres, it is important that Australia remains vigilant to its presence and associated dangers. Despite the Australia-wide ban in place since 31 December 2003, there have been a number of incidents where materials containing asbestos have been imported into Australia. While the incidence of these importations may be low, it is important to remain aware as the use and installation of these new products pose a risk of exposure.

Where to next: gaps and further research

The NAP also highlights that there is a considerable amount of research occurring across a broad range of fields being led by Australian researchers and Australian institutions. Australia's strong track record of epidemiological studies continues to contribute towards the improved diagnosis and treatment of asbestos-related diseases.

The following national profile for Australia is intended to provide a point in time reference to the impact of Australia's asbestos legacy. As progress towards the goal of eliminating asbestos-related disease in Australia and new research and evidence becomes available, this document can be updated to reflect these changes and monitor national progress.

This doesn't mean that there isn't more work to be done. Research can always be refined and improved upon, but this profile identifies two areas as the most pressing for further research and evidence development.

Chapters 13 and 17 provide two recommendations:

Recommendation 1

There is an identified need for more research to gain a better understanding of the amount and location of ACMs in the residential sector.

Recommendation 2

There is an identified need for more research to quantify some of the other costs associated with asbestos-related diseases in Australia to gain a more robust understanding of its impact.

Not only will this information provide a more fulsome picture of the impact of asbestos in Australia – in line with the national profile framework – it will also provide evidence for governments to guide and prioritise prevention policy to eliminate asbestos-related disease.

1. Current regulations on the different forms of asbestos

Asbestos is a naturally occurring mineral and can typically be found in rock, sediment or soil. WHS regulations in Australia define asbestos as referring to:

(a) actinolite asbestos;

(b) grunerite (or amosite) asbestos (brown);

(c) anthophyllite asbestos;

(d) chrysotile asbestos (white);

(e) crocidolite asbestos (blue);

(f) tremolite asbestos; or

(g) a mixture that contains one or more of the minerals referred to in paragraphs (a) to (f)[4].

Australia has laws regulating the whole lifecycle of asbestos and ACMs – from prohibiting production, import and use through to the safe management, removal, transport and disposal of asbestos and ACMs still present in the community. Some aspects of the legislative regime for the management of asbestos vary significantly between the different states and territories. The area where there is the most consistency is in the regulation of WHS, due to the adoption of model WHS laws developed by Safe Work Australia. Although Victoria and Western Australia are the only jurisdictions that have not adopted the model WHS legislation, their regulations relating to asbestos in workplaces are similar.

Australian WHS laws categorise asbestos into two types based on the level of risk to health:

1. non-friable (also known as bonded) asbestos, which is usually asbestos fibres mixed with a bonding compound such as cement
2. friable asbestos, which when dry, is or may become crumbled, pulverised or reduced to powder by hand pressure.

Friable asbestos is considered to pose the greater health risk because loose fibres from it are more likely to become airborne when disturbed. Non-friable (bonded) asbestos in good condition poses a negligible risk to health as it is unlikely to produce airborne fibres.

Phased ban of asbestos

Following increasing public awareness of the carcinogenic nature of inhaled asbestos fibres, Australian jurisdictions introduced bans on asbestos use over a period of time. Most jurisdictions introduced a ban on the mining of raw asbestos and the manufacture, import and installation of products containing crocidolite and amosite asbestos from 31 December 1984.

In 2001, the National Occupational Health and Safety Commission declared a ban on the manufacture and use of all types of asbestos and ACM to take effect from 31 December 2003. This Australia-wide ban is implemented through the WHS laws in all jurisdictions. The Australia-wide ban is supported by a prohibition on the import and export of asbestos, and goods that contain asbestos, implemented through the Commonwealth Customs (Prohibited Imports) Regulations 1956 and the Customs (Prohibited Exports) Regulations 1958.

As the ban does not extend to ACMs already in place at the time the ban took effect, many products containing asbestos are still present in the community.

[4] Model Work Health and Safety Regulations (2016), Pt 1.1.

Coordination and cooperation across governments

The management and regulation of asbestos in Australia is spread across three tiers of government; at the local, state/territory and the federal level. Asbestos exposure risks are not only confined to workplaces, but are also public health and environmental issues. Consequently, there are numerous government agencies involved in asbestos management and regulation. For example, in Queensland alone there are four state government departments and 73 local councils administering laws related to asbestos in the following areas:[5]

- **Work health and safety legislation** regulates the management, control and removal of asbestos in the workplace (including residential premises which become a 'workplace' when work is undertaken by a contractor)
- **Environmental protection and waste legislation** regulates the transportation of commercial and industrial waste; the licensing of disposal facilities (such as landfills); and notification and remediation of contaminated land
- **Public health legislation** applies to asbestos-related activities carried out at non-workplaces
- **Mining and quarrying legislation** regulates the risks posed by naturally occurring asbestos that may be exposed during mining processes within the mining and quarrying industries

A number of jurisdictions have established inter-agency working groups and developed specific plans to facilitate a coordinated approach for minimising the risks of asbestos exposure, for example:

- Statewide Strategic Plan for the Safe Management of Asbestos in Queensland 2014–2019
- New South Wales State-wide Asbestos Plan coordinated by the Heads of Asbestos Coordination Authorities (HACA).

At the national level, the Australian Government established the Asbestos Safety and Eradication Agency (ASEA) in 2013.[6] The agency is not a regulator, but has responsibility for coordinating the implementation of the National Strategic Plan for Asbestos Management and Awareness 2014–18.

The National Strategic Plan provides a framework for the Commonwealth, states and territories to work together with the ultimate aim of preventing exposure to airborne asbestos fibres in order to eliminate asbestos-related disease in Australia. It provides for a national focus on asbestos issues which goes beyond workplace safety to encompass environmental and public health concerns. The agency measures national progress against the plan through its national reporting function. Progress is assessed each quarter, with a national progress report prepared annually to highlight progress, achievements and activities for the period.

Import and export

The Customs (Prohibited Imports) Regulations 1956 and Customs (Prohibited Exports) Regulations 1958 specify that asbestos, and goods containing asbestos may not be imported into, or exported out of, Australia without permission. The Australian Border Force is responsible for enforcing this legislation.

Importing or exporting asbestos is only allowed under very limited circumstances, if one of the following applies:

- the goods are raw materials that contain naturally occurring traces of chrysotile or amphibole asbestos
- the goods are 'hazardous waste' as defined in the *Hazardous Waste (Regulation of Exports and Imports) Act 1989*
- Ministerial permission is granted under the *Commonwealth Work Health and Safety Regulations 2011*, and the goods are for research, analysis or display
- the importation is from the Australian Antarctic Territory (for chrysotile).

Importing amphibole asbestos or chrysotile to Australia is permitted if all of the following apply:

- the importation is a ship or resources installation that is in excess of 150 gross tonnage and the amphibole asbestos or chrysotile in the ship or resources installation was fixed or installed before 1 January 2005

[5] Queensland Government, *Statewide Strategic Plan for the Safe Management of Asbestos in Queensland 2014–2019*, p. 5.

[6] The agency is a statutory authority established under the *Asbestos Safety and Eradication Agency Act 2013.*

- the amphibole asbestos or chrysotile in the ship or resources installation will not be a risk to any person unless the amphibole asbestos or chrysotile is disturbed.

ASEA provides information to importers on the application process for permits to import or export asbestos and goods containing asbestos, which are granted by the Commonwealth Minister responsible for the *Work Health and Safety Act 2011*, currently the Minister for Employment. The agency is also responsible for providing advice to the Minister for Employment in relation to requests for permission to import and export asbestos.

Despite the import prohibition introduced at the end of 2003, goods containing asbestos have been found to have been imported since this time. This has usually been due to importers not ensuring their supply chain quality, with the end result being an inadvertent importation of goods containing asbestos. Further information on the illegal and inadvertent importation of goods containing asbestos is provided in Chapter 3 of this report.

Asbestos management

There is no requirement to remove ACM that has been in situ prior to 1 January 2004. Generally, removal is only considered when ACM requires maintenance, repair, or is damaged. However, a number of jurisdictions have commenced large-scale removal programs: [7]

- The Victorian Government has set a goal for public schools to be free of ACM by 2020 and has committed $100 million to achieve this goal. It is also establishing the Victorian Asbestos Eradication Agency to target and prioritise removal of asbestos in all government buildings.
- The ACT Government concluded on the advice of experts, demolition was the only enduring solution to the health risks posed by the presence of loose fill asbestos insulation installed in Canberra homes between 1968 to 1979, and their attendant social, financial and practical consequences. After receiving a $1 billion loan from the Commonwealth Government, the ACT Government launched the Loose Fill Asbestos Eradication Scheme to acquire affected houses, safely remove the asbestos, demolish the remaining structure and remediate the blocks. The scheme is voluntary and provides an opportunity to homeowners to repurchase their remediated block off-market. Those choosing not to participate in the scheme are required to have an active Asbestos Contamination Report (sometimes known as an Asbestos Management Plan) in place.
- The NSW Government decided on a similar approach in response to the risks of loose fill asbestos insulation. Homeowners can sell to the NSW Government, retain their land and have the government cover the cost of demolition or elect not to proceed with either option, but have their property identified as affected by loose-fill asbestos insulation.
- The Northern Territory Government has implemented a project to make all community buildings in identified remote Indigenous communities free from the risk of airborne asbestos fibres.

The WHS laws in each jurisdiction regulate the management of asbestos and ACM in workplaces and in residential premises when 'work' is being undertaken.[8] There is a general duty for a person conducting a business or undertaking to ensure that exposure to airborne asbestos fibres at the workplace is eliminated so far as is reasonably practicable, and if it is not possible to do so, exposure must be minimised so far as is reasonably practicable. The exposure standard for asbestos must not be exceeded. Air monitoring must be carried out if there is uncertainty about whether the airborne concentration of asbestos fibres exceeds the exposure standard.

Persons with management or control of a workplace are responsible for ensuring that:

- Asbestos or ACM in their workplace is identified by a 'competent person' or, in the ACT, a licensed asbestos assessor.
- Analysis of material samples is undertaken only by laboratories accredited by the National Association of Testing Authorities (NATA) or approved by the WHS regulator.
- Once asbestos or ACM is identified, its presence and location is clearly indicated.

[7] ASEA *National Strategic Plan for Asbestos Management and Awareness Progress Report 2015–16*, October 2016.

[8] In addition to WHS laws that apply to residential premises when 'work' is being undertaken, some jurisdictions have other legislation that regulates asbestos in the residential sector. See for example Chapter 3A *Dangerous Substances Act 2004* (ACT).

- An asbestos register is prepared, maintained, updated and is readily available to workers and other persons. A copy of the register must be provided to anyone who carries out work at the workplace that involves a risk of exposure to airborne asbestos.
- An asbestos management plan is prepared, maintained, updated and readily available to workers and other persons. Asbestos management plans are also required for managing the risks of naturally occurring asbestos if it is identified or likely to be present at a workplace.

Research into the use of asbestos registers in Australia concluded that the way asbestos registers are developed, what they contain and how they are used varies significantly from one organisation to another, with some businesses going beyond the minimum requirements and using registers as an integrated asbestos management solution.[9]

Guidance on managing asbestos in workplaces, including asbestos registers and management plans, is provided in a Model Code of Practice How to Manage and Control Asbestos in the Workplace.

In contrast to the stringent controls applying to asbestos in workplaces, the handling of asbestos by non-workers, such as home owners, remains largely unregulated. In July 2006, the ACT introduced legal requirements that home owners must disclose the presence of asbestos to potential purchasers, tenants and tradespeople if a current asbestos assessment report exists. It is not compulsory to obtain an asbestos assessment report unless the property is contaminated with loose fill asbestos insulation and listed on the Affected Residential Premises Register. These properties are required to have an active Asbestos Contamination Report in place. Where no report exists, real estate agents are required to provide generic asbestos information about the likely location of asbestos in residential premises built prior to 1985 as part of the contract for sale or residential tenancy agreement. In Queensland, laws relating to asbestos in non-workplaces have been in place since June 2007. Under Queensland's Public Health Regulation 2005 home renovators wishing to undertake DIY removal of more than 10m^2 of non-friable asbestos must obtain a certificate under arrangements approved by the Queensland Department of Health.

Western Australia has public health asbestos legislation, as a consequence of the state's very high historic asbestos use and mesothelioma rates. The Health (Asbestos) Regulations 1992 in Western Australia were amended in January 2017 to significantly increase fines for failing to safely handle or dispose of asbestos. Corporations convicted of an asbestos-related offence now face fines of up to $50,000 while individuals can be fined up to $10,000. The removal, handling and disposal of asbestos-contaminated soil is addressed by guidance on contaminated sites.

Victoria also regulates asbestos beyond the workplace under Nuisance Provisions of the *Public Health and Wellbeing Act 2008* (VIC). Environmental Health Officers have the power to administer this Act and issues Notices as required.

Removal and handling

The WHS requirements regarding the removal and handling of asbestos are broadly similar between jurisdictions. Each jurisdiction has an asbestos removal licensing regime with two key licence types:

- Class A/Unrestricted–permits the removal of both friable and non-friable asbestos
- Class B/Restricted–permits the removal of only non-friable asbestos.

Exceptions to licensed removal work exist in some jurisdictions, where no licence is required to remove up to 10m^2 of non-friable asbestos. This exception does not exist in the ACT, where all asbestos must be removed by a licenced removalist. In general, asbestos supervisors must be present for Class A removal work or readily available (that is contactable by phone and within 20 minutes of the worksite) for Class B removal work. Air monitoring is required for Class A asbestos work. For Class B removal work air monitoring is not required and is left at the discretion of the competent person/licensed asbestos assessor (except in South Australia where it is required for work undertaken by both classes of licence holder).

Health monitoring is required for workers removing asbestos or carrying out asbestos-related work who are at risk of exposure. WHS regulators must be notified of licensed asbestos removal work before it commences.[10]

[9] ASEA Report, *A Strategic Review of the Practice and Use of Asbestos Registers in Australia,* September 2016.

[10] Only friable removal work requires notification to the regulator in WA.

Other requirements include:

- Before starting demolition or refurbishment work, asbestos that is likely to be disturbed must be identified and removed so far as is reasonably practicable.
- Construction work that involves, or is likely to involve, the disturbance of asbestos is considered 'high risk construction work' and requires the development of a safe work method statement.
- Asbestos removalists must provide decontamination facilities.
- After asbestos removal work has been completed a clearance inspection of the asbestos removal area must be undertaken and clearance certificates issued by a licensed asbestos assessor or an independent competent person to verify the area is safe for normal use.[11]
- Workers who may be involved in asbestos removal or carrying out asbestos-related work must be trained in the identification and safe handling of asbestos and ACM. In the ACT, there is a list of prescribed occupations that must complete a mandatory asbestos awareness course.

Guidance on how to comply with the WHS regulations for asbestos removal is provided in a model Code of Practice How to Safely Remove Asbestos.

Labelling

Asbestos labelling requirements exist for in situ asbestos within the workplace[12] and throughout the removal, transport and disposal process. Under WHS laws, the presence and location of asbestos in the workplace must be clearly indicated by a label and/or appropriate signage.

Labels must also be used to identify asbestos-related work or removal areas, contaminated equipment including personal protective equipment and containers used for transporting asbestos waste. Waste containers must comply with the labelling elements of the Globally Harmonised System for the Classification and Labelling of Hazardous Chemicals and/or the Australian Dangerous Goods Code.

The environmental regulators also place responsibilities on commercial transporters for labelling asbestos waste.

Transport

Oversight for the transport of asbestos waste is the responsibility of each jurisdiction's environmental regulator. Transporting asbestos on a commercial basis requires a licence. Waste transport certificates are required by some jurisdictions to accompany each load of asbestos waste and must be filled out by the waste producer, handler and receiver.

All jurisdictions track interstate movement of asbestos waste as required under the National Environment Protection (Movement of Controlled Waste between States and Territories) Measure. Only Queensland, Victoria, South Australia and NSW have specific asbestos transport tracking requirements within their state. For example, the Protection of the Environment Operations (Waste) Regulation 2014 in NSW requires waste transporters to record the movement of more than 100 kilograms of asbestos waste or more than 10 square metres of asbestos sheeting. To facilitate compliance with these requirements, the NSW EPA introduced a successful GPS-enabled online tool to monitor the transport and lawful disposal of asbestos in NSW.[13]

Disposal

Current practice in Australia is to dispose of asbestos waste at licenced landfill sites. Depending on the jurisdiction, the disposal of asbestos and ACM is regulated by either the environmental regulator or local council. Common requirements include:

[11] Clearance certificates are only required for friable removal work in WA.

[12] Asbestos labelling requirements also exist for residential premises in the ACT that are on the *Register of Affected Premises* for loose fill asbestos insulation.

[13] **http://epa.nsw.gov.au/wasteregulation/wastelocate-asbestos.htm**.

- asbestos must be securely packaged to prevent the release of airborne fibres and appropriately labelled
- asbestos may only be disposed of at landfill sites authorised to receive it
- once deposited, both friable and non-friable asbestos must be buried to a certain depth.

Although the landfill management requirements are similar across Australia, fees for landfill disposal vary widely. The ACT currently allows up to 250 kilograms of waste from the demolition of a residential property contaminated with loose fill asbestos insulation to be disposed free of charge. A common problem in regional areas is replacement of small landfills with transfer stations that do not accept asbestos, reducing disposal options for regional residents and businesses.[14]

The cost and difficulty in accessing legal disposal facilities is considered a primary motivation for the illegal dumping of ACM which has become a major problem across Australia. Despite limited data on incidents of illegal dumping, it is estimated that approximately 6,300 tonnes of ACM is illegally dumped across Australia each year and the cost of cleaning this up is around $11.2 million per annum.[15]

Inconsistent systems for tracking asbestos movements across Australia make it difficult to predict future demand for the safe disposal of ACM. The quantity of asbestos waste also varies significantly between years and jurisdictions. Spikes are often associated with large redevelopment projects. However, data obtained from asbestos waste tracking systems, landfill reports and historical submissions to Australia's Basel Convention report indicate that the amount of asbestos waste in Australia is rising and may continue to rise for the next 20 years at estimates of 2.8 per cent per year.[16] However, this is in contrast with Donovan and Pickin's stocks and flows model (2016) that estimated waste quantities peaked in 2004 and decline thereafter.[17]

Possible reasons for these differences are outlined in Donovan and Pickin's (2016) report. The stocks and flows model examines asbestos containing products only, whereas asbestos containing waste may comprise large proportions of asbestos soil and demolition rubble, personal protective equipment and other materials such as plastic sheeting used during the removal process that are classified as asbestos waste and incorporated in the quantity of asbestos waste reported as going to landfill.

On average, over the seven financial years from 2008 to 2014, about 20 kilograms of asbestos-contaminated waste was generated for every person in Australia, equating to approximately 400,000 tonnes.[18]

[14] ASEA Report, *Asbestos Waste in Australia*, March 2016, p. 18.

[15] ASEA Report, *Illegal asbestos dumping: Review of issues and initiatives*, March 2016, p.1.

[16] ASEA Report, *Asbestos Waste in Australia*, March 2016, p. 1.

[17] Donovan, S. and Pickin, J., *An Australian stocks and flows model for asbestos*, Waste Management & Research, 2016, p.6.

[18] ASEA Report, *Asbestos Waste in Australia*, March 2016, p. 8.

2. Import and consumption of asbestos each year

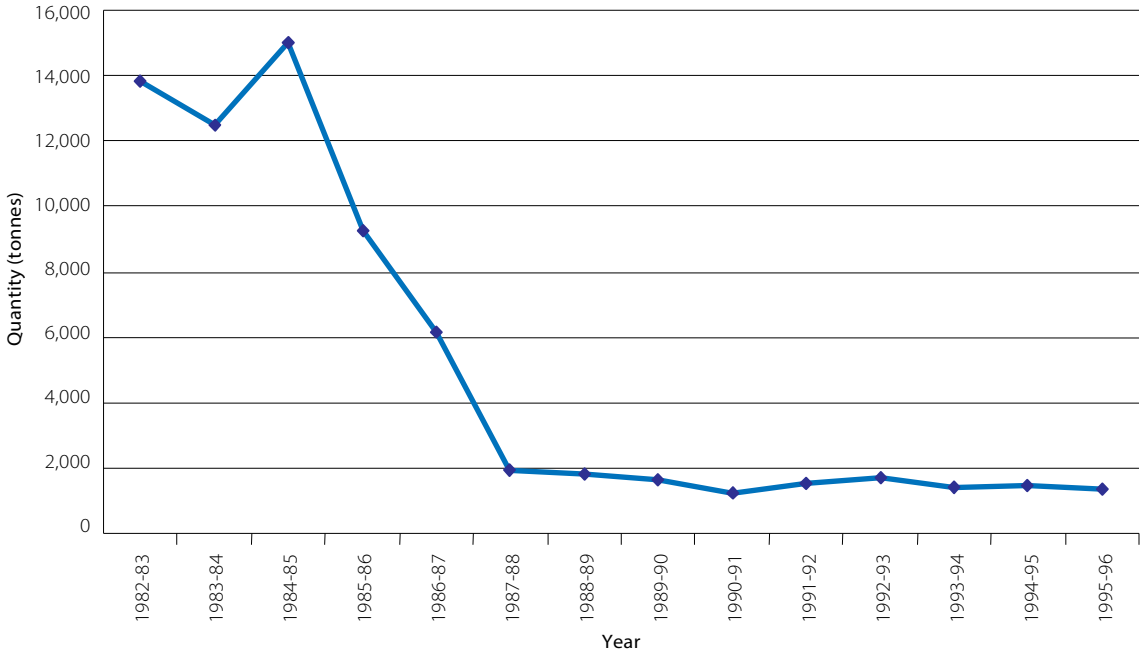
The importation and use of asbestos in Australia is prohibited, with a complete ban in place since 31 December 2003. This chapter provides historical information on the importation and consumption of asbestos prior to the ban.

Import of asbestos

The earliest records of asbestos imports date from 1929. The main sources of raw asbestos imports were Canada (chrysotile) and South Africa (crocidolite and amosite).[19]

From the period just prior to 1930 until 1983 approximately 1.5 million tonnes of all forms of asbestos was imported into Australia.[20] The quantity of raw chrysotile imported into Australia rapidly declined in the mid-1980s and then became relatively constant, between 1,000 and 2,000 tonnes being imported per year until it was banned (see Figure 1 below).

Figure 1: Quantity of raw chrysotile imported into Australia for the period 1982 to 1996[21]



By 1990 Victoria was using approximately 60 per cent of the total amount of raw asbestos imported into Australia, due to its use in the automotive manufacturing industry.[22] Australian Customs data for 1997 indicated that approximately 1,500 tonnes of chrysotile was imported, the majority of which was imported by Bendix Mintex Pty Ltd for manufacturing brake linings and Richard Klinger Pty Ltd for manufacturing industrial gaskets.

Vivacity Engineering imported much smaller amounts (approximately 16 tonnes/year) for the manufacture of epoxy resin adhesives.[23]

[19] Leigh, J., Driscoll, T., *Malignant Mesothelioma in Australia*, 1945-2002, International Journal of Occupational and Environmental Health, July 2003, p.206.

[20] Australian Government, *Asbestos Management Review*, June 2012, p. 10.

[21] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999, p.17, data sourced from the Australian Bureau of Statistics.

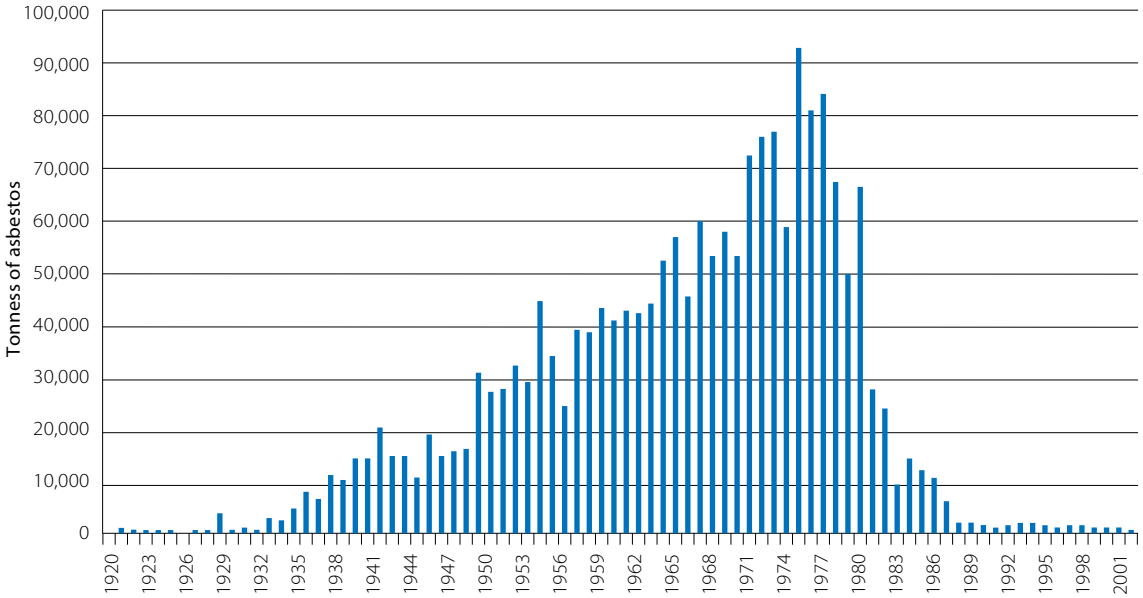
[22] Victorian Occupational Health and Safety Commission, Asbestos: *Usage in Victoria, substitutes and alternatives*, October 1990.

[23] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999, p.17.

Asbestos consumption

The total amount of asbestos consumed in Australia from 1920 through to 2003, when it was banned, is estimated at 12.8 million tonnes. Consumption peaked during the 1970s and sharply declined from 1980. Figure 2 shows the annual apparent consumption of asbestos (Apparent consumption = Production – Exports + Imports) in Australia from 1920 to 2003.[24]

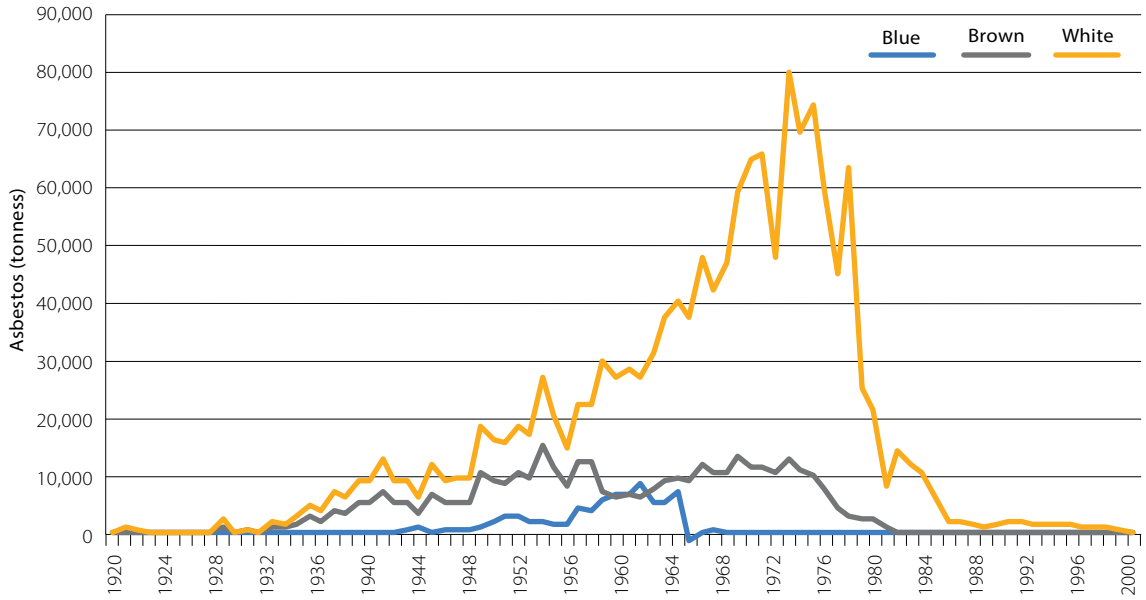
Figure 2: Apparent consumption of asbestos in Australia 1920-2003



Crocidolite is regarded as the most toxic form of asbestos. In Australia this was consumed mainly in the 1950s and 1960s, although crocidolite was always less than 10 per cent of the total consumption. It was withdrawn from use much earlier than other types of asbestos. Amosite was a significant contributor to net consumption. Around 10,000 tonnes of amosite was consumed each year from the late 1940s until the late 1970s.[25]

Chrysotile was the dominant form of asbestos used in Australia. Figure 3 shows asbestos consumption in Australia split by asbestos type.

Figure 3: Australian net asbestos consumption by asbestos type and year

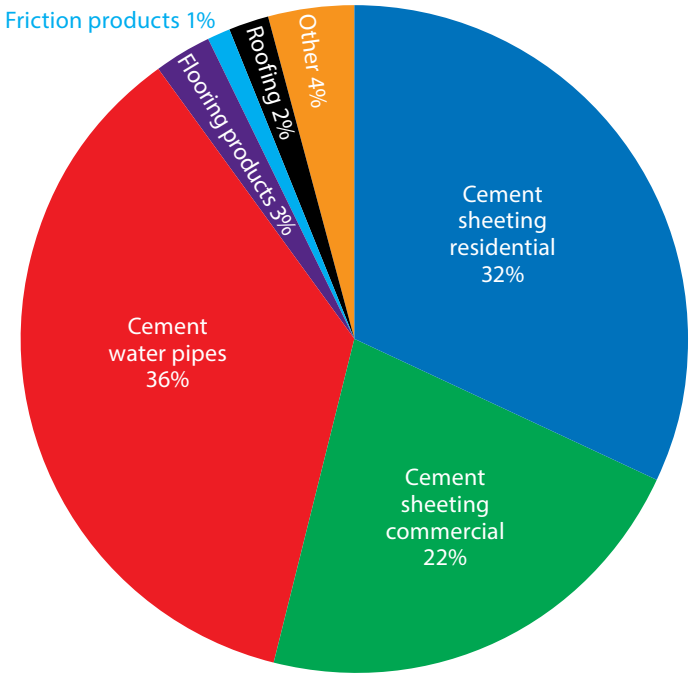


[24] Donovan, S. and Pickin, J., *An Australian stocks and flows model for asbestos*, Waste Management & Research, 2016, p.2, referencing data from the British Geological Survey (2015) World mineral statistics archive.

[25] Finity Consulting, *Future Projections of the burden of mesothelioma in Australia*, ASEA Report, 2016, p. 16.

Asbestos was used extensively in the building construction and manufacturing industries in a wide variety of applications during the 1950s to the 1980s. It is estimated that 90 per cent of asbestos consumed in Australia went into cement sheets used in domestic and commercial buildings and into cement water and sewerage pipes (see Figure 4 below).

Figure 4: Amount of asbestos consumed in each product group from 1920 to 2003[26]



More than 3000 products containing asbestos were used in Australia before the ban, including:

- fire blankets and curtains, and insulation in heaters and stoves
- shingles or tiles (external or ceiling), corrugated asbestos cement roofing sheets and ceiling insulation products
- pipes, tubes or fittings (for example flue pipes) and lagging or jointing materials (including on pipes)
- asbestos rope, electrical cloth and tapes, mastics, sealants, putties, adhesives, and heat-resistant sealing and caulking compounds
- textured paints/coatings and asbestos bitumen damp-proofing products
- compressed, rubberised or polymerised asbestos fibre gaskets and seals
- floor coverings (for example vinyl asbestos tiles) and the backings of linoleum floor coverings
- brake pads and clutch facings
- electrical switchboard panels.

The website www.asbestosawareness.com.au includes a comprehensive database of commonly used ACMs in Australia, mostly found in buildings.

[26] Donovan, S. and Pickin, J., *An Australian stocks and flows model for asbestos*, Waste Management & Research, 2016, p.3.

3. Import of asbestos-containing materials

The importation of asbestos, and goods containing asbestos into Australia is prohibited. Despite this import prohibition, goods containing asbestos have been intercepted by authorities at the Australian border, and found in end-user applications, such as building sites.

Import of goods containing asbestos

The use of asbestos in building and construction materials declined in the 1980s and had virtually ceased by the early 1990s. However, the importation of raw chrysotile asbestos and chrysotile asbestos products continued.

Data sourced from the Australian Bureau of Statistics (ABS) for 1997 show that the most highly imported asbestos products at that time were brake linings, which numbered approximately 860,000 articles, gaskets numbering approximately 200,000 and clutch facings numbering 6,000 articles.[27]

Australia also imported many other asbestos products including asbestos cement articles, asbestos yarn, cord and fabric, asbestos gloves and asbestos millboard.[28]

Illegal and inadvertent import of goods containing asbestos

Importers are responsible for ensuring that materials they import into Australia do not contain asbestos. The maximum penalty for illegally importing asbestos, or goods containing asbestos, is currently $210,000 for individuals ($1,050,000 for corporations), or up to three times the value of the goods, whichever is greater. In addition, under the Australian Consumer Law, suppliers are responsible for selling consumer products that are safe.

However, some goods containing asbestos continue to be illegally imported into Australia, mostly caused by importers who are unaware of the presence of asbestos in the goods being imported. Certification provided to importers from overseas manufacturers that goods are asbestos-free has sometimes been proven to be incorrect or unreliable. Standards in some supplier countries may classify goods 'asbestos free' even if they still contain a low level of asbestos.

Imported products which have been investigated by regulators confirming the presence of asbestos include:[29]

- fibre cement sheets used in the construction of temporary housing in remote areas
- asbestos cement board used as flooring in electrical switch rooms
- expanded polystyrene panels used to construct a residential building in NSW
- unitised roof panels used in the construction of the new Perth Children's Hospital
- plaster coating of metal vessels installed at the Nyrstar smelter in South Australia
- asbestos gaskets used in the construction of a new building in Brisbane, Queensland
- brake shoes and brake pads
- mineral kits containing rock samples.

[27] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999, p. 17–18.

[28] Leigh, J., Driscoll, T., *Malignant Mesothelioma in Australia*, 1945–2002, International Journal of Occupational and Environmental Health, July 2003, p.207.

[29] ASEA Submission to the Inquiry into Non-conforming Building Products, January 2017, available at: **https://www.asbestossafety.gov.au/sites/asbestos/files/2017/01/ASEA_Submission-Inquiry_into_non-conforming_building_products_January_2017.pdf**.

The following factors have been found to increase the risk of illegally importing goods with asbestos:[30]

- the product being sourced through a complex supply chain, in an international market, with different legislative requirements in relation to asbestos
- lack of awareness of supply chain risks of inadvertent procurement of goods containing asbestos
- reliance on country-of-origin supplier documentation without verification through adequate testing or test report practices further testing in Australia
- lack of importer awareness of Australian regulatory requirements.

The Heads of Workplace Safety Authorities (HWSA) established the HWSA Imported Materials with Asbestos Working Group in 2013, following the discovery that motor vehicles with gaskets containing asbestos were being imported into Australia. The working group includes representatives from:

- the ASEA
- Commonwealth, state and territory WHS regulators
- the Australian Competition and Consumer Commission
- The Department of Employment
- the DIBP/Australian Border Force
- Safe Work Australia
- Ministry for the Environment New Zealand.

The working group developed a Rapid Response Protocol to facilitate information sharing between relevant government agencies and a nationally uniform enforcement approach in response to incidents. The protocol allows for quick communication to the community about the safe handling and disposal of goods that contain asbestos.

The DIBP has published information for importers referring to the testing that can be carried out in Australia, or overseas. The clear message is that overseas testing will require an extra level of due diligence taking into account laboratory accreditation, overseas testing standards and reporting practices.

In 2016 the DIBP completed a review of the effectiveness of its internal processes and procedures for managing asbestos at the border.[31] The review identified several challenges, including the differing standards applied to asbestos regulation internationally and the confusion about policy and regulatory responsibilities associated with asbestos across government in Australia. Despite these challenges, the review found that the management of the asbestos border control is effective. The review recommended enhancing a number of border processes, strengthening engagement with industry, the public and other government agencies and raising international awareness of Australia's asbestos ban, particularly among major trading partners.

A Commonwealth parliamentary inquiry into non-conforming building products commenced in June 2015 and is due to report by 30 April 2018. The inquiry adopted additional terms of reference to examine the illegal importation of products containing asbestos.

Efforts to list chrysotile in Annex III of the Rotterdam Convention

The Australian Government plays a key role in supporting international leadership for a worldwide ban on asbestos mining and manufacturing. For the last decade, Australia has made ongoing attempts to list chrysotile asbestos in Annex III of the Rotterdam Convention. If successful, this would have real implications for information sharing, and raise global awareness about the health risks associated with chrysotile.

[30] Building Commission, Department of Commerce Western Australia, *Summary of Interim Report Perth Children's Hospital – Asbestos*, September 2016.
[31] KGH Border Services, Asbestos Importation Review Report, March 2016.

The Rotterdam Convention is a binding multilateral treaty that deals with hazardous chemicals and pesticides in international trade. It is an information sharing tool driven by the 'Prior Informed Consent' (PIC) procedure contained within it. This procedure involves seeking the consent of parties to the Convention before exporting to their territory any chemicals listed on Annex III to the Convention. The Parties meet every two years at a 'Conference of the Parties' (COP) to discuss listing chemicals to Annex III. The Convention does not seek, nor does it have the power, to ban any chemicals. The Convention poses no barrier, neither actual nor perceived, to international trade. Rather, it aims to ensure that all parties have access to relevant and sound scientific information and research about hazardous chemicals.

The eighth meeting of the COP to the Rotterdam Convention was held in April/May 2017 with chrysotile again proposed for listing in Annex III, with a small number of member countries blocking the listing once again. The COP also failed to approve the proposal to alter the rules of procedure to bring the Rotterdam Convention into line with Basel and Stockholm Conventions allowing for listing to be approved by 75 per cent majority vote.

The Australian Government maintains its position that the increased sharing of information around chrysotile, particularly with those nations unable to conduct their own research, is crucial in the global fight against asbestos-related disease and will continue to work with interested parties towards achieving a listing at the next COP in 2019.

4. Domestic production of asbestos

This chapter provides a historical overview of asbestos mining in Australia. Although there is no longer any domestic production of asbestos, there is still a risk of potential exposure to naturally occurring asbestos through ground disturbing activities such as road building, agriculture, forestry, urban development and mining of other minerals, particularly iron ore and nickel.

Asbestos mining

Asbestos, predominantly chrysotile and crocidolite, was mined in Australia until late 1983. Up until this time, almost 750,000 tonnes of asbestos was mined in Australia.[32] A breakdown of asbestos production is shown in Table 1.

Table 1: Asbestos Production in Australia, 1880-1983 (tonnes)[33]

Years	Crocidolite	Chrysotile	Amosite	Total
1880–1889	--	--	26	26
1890–1899	--	20	--	20
1900–1909	--	61	21	80
1910–1919	22	580	23	625
1920–1929	18	3,577	54	3,649
1930–1939	422	1,151	51	1,624
1940–1949	5,619	2,967	750	9,338
1950–1959	63,227	11,511	1	74,739
1960–1969	86,566	8,855	--	95,421
1970–1979	--	394,361	--	394,361
1980–1983	--	160,408	--	160,408
TOTAL	155,874	583,491	927	740,293

The main Australian mines were situated on the crocidolite deposits in the Hamersley Ranges in Western Australia and the chrysotile deposits at Baryulgil and Woodsreef in NSW and Lionel and Nunyerrie in Western Australia.

Approximately 150,000 tonnes of crocidolite was extracted commercially from three mines in Western Australia (Yampire, Wittenoom and Colonial) between 1937 and 1966. The waste ore (known as tailings) left after most of the asbestos had been extracted was estimated to be over three million tonnes.[34] These tailings, which can contain around five per cent asbestos, were used in the construction of Wittenoom town. There were 325 reported deaths from mesothelioma among former Wittenoom workers to the end of 2008[35]. A further 60 to 70 mesothelioma deaths among former workers are predicted by 2020 . A further 67 cases of mesothelioma were reported from residential exposure in the area to the end of 2002.[37]

The Western Australian Government has been phasing down Wittenoom since the late 1970s and in 2006 it was declared a contaminated site and all government services were withdrawn. There are currently three remaining residents living in the area. Over time, the natural forces of wind and water have spread the asbestos waste across an

[32] Virta R.L., *Worldwide Asbestos Supply and Consumption Trends from 1900 through 2003*: United States Geological Survey Circular 1298, 2006, p. 34.

[33] Leigh, J., Driscoll, T., *Malignant Mesothelioma in Australia*, 1945-2002, International Journal of Occupational and Environmental Health, July 2003, p.207.

[34] Department of Industry and Resources, Department of Local Government and Regional Development, *Management of Asbestos Contamination in Wittenoom: Non-technical Summary*, 2006, p. 1.

35 Berry G, Reid A, Aboagye-Sarfo P, de Klerk NH, Olsen NJ, Merler E, Franklin P, Musk AW. (2012) Malignant mesotheliomas in former miners and millers of crocidolite at Wittenoom (Western Australia) after more than 50 years follow-up. Br J Cancer. 2012 Feb 28;106(5):1016-20.

[36] Ibid.

[37] Reid A, Berry G, de Klerk N, Hansen J, Heyworth J, Ambrosini G, Fritschi L, Olsen N, Merler E, Musk AW. Age and sex differences in malignant mesothelioma after residential exposure to blue asbestos (crocidolite). Chest. 2007 Feb;131(2):376-82).

area of approximately 10 square kilometres. In 2008, the Wittenoom area was classified as a contaminated site and unsuitable for any form of human occupation or land use.

Mining of chrysotile peaked dramatically during the 1970s, with new mines such as Woodsreef in New South Wales coming into operation in the early part of the decade. Approximately 500,000 tonnes of chrysotile asbestos was produced between 1970 and 1983. In 1981 there was a decrease in the production of chrysotile due to a drop in world demand and the increased operating costs at the Woodsreef mine. Mining finally ceased in 1983 as the Woodsreef mine could not meet dust control regulations. At the time mining of chrysotile ceased, approximately 55,000 tonnes per year was being produced in Australia.[38]

A list of Australian asbestos mine sites, as compiled by Nevill and Imray, are as follows:[39]

NSW:

- Baryulgil – Chrysotile
- Woodsreef – Chrysotile
- Orange district – Tremolite
- Gundagai district – Actinolite
- Broken Hill district – Chrysotile

South Australia:

- Robertstown – Crocidolite
- Flinders Rangers – Crocidolite
- Truro district – Crocidolite and Tremolite
- Cowell – Chrysotile

Western Australia:

- Lionel – Chrysotile
- Sloansville – Chrysotile
- Nunyerrie – Chrysotile
- Wittenoom Gorges – Crocidolite
- Yampire Gorge – Crocidolite
- Colonial Gorge – Crocidolite
- Bindi Bindi – Anthophyllite

Tasmania:

- Beaconsfield district – Chrysotile and Amphibole
- Zeehan district – Chrysotile

Naturally occurring asbestos

If naturally occurring asbestos (NOA) is identified at a workplace or is likely to be present, the WHS laws require the person with management or control of that workplace to prepare and maintain an asbestos management plan.

NOA is found mainly in Western Australia and in NSW. The NSW Department of Trade and Investment has published maps identifying areas where asbestos quarrying occurred in the past and the potential for NOA based on existing known deposits and the mineralogy and geological history of the host rocks.[40] Guidance on reducing potential exposure has also been developed for residents, farmers and people undertaking recreational activities on land that may contain NOA.[41]

The Department of Mines and Petroleum in Western Australia has developed guidelines for the management of NOA in mining operations.[42] WA Health has also produced a Guidance Note on the Public Health Management of Asbestiform Minerals Associated with Mining which includes a map identifying the occurrence of such minerals.[43]

[38] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999, p.14.

[39] Cited in enHealth, 2005, 'Appendix VIII: summary of mining history in Australia, 1880-1976', *Management of Asbestos in the Non-Occupational Environment*, p. 71.

[40] **https://trade.maps.arcgis.com/apps/PublicInformation/index.html?appid=87434b6ec7dd4aba8cb664d8e646fb06 and Mapping of naturally occurring asbestos in NSW – Known and potential for occurrence**.

[41] **http://www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/asbestos/naturally-occurring-asbestos**.

[42] **http://www.dmp.wa.gov.au/Documents/Safety/MSH_G_ManagementOfFibrousMineralsInWaMiningOperations.pdf**.

[43] Western Australia Department of Health, *Guidance Note on Public Health Risk Management of Asbestform Minerals Associated with Mining* available at **http://ww2.health.wa.gov.au/~/media/Files/Corporate/general%20documents/Asbestos/PDF/GNote-Public-Health-Risk-Mgt-Asbestos-associated-with-Mining-Activities.ashx**.

5. Domestic production of asbestos-containing materials

The manufacture of asbestos-containing materials in Australia has been prohibited since 31 December 2003.

In Australia over 60 per cent of all production and 90 per cent of all consumption of asbestos fibre was by the asbestos cement manufacturing industry. Much of this industry output remains in service today in the form of 'fibro' houses and water and sewerage pipes. Until the 1960s, 25 per cent of all new housing in Australia was clad in asbestos cement sheeting.[44]

There were three primary manufacturers of asbestos-containing building products – James Hardie & Co, Wunderlich and Colonial Sugar Refining (CSR). They manufactured asbestos cement flat and corrugated sheets for internal and external wall cladding in buildings and for roofs, asbestos cement water and sewer pipes, underlay, insulation materials as well as brake linings for motor vehicles, railway wagons and locomotives. The asbestos content of James Hardie asbestos cement sheet and pipes ranged from eight per cent to 15 per cent, and was predominantly chrysotile with amounts of crocidolite (to 1968) and amosite. James Hardie ceased using asbestos in its products in 1987.

Chrysotile was also used in making friction products and gaskets. James Hardie, Hardie Ferodo and Bendix Mintex Pty Ltd in Victoria manufactured disc brake pads, blocks and linings for supply to the Australian automotive industry as well as exporting to distributors overseas. Richard Klinger Pty Ltd, based in Perth and Melbourne, manufactured compressed asbestos fibre sheeting used to make gaskets for a wide range of industries, including petroleum refineries, shipbuilding, chemical and food processing.[45]

[44] Leigh, J., Driscoll, T., *Malignant Mesothelioma in Australia*, 1945-2002, International Journal of Occupational and Environmental Health, July 2003, p.207.

[45] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999, p. 20-21.

6. Estimated total number of workers exposed to asbestos in Australia

Exposure to asbestos occurred in a wide range of occupations and industries. There is no data to estimate with any accuracy the total number of workers exposed to asbestos in Australia.

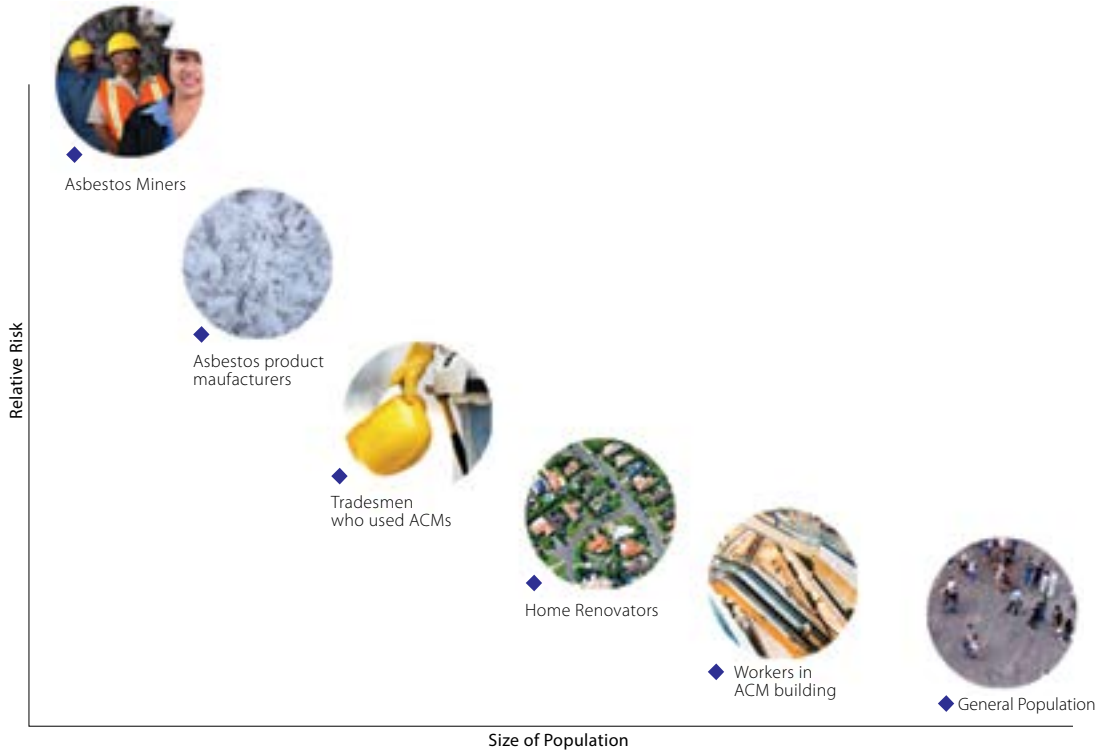
Historically, asbestos exposure occurred among workers who worked with raw asbestos, mining and milling it or processing it in textile or asbestos cement factories. Subsequently, other workers who used the manufactured asbestos product were exposed, including carpenters, plumbers, insulation installers and automotive mechanics.

Specific occupations recording high numbers of exposed workers included workers at Wittenoom, power station workers, railway workers, shipbuilders and navy workers, stevedores, boilermakers, carpenters and joiners, builders and builders labourers.[46]

The use, reuse and selling of any type of asbestos has been prohibited in Australia since 2003, but today the country is left with a legacy of past consumption. Many asbestos products remain in situ today, primarily in the built environment. This means the risk of exposure to asbestos continues and affects not only workers, but also the general population.

Figure 5 shows key groups of people who have been or will be exposed to asbestos. They are ranked based on the size of the exposed population and the relative lifetime risk of contracting mesothelioma (per exposed person) in each group.[47]

Figure 5: Relative size and lifetime risk of contracting mesothelioma (Note: this chart is not drawn to scale. Not all groups exposed in Australia are shown.)



[46] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p.2.

[47] Finity Consulting, *Future Projections of the burden of mesothelioma in Australia*, ASEA Report, 2016, p. 5.

Asbestos miners are a small group but probably had the highest lifetime risk of contracting mesothelioma due to high fibre concentrations from their work. By contrast, the entire Australian population is exposed to background levels of asbestos with significantly lower fibre concentrations on average.

The total number of persons diagnosed with mesothelioma in Australia between 1945 and 2015 is approximately 16,800. However, not all of these cases are a result of occupational exposure (see Chapter 7) and this figure does not include other diseases caused by exposure to asbestos[48].

ASEA has established a national voluntary register to record the details of members of the community who think they may have been exposed to asbestos, including in non-occupational settings. Since its commencement in June 2013 up to July 2017, there have been 5,898 registrations.[49] Although the registrations do not record confirmed exposure, the data may be a useful indicator of actual or potential exposure events and trends across Australia.

[48] Refer to the Australian Mesothelioma Registry for additional detail.
[49] ASEA, *National Asbestos Exposure Register Data Analysis Report*, 1 July 2015 to 30 June 2016.

7. Industries where exposure to asbestos is present in Australia those with the largest numbers of workers potentially exposed to asbestos

Based on the ACMs that still exist in Australia, workers at risk of exposure to asbestos are building and construction workers, asbestos removalists, telecommunication and electricity providers, waste and landfill operators, carpenters, plumbers, painters, electricians, boilermakers, fitters and machinists. The mining industry may also be at risk of exposure due to the presence of naturally occurring asbestos.

The National Data Set for Compensation-based Statistics (NDS) contains information on workers' compensation claims that involve work-related disease. Between 2008–09 and 2010–11, the NDS data shows 63 per cent of compensated mesothelioma claims and 73 per cent of compensated asbestosis claims were made by tradespersons and labourers.[50] Over the three-year period, occupations with higher than average rates of compensated mesothelioma and asbestosis claims included:[51]

- carpentry and joinery tradespersons
- electricians
- freight and furniture handlers
- metal fitters and machinists
- construction and plumbers' assistants.

Since the 1980s onwards, the implementation of regulatory controls for workplaces has meant that the removal of asbestos materials has been carried out by licensed businesses with personnel trained and equipped to carry out the work in a way that minimises potential for occupational and environmental exposure.

There is now evidence that an increasing proportion of mesothelioma cases are arising from non-occupational exposures. These so-called third wave exposures are generally associated with low-dose asbestos exposure or short-term high-dose exposures and include disturbance of asbestos while living in or renovating a home containing ACM.

The Australian Mesothelioma Register (AMR) collects and monitors data on the number of new cases of mesothelioma and past exposure to asbestos. The 5th annual AMR Report[52] includes information of occupational and non-occupational asbestos exposures of persons diagnosed with mesothelioma since 1 July 2010. Out of a total of 3,505 mesothelioma patients, 582 people (17 per cent) provided exposure information in AMR assessments made from 1 July 2010 to 1 April 2016, summarised in
Table 2. The assessment is based on probability of exposure to asbestos and does not take into account intensity, duration or frequency of exposure.

[50] NB – these compensation figures and list of occupations relate to historical exposures.

[51] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 2.

[52] Australian Mesothelioma Registry, *Mesothelioma in Australia 2015*.

Table 2: Australian Mesothelioma Register exposure profile

Exposure source	Females	Males	Total	% of total
Occupational only	1	64	65	11%
Both occupational and non-occupational	7	279	286	49%
Non-occupational only	99	98	197	34%
Unconfirmed exposure source	11	23	34	6%
TOTAL	118	464	582	100%

The data shows that 60 per cent of recent cases were assessed as having probable occupational exposure to asbestos. One third of cases were related to non-occupational exposure only.

The AMR assessment indicates that trade-related jobs were most commonly associated with occupational exposure to asbestos, particularly construction workers, electricians, plumbers, boilermakers, welders, other metal and mechanical trades, engineers and telecommunications technicians. Occupational exposures were also associated with shipbuilding and maintenance, the navy and stevedoring.

In relation to non-occupational exposure, of the 582 respondents:

- 312 respondents (53.6 per cent) reported having undertaken home renovations (seven per cent of these were assessed as having had probable exposure)
- 238 respondents (40.9 per cent) reported living in a house while renovations were occurring, although none were identified to have probable exposure.

Thirty per cent reported exposures from servicing car brakes and clutches at home and 20 per cent reported a household member having a dusty job. Other non-occupational exposures included living near asbestos mines or factories. Among the 582 respondents, it was common to have indications of exposure to asbestos from more than one non-occupational source. The level of exposure was assessed as low in most cases.

8. Industries exceeding occupational exposure limits and estimated total number of workers at high risk

Past exposures were very high in some industries and jobs; for example, 150 fibres/ml in asbestos pulverisors and disintegrators in the asbestos cement industry and up to 600 fibres/ml in baggers at Wittenoom.[53]

Given that most of the asbestos consumed in Australia was used in the built environment, workers who maintain, repair or demolish buildings or remove asbestos from buildings have the highest risk of exposure. A 2005 study into the prevalence of asbestos in buildings in Canberra identified the presence of asbestos in a substantial proportion of buildings and found that 'members of the building industry and other trades whose work involves handling, disturbing and removing ACMs are at greatest risk of exposure to asbestos fibre'.[54]

A 2010 study collected exposure data for a number of common construction related tasks involving ACMs which included cleaning up an asbestos contaminated site, work in a ceiling space containing asbestos and working with electrical switchboard backing materials. [55]Atmospheric monitoring of selected work tasks involving ACMs confirmed the potential risk of exposure when working on fire doors containing friable asbestos and when undertaking work in ceiling spaces containing ACMs. However, for other work tasks such as drilling or sanding asbestos cement sheet, asbestos fibre levels were well below the Australian workplace exposure standard for asbestos of 0.1 fibres/ml of air.

The study acknowledged further monitoring of a larger range of work activities examining type of ACM, material condition, tool used and their speed are needed to provide a clearer picture of which activities generate significant asbestos fibre levels. The study found that although tradespeople were generally aware of the health risks of asbestos, they were not complying with safety procedures as well as they believed.

In a survey undertaken by Safe Work Australia[56] 459 construction workers answered questions about the tasks they completed and the controls that were used at work. Based on their responses to those questions, the likelihood of exposure to 38 carcinogens (and exposure levels) was estimated. Exposure assessments were therefore qualitative and not based on actual measurement. Seventeen (four per cent) workers surveyed were deemed to have probable exposure to asbestos and 183 (40 per cent) were deemed to have possible exposure. Out of those exposed (either probable or possible), sic per cent were exposed at a high level, 29 per cent at a medium level and 65 per cent at a low level.

It is not possible to estimate the total number of workers at high risk of exposure due to the uncertainty about the amount of ACM that remains in situ, its location and condition and the extent of compliance with work health and safety laws.

More recent studies have focussed on non-occupational exposure risks, particularly home owners renovating older homes without adequate protection, as this activity remains largely unregulated.

The ASEA commissioned research to quantify the asbestos fibre release and potential exposure during DIY home renovation involving the disturbance or removal of asbestos cement sheeting.[57] Both personal and static monitoring was undertaken during nine simulated DIY tasks. Analysis of samples involved both phase contrast and electron microscopy.

[53] National Occupational Health and Safety Commission, *The Incidence of Mesothelioma in Australia 1999 to 2001 – Australian Mesothelioma Register Report 2004*, November 2004, p. 3.

[54] ACT Asbestos Taskforce, *Asbestos Management in the ACT,* August 2005.

[55] Safe Work Australia, *Asbestos Exposure and Compliance Study of Construction and Maintenance Workers*, February 2010.

[56] Safe Work Australia, *The Australian Work Exposure Study: Carcinogen Exposure in the Construction Industry*, May 2016.

[57] Monash University, *Measurement of asbestos fibre release during removal works in a variety of DIY scenarios*, ASEA Report, 2016.

The results indicated that if power tools were not used and there was minimal breakage of asbestos cement sheets, then exposure was generally low. Using a hammer or an angle grinder to break up sheets in an enclosed space with little ventilation and no wetting of the ACM could result in higher levels of personal exposure.

However, significant differences were found between sampling results for the same task, with static sampling results always being lower and often less than half the exposure from simultaneous personal monitoring, indicating a need for more personal monitoring to provide more accurate information on the effectiveness of control measures used during asbestos removal work.

Furthermore, research has found that while homeowners are aware that asbestos can be dangerous, many do not feel confident in being able to identify asbestos in their home or to manage it safely.[58]

Indigenous communities have also been identified at higher risk of asbestos exposure due to the previous widespread use of ACMs in constructing dwellings.[59] Many of these buildings are more than 50 years old and often located in areas subject to extreme weather conditions. The cost of removing asbestos in remote areas can be up to three times higher than for other parts of the country; however remote communities have limited resources to safely remove or manage asbestos in existing buildings.[60]

It is evident that current and future risks of asbestos exposure arise from:[61]

- DIY renovations being undertaken by homeowners themselves, rather than paid professionals
- large amounts of in-situ asbestos, often in poor condition, found in remote Indigenous communities
- deterioration of in situ asbestos caused by weathering
- damage to asbestos structures due to storms, floods and fires
- illegally dumped asbestos
- soil contamination from former asbestos waste sites
- unsafe asbestos removal practices.

There is uncertainty about what the actual level of risk is in these various circumstances due to a lack of ongoing and accurate measurement of asbestos fibre concentrations.[62]

What is known is that the number of people exposed to asbestos in Australia is probably very large, but the amount they have been exposed to, in most circumstances, is likely to be very low.[63]

[58] EY Sweeney, *Attitudes to residential assessments*, ASEA Report, 2016.

[59] New South Wales Ombudsman, *Asbestos: How NSW government agencies deal with the problem*, A Special Report to Parliament under Section 31 of the Ombudsman Act 1974, April 2017.

[60] Matrix On Board Consulting, *Remote Australian communities: The asbestos legacy*, ASEA Report, 2017.

[61] Corie Gray, Renee N. Carey & Alison Reid, *Current and future risks of asbestos exposure in the Australian community*, 2016; International Journal of Occupational and Environmental Health, 22:4, 292-299.

[62] Armstrong B., Driscoll T., *Mesothelioma in Australia: cresting the third wave*, Public Health Research and Practice, April 2016; Vol 26(2):e2621614.

[63] Reid, A. *Review of the effectiveness of predictive models for mesothelioma to identify lessons for asbestos-related policy*, Evidence Base, Issue 3, 2016.

9. Estimate of the burden of asbestos-related diseases: disability adjusted life years and deaths attributable to asbestos exposure

The most common form of asbestos-related disease is lung cancer[64], followed by mesothelioma[65]. Other diseases included in this estimate are asbestosis and asbestos-related cancers of the larynx and ovaries.

Information about the population of sufferers and deaths due to asbestos-related disease has been obtained from the Global Burden of Disease (GBD) study through the GBD Compare online tool. Australian state-based cancer registries and the AMR also monitor deaths due to asbestos-related diseases.

The GBD dataset collates various data sources to provide a consistent set of death, prevalence and other measures on the impact of asbestos-related diseases for a given year. Not all data is available from this source. For example, the proportion of occupational and non-occupational exposures is not known for lung cancer, laryngeal or ovarian cancer. These have been estimated based on the observed ratio for mesothelioma.[66]

Deaths due to asbestos-related disease

In 2015, there were an estimated 4,152 deaths in Australia due to asbestos-related diseases among 10,444 prevalent cases of disease.

Table 3 summarises the number of deaths due to asbestos-related diseases. Approximately 87 per cent of people who die from asbestos-related diseases are male. Most people with asbestos-related disease are over 65, given the long latency period of 20 to 40 years for a disease such as mesothelioma.

Table 3: Deaths due to asbestos-related diseases in 2015

Patient category	Mesothelioma	Asbestosis[68]	Lung cancer[a]	Larynx cancer	Ovarian cancer	All diseases
	Number	Number	Number	Number	Number	Number
Occupational exposure						
Male	592	61	2,726	53	0	3,431
Female	98	1	318	0	15	432
Both				53	15	3,864
Non-occupational exposure						
Male	47	0	121	2	0	169
Female	36	0	79	0	4	119
Both	83	0	200	2	4	288
All sources of exposure						
Male	639	61	2,847	55	0	3,601
Female	133	1	397	0	19	551
Both				55	19	4,152

[a] Includes tracheal, bronchus, and lung cancer.

[64] The Global Burden of Disease Study 2015.

[65] The Global Burden of Disease Study 2015.

[66] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017.

[67] Global Burden of Disease project ('GBD Compare' tool, available at **https://vizhub.healthdata.org/gbd-compare/**), The Centre for International Economics.

[68] Asbestosis deaths include asbestosis as an underlying and contributing cause.

Estimating the value of lost quality or years of life

Living with asbestos-related disease is a burden for sufferers and their families, beyond the adverse effects on workforce participation and the costs required to treat medical conditions.

The 'burden of disease' framework measures the compromised quality of life experienced by people with an asbestos-related disease, which is valued at $11 billion for all people living with an asbestos-related disease in 2015–16 over their lifetime.

This burden is quantified in terms of disability adjusted life years (DALYs) which put simply, combines the impact of premature death and living with illness. It combines the estimates of years of life lost (YLL) and years of living with ill-health or disability (YLD). This health loss represents the difference between the current health status of the population and the ideal situation where everyone lived a long life, free of disease.

Number of Disability Adjusted Life Years due to asbestos-related disease

Data on the number of DALYs lost due to asbestos-related disease was collated by the GBD study.[69] The GBD study methodology does not discount losses of years of life in the future (for deaths in the current year) or YLDs. This is consistent with the approach taken by AIHW in estimating DALYs.[70]

Table 4 shows the DALYs lost by disease and patient category in 2015. It shows that most DALYs are lost due to lung cancer and mesothelioma. Approximately 90 per cent of DALYs lost are associated with diseases caused by occupational (rather than non-occupational) exposure.

Table 4: Disability Adjusted Life Years lost due to asbestos-related disease[71]

Patient category	Mesothelioma	Asbestosis[68]	Lung cancer[a]	Larynx cancer	Ovarian cancer	All diseases
	Number	Number	Number	Number	Number	Number
Occupational exposure						
Male	9,712	664	36,026	568	0	46,970
Female	1,502	13	3,961	4	195	5,676
Both				571	195	52,645
Non-occupational exposure						
Male	1,322	0	2,338	21	0	3,681
Female	923	0	1,427	1	77	2,428
Both	2,246	0	3,765	22	77	6,109
All sources of exposure						
Male	11,034	664	38,364	588	0	50,651
Female	2,426	13	5,388	5	272	8,103
Both				593	272	58,754

[a] Includes tracheal, bronchus, and lung cancer.

The value of DALYs cannot be combined or summed together with the productivity impacts estimated in Chapter 17 of this report, where discounting has been used to value changes in the productive capacity of individuals with asbestos-related disease.

[68] Asbestosis deaths include asbestosis as an underlying and contributing cause.

[69] Available at **https://vizhub.healthdata.org/gbd-compare/**.

[70] Australian Institute of Health and Welfare 2016. *Australian Burden of Disease 2011: methods and supplementary material.* Australian Burden of Disease Study series no. 5. Cat. no. BOD 6. Canberra: AIHW, p.5, available at: **http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=60129558665**.

[71] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017.

The cost of lost quality of life and death can be estimated by multiplying the number of DALYs by the value of a statistical life year (VSLY).[72] Measuring the economic cost of lost quality of life due to asbestos-related diseases involves establishing a monetary value for lives saved. The VSLY used is $186,640.

The loss of DALYs can be represented in monetary terms by multiplying the values in Table 4 by the assumed VSLY ($186,640). Table 5 summarises the value of lost quality of life due to asbestos-related disease based on a constant VSLY with respect to age.

Table 5: Value of lost quality of life due to asbestos-related disease[73]

Patient category	Mesothelioma	Asbestosis[68]	Lung cancer[a]	Larynx cancer	Ovarian cancer	All diseases
	$ million	$ million	$ million	$ million	$ million	$ million
Occupational exposure						
Male	1,813	124	6,724	106	0	8,766
Female	280	2	739	1	36	1,059
Both				107	36	9,826
Non-occupational exposure						
Male	247	0	436	4	0	687
Female	172	0	266	0	14	453
Both	419	0	703	4	14	1,140
All sources of exposure						
Male	2,059	124	7,160	110	0	9,453
Female	453	2	1 006	1	51	1,512
Both				111	51	10,966

[a] Includes tracheal, bronchus, and lung cancer.

[68] Asbestosis deaths include asbestosis as an underlying and contributing cause.

[72] Abelson, P. 2008, *Establishing a Monetary Value for Lives Saved: Issues and Controversies, Working papers in cost benefit analysis*, WP 2008 02, Office of Best Practice Regulation, Department of Finance and Deregulation.

Using ABS, Consumer Price Index, Australia, All Groups CPI, Australia, Cat. No. 6401.0. to convert to $2016. Using CPI to convert to current prices is consistent with the OBPR guidance: **https://www.pmc.gov.au/sites/default/files/publications/Value_of_Statistical_Life_guidance_note.pdf** p. 2.

[73] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017.

10. Prevalence of asbestosis

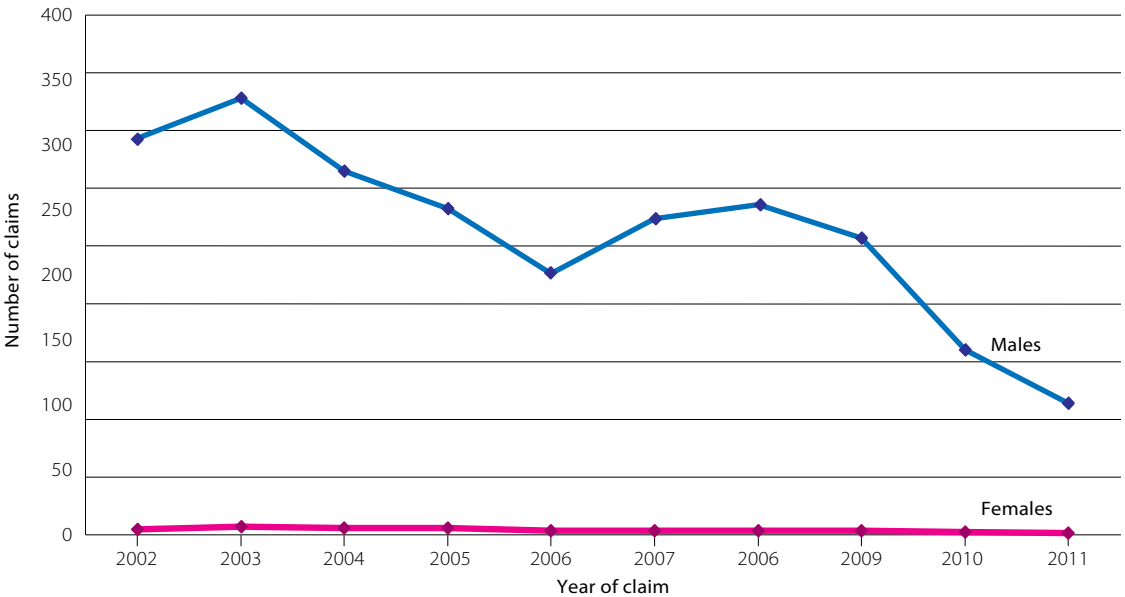
The exact number of people diagnosed with asbestosis in Australia each year is unknown because, unlike mesothelioma, the disease does not have to be notified to jurisdictional authorities. However, there are four data sources that provide an indication of the prevalence of asbestosis in the general population:

- AIHW compiles national hospitalisation data on the number of hospital stays where the patient was recorded as having asbestosis
- icare Dust Diseases Care in NSW, formerly known as the NSW Dust Diseases Board, records the number of compensation claims for asbestosis in NSW. Although representing only one state, NSW accounts for around one-third of the Australian population.
- ABS Causes of Death data can identify the number of deaths registered in a year where asbestosis was recorded as a cause of death
- Safe Work Australia's National data set for compensation based statistics (NDS) contains workers' compensation data received annually from Australian workers' compensation authorities.

Over the period 1998–99 and 2009–10 there were 1,394 asbestosis-related hospitalisations, 97 per cent of these were male patients.

Another measure of the prevalence of asbestosis combines the data from icare Dust Diseases Care in NSW and the NDS. Figure 6 shows there were 102 accepted asbestosis-related compensation claims in 2011, the lowest number observed since 2002.

Figure 6: Compensated claims for asbestosis: 2002–2011[74]



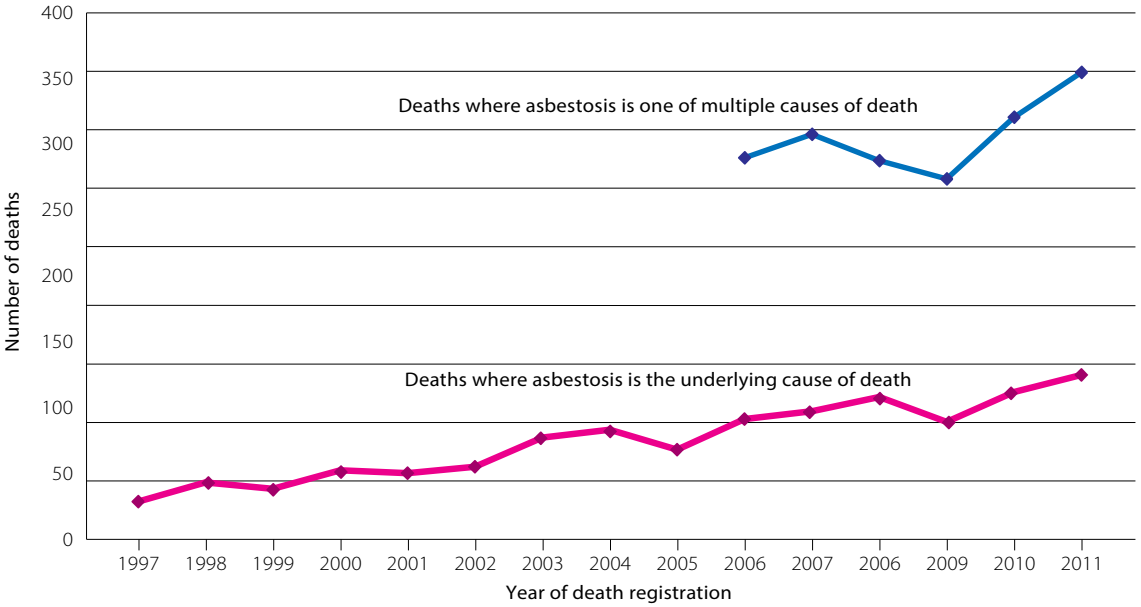
[74] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 9.

The number of male asbestosis-related compensations decreased from 336 in 2003 to 101 in 2011. Between 2002 and 2011, fewer than 10 female asbestosis-related compensations were recorded each year.

In 2011, asbestosis was recorded as one of multiple causes of death in 355 cases and the underlying cause of death in around one-third (125) of those cases. This reflects a common characteristic among asbestosis-sufferers as they do not usually die of the disease itself, but of other serious associated conditions.

Figure 7 shows an upward trend in the number of deaths where asbestosis was the underlying cause, increasing from 28 in 1997 to a peak of 125 in 2011. Likewise, there appears to be an increase in the number of deaths where asbestosis is one of multiple causes of death. This reflects a common characteristic of asbestosis, where sufferers do not die from the disease itself, but from other conditions that may have been triggered by it as a result of reduced lung function placing greater stress on the body's other vital organs.[75]

Figure 7: Asbestosis-related deaths 1997 to 2011[76] (Note: Data where asbestosis was recorded as one of multiple causes of death are only available from 2006)



[75] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 8.

[76] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 10.

11. Incidence of lung cancer among workers exposed to asbestos

Lung cancer caused by exposure to asbestos is not different to lung cancer from other causes, for example cigarette smoking. It is not possible to identify asbestos exposure as the sole cause of lung cancer, and therefore estimating the new cases (incidence) of asbestos caused lung-cancer is more difficult than for mesothelioma and asbestosis.

Lung cancer is the fifth most common cancer in Australia and the leading cause of cancer death.

In 2013, there were 11,174 new cases of lung cancer diagnosed in Australia (6,627 males and 4,548 females). The AIHW estimates that 12,434 new cases of lung cancer will be diagnosed in 2017. This accounts for approximately nine per cent of all cancers diagnosed.

In 2014, there were 8,251 deaths from lung cancer in Australia (4,947 males and 3,304 females). In 2017, it is estimated that this will increase to 9,021 deaths.

Asbestos-related lung cancer

The most common form of asbestos-related disease is lung cancer. A number of studies have tried to estimate the ratio of cases of lung cancer caused by exposures to asbestos, compared to cases of mesothelioma caused by exposures to asbestos. The lung cancer:mesothelioma ratio ranges from conservative estimates of 2:1[77] to higher estimates of 5.2:1.[78]

Table 6 summarises the number of deaths and prevalence of asbestos-related lung cancer in 2015, based on the GBD study.

Table 6: Deaths and prevalence of asbestos-related lung cancer in 2015

Asbestos-related lung cancer	Deaths	Prevalence
Male	2,847	6,845
Female	397	1,265
Total	**3,244**	**8,111**

[77] McCormack. V, Peto. J, Straif. K, Boffetta, K., *Estimating the asbestos-related lung cancer burden from mesothelioma mortality*, British Journal of Cancer (2012) 106, 575-584.

[78] Global Burden of Disease project (2015) available at **https://vizhub.healthdata.org/gbd-compare/**.

12. Incidence of mesothelioma

The Australian Mesothelioma Registry (AMR) contains information about people diagnosed with mesothelioma in Australia from 1 July 2010. Cases of mesothelioma are provided to the AMR by the state and territory cancer registries. Cancer registries are notified of all cases of cancer diagnosed in residents living in their jurisdiction.

In total, 650 people diagnosed with mesothelioma from 1 January 2015 to 31 December 2015 had been notified to the AMR at 31 May 2016 (Table 7). This compares with 641 cases reported for 2014 at 31 May 2015.

Table 7: People in Australia newly-diagnosed with mesothelioma, 2011–15[79]

Year of diagnosis	Males	Females	Total persons
2011	595	105	700
2012	605	126	731
2013	561	131	692
2014	593	139	732
2015	505	145	650

Average number of people diagnosed with mesothelioma each year since 2011

701

Since the AMR's previous report[80], there have been additional notifications of people diagnosed with mesothelioma reported to the AMR for all previous years: 8 for 2011 (1.2 per cent increase), 18 for 2012 (2.5 per cent increase), 16 for 2013 (2.4 per cent increase) and 91 for 2014 (14.2 per cent increase). A similar increase is anticipated in the reported number of patients diagnosed in 2015. This is why the average is the best indicator.

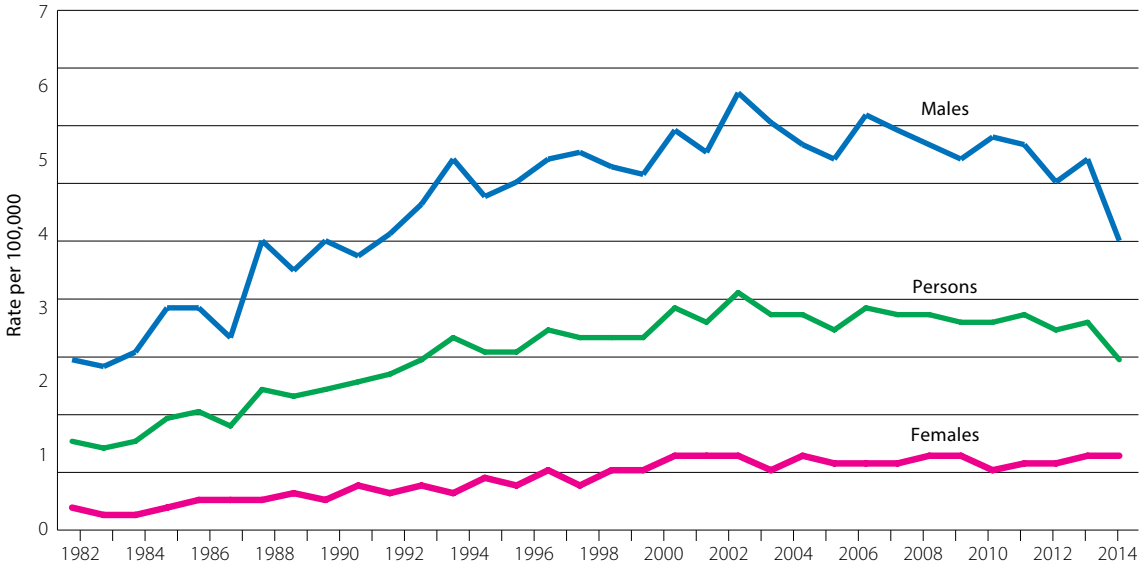
The 2015 incidence rate for males and females combined was 2.3 per 100,000 population overall, with Western Australia reported the highest combined incidence rate (4.2 per 100,000) and Tasmania reporting the lowest (0.5 per 100,000).[81]

The incidence rate age-standardised to the World Standard Population was 1.3 per 100,000 overall[82]. This is the figure that should be used when comparing incidence rates in Australia to those in other countries.

There are limitations with reporting mesothelioma trends due to the lack of time series data in the AMR at this stage. However, Figure 8 shows trends in mesothelioma incidence using available data from two sources: the AIHW Australian Cancer Database for 1982–2010 and the AMR for 2011–15.

[79] Australian Mesothelioma Registry, *Mesothelioma in Australia 2015* , p. 4.
[80] Australian Mesothelioma Registry, *Mesothelioma in Australia 2014.*
[81] Australian Mesothelioma Registry, *Mesothelioma in Australia 2015*, p. 4.
[82] Australian Mesothelioma Registry, *Mesothelioma in Australia 2015*, p. 4.

Figure 8: Age-standardised incidence rates of mesothelioma per 100,000 from 1982–2015[83]



It is estimated that there will be around 19,400 new mesothelioma cases diagnosed in Australia between 2015 and 2100, and that non-occupational exposure will overtake exposure from mining, manufacturing and use of asbestos cement. Fifty-eight per cent of these are attributed to previous industrial exposures from the first and second waves, with the remaining 42 per cent coming from the third wave.[84]

[83] Australian Mesothelioma Registry, *Mesothelioma in Australia 2015*, p. 7.

[84] Finity Consulting, *Future Projections of the burden of mesothelioma in Australia*, ASEA Report, 2016, p. 23.

13. Estimates on the percentage of house stock and vehicle fleet containing asbestos

Although there are records detailing the amount of asbestos consumed in Australia annually from 1920 through to 2003 (see Chapter 2 of this report), information on the subsequent dispersion of asbestos into various product stocks is not documented. Donovan and Pickin (2016) developed a model to estimate the remaining stock of asbestos in Australia and when this will be discarded as waste through to the year 2100. The model uses:

- data on annual asbestos consumption (see Figure 2 in Chapter 2)
- estimates of the proportion of the consumed asbestos that went into certain product groups (including building and friction products, see Figure 4 in Chapter 2)
- estimates of the average amount of asbestos found in each product group
- estimates the lifetime of each product group.

The study concluded, under the best estimate, that 44 per cent of consumed asbestos remained in use in 2016 and 10 per cent will remain by 2055.[85]

Houses and other buildings containing asbestos

The use of building materials containing asbestos was never tracked or documented when used in the construction of housing. Most of the in situ asbestos remaining in the built environment is non-friable, consisting of asbestos cement sheeting used for internal walls or external cladding, roofing, fencing and vinyl floor tiles.

The Asbestos Management Review (2012) found only a small number of studies have attempted to either estimate or collect data that may indicate the level and condition of ACMs in residential properties, with varying levels of success. For example, an Australian Housing Survey conducted by the ABS in 1994 estimated that approximately 5.5 million occupied dwellings in Australia were built before 1987. The survey also showed that, of these, over 820,000 dwellings had asbestos cement sheeting as a main construction material in one or more of the wet areas, roof, eaves and outside walls. This represents approximately 15 per cent of dwellings constructed prior to 1987. However, this result may be understated given the survey relied on the occupant having a general awareness of ACMs.[86]

A survey of over 500 residential buildings in Canberra found that by 1985, ACMs were no longer used as new building products in houses in the ACT and that ACMs in residential premises were generally in sound condition.[87] ASEA estimates that one third of all homes built in Australia before 1990 contain asbestos. Over time more and more of these houses are being demolished or renovated, where the asbestos is removed.

Approximately one in five renovations requires asbestos to be removed. In these situations, asbestos is mainly removed by either a licensed removalist or by the tradesperson. However, one in three DIY home renovators carries out the removal of the asbestos themselves.[88]

In a 2008 mail survey of 10,000 adults listed on the NSW Electoral Roll, 37.5 per cent of whom responded, 24 per cent reported having undertaken DIY renovations. Of those, 61 per cent reported being exposed to asbestos during the renovation. A total of 20 per cent reported other home renovations, where only three per cent reported asbestos exposure.[89]

[85] Donovan, S. and Pickin, J., *An Australian stocks and flows model for asbestos*, Waste Management & Research, 2016, p. 6.
[86] Australian Government, *Asbestos Management Review*, June 2012, p. 11.
[87] ACT Asbestos Taskforce, *Asbestos Management in the ACT*, August 2005.
[88] EY Sweeney, *Asbestos Awareness and Attitude Survey 2016*, ASEA Report, 2016, p. 8.
[89] Park E, Yates D, Hyland R, Johnson A., *Asbestos exposure during home renovation in New South Wales*, Med J Aust, 2013;199(6):410-13.

The increasing popularity of DIY renovations, combined with the lack of asbestos awareness amongst homeowners and lack of regulatory oversight in this area, has raised concerns about a third wave of asbestos exposure.

The requirement to keep an asbestos register to record the location, type and condition of asbestos in buildings only applies to workplaces. However, there is no central repository for this information, so the extent of in-situ asbestos in buildings used as workplaces across Australia is unknown.

State and territory governments own a number of buildings including offices, housing, schools, prisons and hospitals. Some governments and local councils have undertaken audits of asbestos in their buildings and have made this information publically available online, including asbestos registers. For example:

- NSW Department of Education publishes its Asbestos Management Plan and asbestos registers for each of its schools **http://www.dec.nsw.gov.au/about-us/supplying-to-us/asbestos-register**
- District Council of the Copper Coast in South Australia publishes asbestos management plans and asbestos registers for its facilities **http://www.coppercoast.sa.gov.au/asbestosreg**.

The ACT is currently the only jurisdiction that requires homeowners to disclose the presence of asbestos in residential premises to both potential purchasers and tenants, however this is only in instances where a licenced assessor has prepared an asbestos survey previously. A report by the NSW Ombudsman (2017) recommended the NSW Government introduce a similar scheme requiring property owners to obtain a certificate indicating the location and type of asbestos present in the building and provide it to potential purchasers or tenants.90 The certificate could also be lodged with the relevant local council prior to the sale of a property which would allow the collection of data on the percentage of house stock containing asbestos and assist in ensuring compliance with asbestos-related legislation.

Vehicle fleet containing asbestos

It is estimated that there are now very few vehicles containing asbestos in Australia. A number of vehicle manufacturers selling vehicles in Australia had stopped using asbestos in their new vehicles since the late 1980s and early 1990s. By 1999, non-asbestos friction products were available for around 90 per cent of the automotive models.[91] Despite this, the use of asbestos in the aftermarket parts industry was common until the asbestos ban came into effect in 2003. Brake linings and pads containing asbestos were generally cheaper than those without, which meant that vehicles with asbestos-free brakes originally may have had asbestos in the replacement parts. There was also a prevailing view that the performance of asbestos parts was better than the asbestos free alternatives.

Vehicle parts most likely to contain asbestos were brake pads, exhaust gaskets and clutch plates. There are many variables that influence the replacement periods for these car parts, including distance driven, where the driving has occurred and the car type. Based on a number of industry websites, replacement periods for these parts are estimated as follows:

- brake pads – 15,000–70,000 kilometres
- exhaust gaskets and clutches – 100,000 kilometres.

The following data on motor vehicles has been published by the ABS:

- In 2015, there were 18,007,767 motor vehicles registered in Australia and the average age of a motor vehicle in Australia was 10.1 years[92]
- the average motor vehicle drove 13,800 kilometres each year (in 2014).[93]

[90] New South Wales Ombudsman, *Asbestos: How NSW government agencies deal with the problem*, A Special Report to Parliament under Section 31 of the Ombudsman Act 1974, April 2017, p.30.

[91] National Industrial Chemicals Notification and Assessment Scheme, *Chrysotile Asbestos Priority Existing Chemical Report No. 9*, 1999.

[92] Australian Bureau of Statistics, 2015, 9309.0 – Motor Vehicle Census, Australia, **http://www.abs.gov.au/ausstats/abs@.nsf/mf/9309.0**.

[93] Australian Bureau of Statistics, 2014, 9208.0 – Survey of Motor Vehicle Use Australia, **http://www.abs.gov.au/ausstats/abs@.nsf/mf/9208.0/**.

This indicates that approximately half the vehicles on the road in Australia today would have been made after the asbestos ban came into effect in 2003. Those vehicles that were made prior to 2003 would have done, on average, 179,000 kilometres. This suggests that all parts in the vehicle that may have contained asbestos would have already been replaced with non-asbestos parts.

Despite the ban, there have been a number of incidents where automotive parts containing asbestos have been imported from China (see Chapter 3). In 2012 the Australian Competition and Consumer Commission monitored a voluntary recall of approximately 23,000 Great Wall and Chery motor vehicles with engine and exhaust gaskets containing asbestos.

More recently, in March 2017, the Australian Border Force identified asbestos in brake components on Vespa scooters with side cars and imported electric scooters. The scooters were imported from China and were thought to be asbestos-free, but subsequent testing by NATA confirmed some of the brake components contained chrysotile asbestos. The shipments were quarantined by the Australian Border Force, pending removal of the asbestos materials.

Recommendation

There is an identified need for more research to gain a better understanding of the amount and location of ACMs in the residential sector in Australia.

14. Total number of workers eligible for compensation for asbestos-related diseases per year and the numbers of individuals compensated yearly

Generally, a person diagnosed with asbestos-related disease in Australia may be entitled to two different types of compensation:

1. a claim under a workers' compensation or other government compensation scheme, known as 'no-fault' statutory claim; or
2. a claim for damages through the court, known as a common law claim. Under common law, it is necessary to prove negligence against the party to receive damages. This is not required under 'no fault' statutory schemes.

Each state and territory has its own workers' compensation scheme. Compensation is payable to a worker who suffers an injury or disease arising from, or during, his or her employment.

Compensation claims are usually pursued through the common law process instead of through statutory schemes for the following reasons:

- more generous entitlements are available than through workers' compensation
- self-employed workers are not covered by workers' compensation
- exposure to asbestos at multiple workplaces or in multiple jurisdictions makes receiving workers' compensation more complex
- exposure occurred in a non-occupational setting.

There are many differences between the jurisdictions in relation to their workers' compensation schemes, including how workers and work-relatedness is defined, the time limits for lodging a claim and the entitlements provided.[94]

In terms of the availability of common law damages jurisdictions have placed some restrictions on the types of damages that a worker can receive, and/or placed caps on the amount that can be awarded.

NSW has specific arrangements relating to compensation for dust diseases. Workers in NSW are able to claim both statutory and common law compensation. icare Dust Disease Care, formerly known as the Dust Diseases Board, was established by the Workers Compensation (Dust Diseases) Act 1942 to compensate workers who have contracted a dust disease during the course of employment in NSW, including asbestos related pleural disease, asbestosis, asbestos induced lung cancer and mesothelioma. The number of claimants, which includes workers and upon the workers death their surviving dependents, compensated by icare Dust Diseases Care in 2015–16 was 2,291 for mesothelioma, 714 for asbestosis and 375 for lung cancer.[95]

The NSW Dust Diseases Tribunal (DDT), established in 1989, hears and determine claims for damages by victims of dust-related diseases. Most of the work of the DDT involves asbestos-related disease claims.

[94] Safe Work Australia, *Comparison of Workers' Compensation Arrangements*, October 2016.

[95] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017

NB – these numbers of reflect the number of claimants (including dependents and spouses), not only the number of people suffering from asbestos-related diseases.

Tasmania has an Asbestos Compensation Scheme that governs all statutory compensation in Tasmania for asbestos-related diseases reasonably attributable to exposure to asbestos at work. It provides no-fault and timely compensation to workers, and members of the family of deceased workers, who have been diagnosed with an asbestos-related disease and are entitled to compensation under the Asbestos-Related Diseases (Occupational Exposure) Compensation Act 2011. However, if a worker has already received damages through common law for a particular asbestos-related disease, the worker is not eligible for statutory compensation.

The scheme is designed to be non-adversarial, where claimants are helped in completing the necessary employment and medical information to facilitate a determination of their claim. To date 127 claims have been received, and the 79 asbestos claims have been compensated to July 2017.

A worker who develops an asbestos-related disease as a result of exposure to asbestos during the course of their work in Tasmania is entitled to claim compensation under the Asbestos-Related Diseases (Occupational Exposure) Compensation Act 2011. However, if a worker has already received damages through common law for a particular asbestos-related disease, the worker is not eligible for statutory compensation.

Safe Work Australia's National Data Set collects data annually from the workers' compensation authorities on all accepted workers' compensation claims, including claims that involve work-related disease. The number of compensated claims for mesothelioma remained relatively stable over the period from 2002 to 2011 with an average of 259 claims compensated each year. Compensated claims for females have remained stable at an average of 18 each year.[96] In contrast, the number of asbestosis compensation claims for males decreased from 336 in 2003 to 101 in 2011, the lowest number recorded over the period. Between 2002 and 2011, fewer than 10 females were compensated for asbestosis each year.[97]

Not all claims for compensation are made through workers' compensation schemes. Most claims for compensation are pursued through common law courts. Consequently, the number of asbestos-related disease compensation claims reported from the National Data Set and the NSW Dust Diseases Authority does not represent the total number of compensation claims accepted for these diseases in Australia.

A large number of common law claims have been made against the James Hardie companies which manufactured and supplied various products containing asbestos up until 1987. Following an Inquiry into the management of James Hardie's asbestos liabilities in 2004[98], James Hardie Industries committed to funding a new trust, the Asbestos Injuries Compensation Fund (AICF), to provide compensation for Australian asbestos-related disease claims against former subsidiaries of the James Hardie Group. Information on the numbers of these claims and estimates of future asbestos-related disease liabilities to be met by the AICF can be found in the KPMG Actuarial Reports on the AICF website.

The Australian Government has centralised the management of its common law asbestos-related disease liabilities with the Commonwealth regulator, Comcare, under the Asbestos-related Claims (Management of Commonwealth Liabilities) Act 2005.

A proportion of people diagnosed with asbestos-related disease due to occupational or non-occupational exposure may be eligible for compensation but do not make a claim. It is difficult to quantify the total number of persons eligible for asbestos-related disease compensation. As outlined in chapter 7 of this report, approximately 60 per cent of new mesothelioma cases are attributed to occupational exposure, however non-occupational exposure will overtake occupational exposure as the number of workers' compensation claims decrease.

[96] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 6.

[97] Safe Work Australia, *Asbestos related disease indicators*, May 2014, p. 9.

[98] Jackson D.F QC, Report pf the Special Commission of Inquiry into the Medical Research and Compensation Foundation September 2004, available at **http://www.ir.jameshardie.com.au/jh/asbestos_compensation/special_commission_of_inquiry.jsp#report**

15. Workplace exposure limits for asbestos

Under Australian WHS regulations exposures to hazardous workplace chemicals must be minimised, so far as reasonably practicable. Where a workplace exposure standard exists for a specific workplace chemical, that workplace exposure standard must not be exceeded. The Australian workplace exposure standard for asbestos is a respirable fibre level of 0.1 fibres per millilitre (fibres/mL) of air measured in a person's breathing zone, expressed as a time weighted average fibre concentration calculated over an eight-hour working day and measured over a minimum period of four hours.

Air monitoring must be carried out if there is uncertainty about whether or not the workplace exposure standard is likely to be exceeded when asbestos-related work is being carried out. Health monitoring is also required where asbestos-related work is ongoing and workers are at risk of being exposed to asbestos.

The following requirements apply when asbestos is being removed from a workplace. Friable asbestos can only be removed by a Class A licensed removalist and notice must be given to WHS regulators before the removal work commences. Friable asbestos must be removed in an enclosed area that is under negative pressure, where reasonably practicable. An independent licensed asbestos assessor must undertake air monitoring of the asbestos removal area.

Where respirable asbestos fibres are:

- at or more than 0.01 fibres/mL but not more than 0.02 fibres/mL – immediately investigate potential causes for the release of asbestos fibres, implement controls and prevent further releases
- more than 0.02 fibres/mL – immediately stop the removal work, notify the regulator, investigate potential causes for the release of asbestos fibres, implement controls and prevent further releases.

Where friable asbestos removal work is stopped in these circumstances, it must not recommence until air monitoring shows respirable asbestos fibre levels are less than 0.01 fibres/mL.

The removal of more than 10 square metres of non-friable asbestos and associated asbestos-contaminated dust requires a Class B licence. Air monitoring is generally not required where asbestos removal requires a Class B licence.[99]

A clearance certificate is required when any licensed asbestos removal work has been completed to ensure the area is safe for normal use. If air monitoring has been carried out during a clearance inspection then the respirable asbestos fibre level must be less than 0.01 fibres/mL.

Workplace exposure standards are only one aspect of asbestos safe work requirements. Regulators expect that duty holders will work below these standards by following asbestos workplace health and safety legislation and codes of practice.

[99] South Australia requires air monitoring during removal work undertaken by a class B licenced removalist.

16. The system for inspection and enforcement of the exposure limits

The inspection and enforcement of the exposure standard for asbestos only applies to workplaces. WHS Regulations require air monitoring to be carried out if there is uncertainty about whether the airborne concentration of asbestos fibres exceeds the exposure standard.

When asbestos is to be removed, the licensed asbestos removalist must give written notice to the WHS Regulator at least five days before commencing the removal work, or immediately by telephone if an event requires urgent removal. In Western Australia, notification is only required for Class A (friable) removal work. Approximately 70,000 removal work notifications were provided to WHS regulators across Australia during 2015–16, with the highest numbers in Victoria, NSW and Queensland.

Asbestos supervisors must be present for Class A removal work or be readily available (that is, contactable by phone and within 20 minutes of the worksite) for Class B work. In the ACT an asbestos supervisor must be present during Class A and Class B removal work, whereas in Western Australia there are no requirements for asbestos supervisors.

An independent licensed asbestos assessor must be engaged to undertake air monitoring (using the membrane filter method) during Class A removal work. In South Australia air monitoring is required for both Class A and B removal. When the asbestos removal is completed, a clearance inspection must be carried out by an independent competent person, or in the case of Class A removal work, a licensed asbestos assessor. The competent person or licensed asbestos assessor must issue a clearance certificate if they are satisfied that:

- the asbestos removal area, and the area immediately surrounding it, are free from visible asbestos contamination
- if air monitoring was undertaken as part of the clearance inspection, the monitoring shows asbestos levels below 0.01 fibres/ml.

The model WHS Regulations impose maximum penalties of $6000 for individuals ($30,000 for corporations) for a failure to comply with the clearance inspection and certificate requirements.

As described in Chapter 1, each jurisdiction has regulatory responsibility for monitoring compliance and enforcing the exposure limits under their WHS laws. This includes carrying out regular and targeted compliance audits of the asbestos removal industry to ensure asbestos requirements are being followed.

When necessary, statutory intervention is used to improve work practices involving asbestos. In addition to issuing improvement, prohibition and infringement notices, the regulators can initiate prosecutions against businesses that fail to meet their legislative duties. Asbestos removal licences can also be suspended or cancelled.

Examples of inspection and enforcement activities are provided in Table 8.

[102] ASEA *National Strategic Plan for Asbestos Management and Awareness Progress Report 2015–16*, October 2016, p. 26.

[101] Infringement notices are not available in Western Australia.

Table 8: Examples of compliance activities undertaken by WHS regulators

Jurisdiction	Asbestos inspection and enforcement activity
South Australia	Between 2012 and 2014, a joint compliance exercise was undertaken by SafeWork SA and the Environmental Protection Authority (EPA). Inspectors audited 71 licensed asbestos removalists during the compliance program, focusing on the minimisation of the release of respirable asbestos fibres into the environment and the safe storage, transit and disposal of asbestos waste. Inspectors issued 310 statutory notices to address non-compliance with legal requirements.[102]
Queensland	During 2015–16, work health and safety inspectors in Queensland carried out 342 audits on the work practices of licensed asbestos removalists. They also visited 730 workplaces to check asbestos registers and management plans were being maintained. Workplace Health and Safety Queensland has commenced a number of asbestos-related prosecutions, which highlight to the industry that a failure to use safe work practices when dealing with asbestos will not be tolerated. In addition, a two-day intermediate level training course on asbestos compliance and enforcement was delivered to Workplace Health and Safety Queensland's inspectors and advisors throughout the state. This has helped to ensure the inspectorate can effectively enforce asbestos laws.[103]
Victoria	During 2015, the work health and safety regulator conducted 1,464 asbestos related workplace visits, received 22,584 asbestos removal notifications and continued a pilot program with local government, distributing domestic asbestos removal kits for the renovation sector.[104]

In addition to enforcement of the exposure limits in workplaces, governments in each state and territory are undertaking awareness raising programs about the dangers of asbestos. For example, Betty – The ADRI House is a purpose built, mobile model home designed to demonstrate where asbestos might be found in and around Australian homes built or renovated before 1987. Betty visits various community events and is an awareness initiative of the NSW Asbestos Education Committee in partnership with the Asbestos Diseases Research Institute (ADRI).[105]

[102] Government of South Australia, SafeWork SA, *Asbestos Audit Project, Final Report 2014:* ***https://www.safework.sa.gov.au/uploaded_files/AsbestosAuditReport.pdf.***
[103] Queensland Government, Asbestos Strategy Report Card Three 2016, p. 1. **http://deir.qld.gov.au/asbestos/resources/pdfs/asbestos-strategy-report-card-three-2016.pdf**
[104] WorkSafe Victoria Annual Report 2015, p. 15.
[105] **http://asbestosawareness.com.au/betty-the-adri-house/**.

17. Estimated economic losses due to asbestos-related diseases

Asbestos-related diseases impose substantial costs on sufferers, their families, and the wider community and economy.[106] A recent study commissioned by ASEA quantified the following economic and social costs of asbestos-related disease in Australia for 2015.[106] It is important to note the limitations of this study most notably that it only estimates the health system and productivity costs associated with the physical asbestos of asbestos-related diseases. Some of the key costs that have not been quantified in this study include:

- costs to industry of managing asbestos in buildings
- governance, monitoring and reporting costs of implementing asbestos policies
- costs of mental ill health associated with asbestos-related disease (both sufferers, as well as family members)
- potential price impacts on the housing market associated with asbestos removal.

Health system costs

Patients and governments incur healthcare costs associated with asbestos-related diseases. Total health system costs related to asbestos-related disease are estimated at $185 million in 2015–16.

- Admitted patient hospital expenditure is estimated at $55.8 million. Average costs per separation are highest for patients with asbestosis ($21,867) and lowest for patients with mesothelioma ($5,172).
- Non-admitted patient expenditure on hospital costs is valued at $10.1 million, with most incurred for patients with lung cancer (73 per cent).
- General practitioner expenditure related to asbestos-related diseases is estimated at $22.4 million, and spending on specialists and other health practitioners is valued at $42.5 million, predominantly associated with lung cancer.
- Spending on pharmaceuticals is estimated at $54.2 million in 2015–16, 83 per cent of which is subsidised by the Australian Government through the Pharmaceutical Benefits Scheme (PBS), and the remainder incurred by patients in out-of-pocket costs.

Lost productivity costs

Living with an asbestos-related disease compromises an individual's ability to participate in the paid and unpaid workforce. Productivity losses also flow through to carers who are no longer able to participate in work and the community as they otherwise would.

These indirect effects are estimated at $321 million in 2015. Most losses (85 per cent) are due to disease caused by occupational exposure, with losses evenly shared between paid and unpaid work. Overwhelming, these costs arise due to the premature death of a person, rather than their disability.

The burden of living with an asbestos-related disease

Living with an asbestos-related disease is a burden for patients and their families, who experience a compromised quality of life. The concept of costs associated with reduced quality of life cannot be compared or added to other economic costs. However, they do signal the magnitude of disadvantage that patients endure. Over the lifetime of all patients with an asbestos-related disease, burden of disease costs are estimated to be $11 billion.

[106] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017.
[107] The Centre for International Economics, *The Economic Burden of Asbestos-related Disease*, ASEA Report, August 2017.

Compensation

Many sufferers of asbestos-related diseases have a right to obtain monetary compensation for their loss due to the disease.

Compensation payments act as a lower bound estimate of the costs of asbestos-related disease, as they are contained by statutory limits on payments, and difficultly in providing evidence of exposures that occurred many years ago. Not all cases of asbestos-related disease are compensated.

The following figures provide the average amounts awarded by James Hardie in 2013–14 and 2014–15 in settlement of common law claims.

Table 9: Average compensation amounts

Disease type	2014–15 compensation amounts	2013–14 compensation amounts
Mesothelioma	$301,275	$311,346
Asbestosis	$99,251	$98,795
Lung cancer	$134,262	$103,720

These figures should only be used as a rough indication of average compensation amounts. One major limitation is that James Hardie is not the only defendant facing common law claims. These amounts represent James Hardie settlements only.

Recommendation

There is an identified need for more research to quantify some of the other costs associated with asbestos-related diseases in Australia to gain a more robust understanding of its impact.

Each state and territory has its own workers' compensation scheme. Compensation is payable to a worker who suffers an injury or disease arising from, or during, his or her employment.

Compensation claims are usually pursued through the common law process instead of through statutory schemes for the following reasons:

- more generous entitlements are available than through workers' compensation
- self-employed workers are not covered by workers' compensation
- exposure to asbestos at multiple workplaces or in multiple jurisdictions makes receiving workers' compensation more complex
- exposure occurred in a non-occupational setting.

There are many differences between the jurisdictions in relation to their workers' compensation schemes, including how workers and work-relatedness is defined, the time limits for lodging a claim and the entitlements provided.[109]

[109] Safe Work Australia, *Comparison of Workers' Compensation Arrangements*, October 2016.

18. Major studies on epidemiology of asbestos-related diseases in Australia

Australia has seen pioneering research in the epidemiology of asbestos-related diseases, providing an evidence base to inform policy development and improving the diagnosis and treatment of these diseases.

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Appendix: Information and data deficiencies

It is acknowledged that significant research has been commissioned by the ASEA to help inform Australia's National Asbestos Profile. This information sets a benchmark against which to measure progress in the management of Australia's asbestos legacy.

While the reporting structure proposed by the WHO is focussed on work-related exposure, Australia's National Asbestos Profile includes information on non-occupational exposures to reflect the concerns in Australia about a rising third wave of asbestos exposure.

Preparing this National Asbestos Profile has, however, identified a number of insufficient or unreliable data sources on some of the topics that form the reporting structure. Further information and data will be valuable if aimed at informing policy and practice to reduce the risk of asbestos exposure and the future burden of asbestos-related disease.

The areas of uncertainty that may benefit from up-to-date data collection and further research are as follows:

- The estimated total number of workers previously and currently exposed to asbestos and estimated total number of workers at high risk of exposure.
- Estimates of the percentage of house stock containing asbestos. There is no comprehensive data on the amount of in-situ asbestos, its location and condition and the impact this has on the management of asbestos in Australia. A number of studies have attempted to provide estimates based on available data, including research by Donovan and Pickin (2016) referenced throughout.
- Total number of workers eligible for compensation for asbestos-related diseases and the number compensated per year.
- Although there is up-to-date national data on the incidence and prevalence of mesothelioma in Australia, there is less reliable data available on the incidence and prevalence of other diseases where asbestos exposure is noted as the cause, such as asbestosis and lung cancer.