Australian Government

National Occupational
Health and Safety Commission

Regulation Impact Statement

CODES OF PRACTICE AND GUIDANCE NOTE FOR ASBESTOS

CANBERRA
APRIL 2005

RIS approved by ORR (23/02/2005)

NATIONAL OCCUPATIONAL HEALTH AND SAFETY COMMISSION

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FOREWORD

In seeking to achieve Australian workplaces free from injury and disease, the National Occupational Health and Safety Commission (NOHSC) works to lead and coordinate national efforts to prevent workplace death, injury and disease. NOHSC seeks to achieve its mission through the quality and relevance of information provided, and to influence the activities of all parties with roles in improving Australia's occupational health and safety (OHS) performance.

In seeking to improve Australia's OHS performance, NOHSC works to:

- support and add value to efforts in the states and territories to tailor approaches to prevention improvement;
- facilitate, through strategic alliances, the development and implementation of better approaches to achieving improved prevention outcomes; and
- integrate the needs of small business into its work.

On 24 May 2002, the Workplace Relations Ministers' Council endorsed the release of the NOHSC *National OHS Strategy 2002-2012*. The Strategy was developed by the members of NOHSC and reflects their agreement to share responsibility for continuously improving Australia's performance in work related health and safety.

There are five initial national priority areas for action to achieve short-term and long-term improvements.

The priorities are:

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

This Regulation Impact Statement (RIS) has been prepared to fulfil Council of Australian Government (COAG) requirements to assess the impact on Australian governments, industry and community of declaring the revised NOHSC guidance material for asbestos.

The Australian Government Office of Regulation Review (ORR) assists COAG in reviewing and advising on draft RIS prepared by national regulatory bodies such as NOHSC.

The COAG Principles state that "the purpose of preparing a RIS is to draw conclusions on whether regulation is necessary, and if so, on what the most efficient regulatory approach might be" and "ensures that new or amended regulatory proposals are subject to proper analysis and scrutiny as to their necessity, efficiency and net impact on community welfare".

The RIS process emphasises the importance of identifying the effects of regulation on groups, and consideration of alternatives to the proposed regulation.[1]

In this RIS:

- Part One identifies the problem of asbestos and provides background information on the regulation of asbestos in Australia.
- Part Two sets out the objectives of revising the existing asbestos documents
- Part Three sets out the options considered
- Part Four sets out the costs and benefits associated with the options
- Part Five provides an evaluation of the options
- Part Six sets out the consultation undertaken
- Part Seven sets out the implementation and review process

1 COAG (2004), *Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies*. Accessed on 29/09/2004 at http://www.pc.gov.au/orr/reports/external/coag/index.html

CONTENTS

FOREWORD V

EXECUTIVE SUMMARY 1

PART 1. THE PROBLEM 6

1.1 Introduction 6

1.2 Exposure to asbestos 7

1.2.1 Asbestos containing products 7

1.2.1.1 Asbestos cement products 8

1.2.1.2 Insulations materials 8

1.2.1.3 Asbestos friction products 8

1.2.2 Occupational exposure 8

1.2.3 The risks of in situ materials in buildings and structures 11

1.2.3.1 Reported cases of asbestos-related diseases connected to the occupancy of work places containing friable, damaged and poorly maintained ACM 13

1.2.4 Extent of asbestos in the built work environment 14

1.2.5 Extent of asbestos in friction materials 15

1.3 Asbestos regulation and guidance materials in Australia 16

1.3.1 Background to asbestos regulation 16

1.3.1.1 Asbestos guidance material 16

1.3.1.2 Asbestos prohibition 16

1.3.1.3 National Exposure Standard 18

1.3.1.4 International comparison of asbestos regulation 18

1.4 Is there a 'market failure'? 19

1.5 How is the problem being addressed? 19

PART 2. OBJECTIVE 21

PART 3. OPTIONS 23

3.1 Option One — The *Status Quo* 23

3.2 Option Two — Declare revised asbestos guidance material 23

PART 4. COSTS AND BENEFITS 27

4.1 The costs associated with adverse health effects as a result of exposure to asbestos 28

4.1.1 Compensation and medical costs 28

4.1.2 Estimated lives lost and associated costs 31

4.1.2.1 The extent of exposure 33

4.1.2.1.1 Extent of exposure from friable, damaged or poorly maintained in situ ACM in the built work environment 33

4.1.2.1.2 Extent of exposure from asbestos friction products 35

4.1.2.1.3 Extent of exposure from maintenance and building tasks involving ACM 36

4.1.2.1.4 Extent of exposure during removal of ACM 37

4.1.2.2 Summary of exposures 38

4.1.2.3 Risk of disease and death 39

4.1.3 Summary of costs of asbestos-related disease 41

4.2 Option One — The Status Quo 42

4.2.1 Cost to business 42

4.2.2 Benefit to business 43

4.2.3 Cost to government 43

4.2.4 Benefit to government 43

4.2.5 Costs to general community 43

4.2.6 Benefit to general community 44

4.2.7 Implications for New Zealand 44

4.3 Option Two — Revise existing guidance 44

4.3.1 Cost to business 44

4.3.1.1 Cost from additional regulation under the Management Code 44

4.3.1.2 Cost from additional regulation under the Removal Code 49

4.3.1.3 Summary of Costs to Business 55

4.3.2 Overall benefits 57

4.3.3 Benefit to business 58

4.3.3.1 National consistency 59

4.3.3.2 Decreased employee exposure – compensation premiums 59

4.3.3.3 Presumption criteria: Material testing cost savings 59

4.3.4 Implications for Small Business 60

4.3.5 Costs to government 61

4.3.6 Benefit to government 61

4.3.7 Cost to general community 62

4.3.8 Benefit to general community 62

4.3.9 Implications for New Zealand *63*
4.4 Summary of options considered 63
PART 5. EVALUATION OF OPTIONS 69
5.1 Option One — The Status Quo 69
5.2 Option Two — Revise existing guidance 69
5.3 Recommended option 70
PART 6. CONSULTATION 71
6.1 Drafting of the new and revised Codes and Guidance Note 71
6.2 Public comment period 71
6.3 Workshops 71
6.4 Review of public comment 72
6.5 Cost issues raised during public comment 72
PART 7. IMPLEMENTATION AND REVIEW 75
APPENDIX A 77
APPENDIX B 83
APPENDIX C 95
APPENDIX D 99
APPENDIX E 103
APPENDIX F 107
APPENDIX G 111
APPENDIX H 113
APPENDIX I 117
APPENDIX J 119
GLOSSARY 121
REFERENCES 123

TABLES

Table 1: Summary of impacts of Option 1 **3**

Table 2: Summary of impacts of Option 2 **4**

Table 3: Mesothelioma risks in occupational groups **9**

Table 4: Occurrence of occupational exposures to asbestos – 1945-1985* **9**

Table 5: Occurrence of occupational exposures to asbestos – 1986-2000* **10**

Table 6: Level of risk associated with various exposure sources **12**

Table 7: Level of risk associated with the National Exposure Standard **13**

Table 8: Number of employer locations in victoria conatining ACM in 2004 **14**

Table 9: Number of employer locations by State and proportion containing asbestos– 2004[1] **15**

Table 10: Diseases linked to chrysotile and treatment costs per person **29**

Table 11: Compensated payments made to workers and beneficiaries of workers in NSW during the financial year 2002 – 2003 **30**

Table 12: Summary of figures used for estimating the number of workers in Australia that may be exposed to asbestos from the presence of friable, damaged or poorly maintained ACM in the built work environment * **34**

Table 13: Number of persons in Australia who may be potentially exposed to asbestos, by occupational grouping, 2004 **37**

Table 14: Summary of figures used for estimating the future number of lung cancer and mesothelioma cases that may occur in Australian workers as a result of working with asbestos in 2005 **40**

Table 15: Estimated cost of asbestos-related lung cancer and mesothelioma 2004-2030 **41**

Table 16: Proportionate breakdown of costs of mesothelioma and asbestos-related disease by employer, employee and community **42**

Table 17: New points of regulation and associated costs for the management code **45**

Table 18: New points of regulation, by jurisdiction, arising from the Management Code. **45**

Table 19: Costs to business associated with new points of regulation of the Management Code 46

Table 20: Asbestos labelling and signage costs 48

Table 21: Cost of regulation under the Management Code to business by State 49

Table 22: New points of regulation and associated costs for the Removal Code 50

Table 23: New points of regulation, by jurisdiction, arising from the Removal Code. 51

Table 24: Costs to business associated with new points of regulation of the Removal Code 52

Table 25: Plastic sheeting costs 54

Table 26: Average Cost of Regulation under the Removal Code to Business, per job, by State 55

Table 27: Summary of costs to business associated with Option 2 55

Table 28: Benefits from implementation of the Management Code 57

Table 29: Proportionate breakdown of employer, employee and community savings through lives saved 58

Table 30: Proportionate breakdown of continuing employer, employee and community costs through lives lost 58

Table 31: Savings to general community 63

Table 32: Comparison of costs for Option One and Option Two 64

Table 33: Summary of costs and benefits of Option 1 66

Table 34: Summary of costs and benefits of Option 2 67

Table 35: Comparison between different forms of asbestos 79

Table 36: Carcinogen classification of asbestos 84

Table 37: Number of mesothelioma cases in Australia 1945 – 31 March 2003 89

Table 38: Number of reported deaths dust disease cases in NSW — February 1968 – 2003 92

Table 39: Mesothelioma incidences and use of asbestos 93

Table 40: Gap analysis – Adoption of the 1988 Guide by Jurisdiction 96

Table 41: Gap analysis – Code of Practice for the Management and Control of Asbestos in Workplaces. 96

Table 42: Gap analysis – Adoption of the 1988 Removal Code by Jurisdiction 100

Table 43: Gap analysis – Code of Practice for the Safe Removal of Asbestos – Additional requirements for safe asbestos removal 100

Table 44: Gap analysis – Code of Practice for the Safe Removal of Asbestos – Common requirements for safe asbestos removal 102

Table 45: Extrapolation of the number of cases of mesothelioma and asbestos-related lung cancer 2005-2030 103

Table 46: Ongoing costs associated with the Management Code * 111

Table 47: Estimates of new cases of asbestos-related lung cancer and mesothelioma 2005-2030 119

EXECUTIVE SUMMARY

Asbestos is a known carcinogen and exposure to asbestos fibres is associated with increased incidences of a range of lung diseases including asbestosis (scarring of the lungs), lung cancer and mesothelioma (a cancer of the inner lining of the chest wall or abdominal cavity), which is a formerly rare form of cancer that has become increasingly common due to asbestos usage. Asbestos–related lung cancer and mesothelioma are typically fatal. Mesothelioma has no cure with almost all cases dying within 2 years of diagnosis. Australia has the highest incidence of mesothelioma in the world. A total of 8,191 cases of mesothelioma have been reported in Australia during the period 1945 to 30 June 2004. Recent extrapolations based on data, up to the year 2000, for previous exposures to asbestos estimate that the total number of mesothelioma cases in Australia from 1945 to 2020 is likely to be approximately 18,000. Similarly, estimates of asbestos-related lung cancer indicate diagnosed cases of between 30,000 and 40,000 by 2020.

Asbestos was extensively used throughout Australia in a wide variety of applications during the 1960s and 1970s, ranging from basic building materials such as asbestos cement sheeting (fibro) and thermal insulation, to gaskets and brake pads for vehicles and machinery. Raw asbestos was mined in Australia until 1983. In the mid 1980s, the use of crocidolite (blue) and amosite (brown) asbestos was banned in Australia, following this, the use of asbestos in building and construction materials declined in the late 1980s and had virtually ceased by 1990. However, the importation of raw chrysotile (white) asbestos and chrysotile asbestos products continued until 31 December 2003. Raw chrysotile imports were predominantly used in the production of friction products (i.e. brake pads and linings) and compressed asbestos fibre (CAF) sheeting for the manufacture of gaskets. The majority of imported chrysotile products were brake linings/pads and clutch facings.

Since 1988, NOHSC has provided a package of guidance material to help minimise occupational exposures to asbestos. This package included the *Guide to the Control of Asbestos Hazards in Buildings and Structures* [NOHSC 2002(1988)] (1988 Guide), the *Code of Practice for the Safe Removal of Asbestos* [NOHSC 2002(1988)] (1988 Removal Code) and the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Fibre* [NOHSC 3003(1988)] (1988 MFM Guidance Note).

In 2001, NOHSC declared a prohibition on all uses of chrysotile asbestos to take effect from December 31 2003. The objective of the prohibition is to reduce future death and illness resulting from exposure to asbestos fibres. The prohibition of uses includes manufacture, processing, sale, storage and re-use of asbestos and materials containing asbestos. Some time limited exemptions to the prohibition apply. The prohibition also consolidates previous prohibitions on the use of other forms of asbestos. The prohibition does not extend to asbestos containing materials in place (in situ) at the time prohibition took effect. For this reason, many asbestos products that were used in the past are still present in the community.

In July 2003 NOHSC declared a revised national exposure standard (NES) of 0.1 fibres/mL for chrysotile asbestos, bringing it in line with the NES for other forms of asbestos. Around this time, NOHSC also began revising the 1988 guidance material for asbestos.

In October 2003, NOHSC agreed to review the 1988 guidance material for asbestos to ensure the technical accuracy of the documents. Two options were considered as part of this review. The first option considers maintaining the status quo. That is, continue with the current 1988 guidance material for asbestos and not provide new/additional guidance to manage and control expose to airborne asbestos fibres from in situ ACM.

The second option includes revising the 1988 Removal Code and 1988 MFM Guidance Note, and upgrading the 1988 Guide to a Code of Practice.

Both options have been assessed for their impact on government, industry and the community. The outcomes of this assessment are outlined in Table 1 and Table 2 . Based on the findings from this assessment, Option Two, to revise the existing guidance for asbestos, is the recommended option.

Regardless of the monetary value of each option, the significant factor in these two options is the reduction in the number of new cases of asbestos-related lung cancer, mesothelioma and other diseases which could be expected to occur as a result of Option Two.

Under Option One, as a result of work-related exposure to asbestos, it was estimated that a further 341 cases of asbestos-related lung cancer and mesothelioma could be expected to occur up to 2030 as a result of work with asbestos. By comparison, under Option Two, the number of new cases of asbestos-related lung cancer and mesothelioma that could be expected to occur over the same period is 185. This amounts to a reduction of 156 cases.

Revising the 1988 Removal Code and MFM Guidance Note and upgrading the 1988 Guide to a Code of Practice will increase the costs to industry of managing the risks associated with the presence of friable and non-friable forms of asbestos in the workplace.

The average cost to business of complying with the additional requirements of the Management Code in the first year of operation is estimated at between $843.75 (SA) and $4,580.50 (QLD). The average additional cost, per job, for all forms of asbestos removal under amendments to the Removal Code is estimated at up to $1,042.05 (WA, TAS, NT and ACT). The average additional cost, per job, for friable asbestos removal work is estimated at between $2,587.50 (QLD, NSW) and $2703 (other States and Territories).

However, it will also reduce the incidence of asbestos-related lung cancer and mesothelioma arising from in-situ asbestos. The medical and compensation costs avoided by the prevention of each case of mesothelioma are estimated at $667,000. Academic studies of the 'value of a statistical life' suggest that the benefits of reduced incidence of asbestos-related cancer and mesothelioma may be closer to $3.8 million per case avoided. But even these studies have their limitations. The length of morbidity, prognosis and 'fear' factor associated with an illness (such as asbestosis and mesothelioma) also affect society's willingness to pay to reduce the risks of contracting the disease. On this basis, the benefits flowing from the package of revisions are likely to exceed the costs.

TABLE 1: SUMMARY OF IMPACTS OF OPTION 1

	Government	Industry	Community	Comment
Benefit	• No benefit • There is no anticipated impact of this option for New Zealand.	• No benefit	• No benefit	• There are no anticipated benefits to be gained by maintaining the status quo.
Cost	• State and Territory governments required to develop and maintain guidance to address shortfalls in the current guidance material. • Duplication of guidance material requires duplication of resources spent. • There is no anticipated impact of this option for New Zealand.	• Industry costs associated with identifying and addressing shortfalls in the current guidance material. • Estimated costs of between approximately $6.82 million and $62.4 million associated with workers compensation and medical costs for workers contracting asbestos-related lung-cancer and mesothelioma. • It was not possible to estimate the costs of other asbestos-related diseases and conditions such as asbestosis and pleural plaques.	• 341 lives at an estimated value of between $220.62 million and $2.017 billion. • Costs of pain and suffering to workers contracting an asbestos-related disease. It is not possible to estimate these costs. • Social costs as a result of fear and concern for family and friends exposed to asbestos. It is not possible to estimate these costs.	• By maintaining the status quo at least 341 new cases of asbestos-related lung cancer and mesothelioma could be expected to occur as a result of exposures over the next 25 years. This could cost the Australian economy between $227.45 million and $2.08 billion.
Overall Benefit/Cost	• The average overall costs of maintaining the status quo are approximately 341 lives and $1.2 billion over the next 25 years.			

TABLE 2: SUMMARY OF IMPACTS OF OPTION 2

	Government	Industry	Community	Comment
Benefit	• Most States and Territories have adopted the 1988 Code, Guide and Guidance Note into their regulations, therefore revised NOHSC documents should not significantly impact on costs associated with updating jurisdictional regulation beyond the cost of adoption and provision of advice to business. • Costs to the Australian Government to date has been approximately $160,000 in consultant and administration costs. • There is no anticipated impact of this option for New Zealand.	• Increased national consistency of asbestos regulation and an associated decrease in costs relating to ensuring compliance with multiple regulations. • Savings of between $3.12 million and $28.55 million as a result of reduced cases of asbestos-related lung cancer and mesothelioma. • It was not possible to estimate savings from a reduction in other asbestos-related diseases and conditions such as asbestosis and pleural plaques. • Reduced insurance premiums. This value could not be calculated. • Provisions exist in the proposed regulations to alleviate the impact on small business (i.e. presumption criteria).	• Greater consistency in the management, control and removal of in situ asbestos, leading to improved health and safety outcomes. Over the period 2005-2030 at least 156 cases of asbestos-related lung cancer and mesothelioma will be prevented, thereby saving at least 156 lives at a value of between $104.05 million and $951.6 million. Of these savings between $45.78 million and $418.7 million will be saved by employees, their families and carers, and between $55.15 million and $504.35 million by the community in general. The remaining portion is a saving to industry. • It was not possible to calculate the community benefits that may be gained as a result of decreased fear, pain, suffering and anguish for asbestos-disease sufferers, their family, friends and the community or the quality of those lives and their potential contributions to the community.	• By implementing Option Two at least 156 cases of asbestos-related lung cancer and mesothelioma could be expected to be prevented as a result of reduced exposures to asbestos over the next 25 years. This could save the economy between $104.05 million and $951.6 million.
Cost	• Nationally consistent OHS model for asbestos regulation. • Fulfil Australian Government stated objectives to reduce the incidence and severity of occupational injury and disease. • There is no anticipated impact of this option for New Zealand.	• Total costs of approximately $1.76 billion over 13 years to 2018 with approximately $893.02 million of this total relating to the initial implementation of the Codes and the remaining portion relating to ongoing costs associated with the management and removal of in situ ACM.	• Possible increase in costs of services for asbestos removal to owners of domestic premises as a result of more stringent requirements for asbestos removalists. These costs could not be calculated. • Continuing costs to the community of between $119.7 million and	• Implementation of Option Two is expected to incur operational costs of approximately $1.76 billion over the next 25 years. • Continuing costs due to the 185 remaining cases of asbestos-related disease are expected to be between $123.4 million and $1.128 billion.

		• Costs for individual businesses will vary according to the size of the workplace and number of work sites; number of employees; degree of OHS training previously provided; training provider costs; degree of reliance on external consultants to undertake the required work; the extent to which ACM is present and the amount to be removed; the type of ACM to be removed; and individual state and territory waste disposal costs. • The MFM Guidance Note is not expected to incur any additional costs.	$1.09 billion due to 185 new cases of asbestos-related disease.	
Overall Benefit/Cost	• The average overall costs from Option Two are the loss of 185 lives and $2.4 billion over the next 25 years. • The average cost to business of complying with the additional requirements of the Management Code in the first year of operation is estimated at between $843.75 (SA) and $4,580.50 (QLD). The average additional cost, per job, for all forms of asbestos removal under amendments to the Removal Code is estimated at up to $1,042.05 (WA, TAS, NT and ACT). The average additional cost, per job, for friable asbestos removal work is estimated at between $2,587.50 (QLD, NSW) and $2703 (other States and Territories). • Revising the 1988 Removal Code and MFM Guidance Note, and upgrading the 1988 Guide to a Code of Practice, will result in the prevention of at least 156 cases of asbestos-related lung cancer and mesothelioma over the next 25 years. The overall benefits from Option Two are the saving of at least 156 lives and between $104.05 million and $951.6 million over the next 25 years. Since asbestos-related lung cancer and mesothelioma typically result in death, the prevention of these diseases equates to the saving of at least 156 lives.			

PART 1. THE PROBLEM

1.1 Introduction

Asbestos is a generic term for a group of six naturally occurring, fibrous[2] silicate minerals that have been widely used in commercial products. Asbestos is a versatile mineral, which because of its composition and fibrous structure, possesses good insulation capabilities and a high resistance to heat. It is these qualities that made it such an attractive material in the manufacture of an array of building, textile and other products throughout most of the 20th century. Appendix A provides more detailed information on the physical composition and properties of asbestos.

Asbestos is thought to have had more than 3,000 applications worldwide, and was used extensively throughout Australia. Asbestos usage in Australia peaked at approximately 73,192 tonnes in 1975.[3] Many asbestos products that were used in the past are still present (in situ) in the community. It is estimated that approximately 25 percent of all houses built in Australia until the 1960's were clad in asbestos cement sheeting. Appendix A provides more information on the production and historical use of asbestos products in Australia.

Asbestos is known to cause cancer in humans and exposure to asbestos can cause asbestosis (scarring of the lung tissue), lung cancer and mesothelioma along with other related health effects. There is no known safe level of exposure. Unlike many occupational diseases, there is a long latency period before asbestos-related disease manifests. This may extend to 20 or 30 years, or, in the case of mesothelioma, as long as 40 or 50 years. The current incidence of asbestos-related diseases is therefore a measure of exposure to asbestos fibres many years ago.[4] Appendix B provides more detailed information on the health effects of exposure to respirable asbestos fibres and the incidence of asbestos related disease in Australia.

Each year hundreds of Australians die from asbestos related diseases as a result of previous exposure. As in-situ material is disturbed or removed in the future, there is potential for people to be exposed to respirable asbestos fibres and, as a result of that exposure, contract asbestos related diseases.

This problem is exacerbated where workers who are likely to disturb asbestos containing materials are unaware that the material contains asbestos and therefore do not put in place appropriate precautions to minimise the generation of respirable asbestos fibres. The generation of airborne asbestos fibres can in turn contaminate buildings and the environment and therefore expose members of the broader community to the risk of contracting asbestos related diseases.

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2 Serpentine and amphibole minerals also occur in non-fibrous or non-asbestiform forms. These non-fibrous minerals, which are not asbestos, are much more common and widespread than the asbestiform varieties.

3 Virta RL (2003), '*Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000*', US Geological Survey – Open-file Report 2003-83, US Department of the Interior. Accessed on 10/09/2004 at http://pubs.usgs.gov/of/2003/of03-083/of03-083.pdf

4 ibid

1.2 Exposure to asbestos

1.2.1 Asbestos containing products

Because of its extraordinary tensile strength and other physiochemical properties asbestos was commonly incorporated into a range of building, insulation, friction and other materials for use in textiles, construction, vehicles and plant throughout the majority of the twentieth century. Some products manufactured prior to the 2003 asbestos prohibition that may contain asbestos include:

- Fire blankets and curtains
- Shingles or tiles (external or ceiling)
- Pipes, tubes or fittings (eg flue pipes)
- Insulation in heaters
- Insulation in stoves
- Lagging on pipes
- Electrical cloths and tapes
- Textured paints and coatings
- Asbestos bitumen products used to damp-proof
- Compressed asbestos fibre gaskets and seals
- Rubberised or polymerised asbestos gaskets and seals
- Floor coverings (eg vinyl asbestos tiles)
- Compressed asbestos cement sheeting (fibro cement or 'AC' sheeting)
- Gaskets
- Ceiling insulation products
- Asbestos tape / rope
- Lagging and jointing materials
- Insulation on hot water pipes
- Brake pads
- Electrical panel partitioning
- Clutch facings
- Corrugated asbestos cement roofing sheets
- Mastics, sealants, putties and adhesives
- The backings of linoleum floor coverings
- Heat resistant sealing and caulking compounds

Asbestos materials can take two general forms:

(a) *Friable* material, which when it is subjected to even a small amount of pressure, can produce a fine dust or powder containing respirable asbestos fibres.

Without jacketing, coverings, or some other form of containment, friable asbestos poses a serious health hazard. Friable ACM is found in items such as sprayed insulation and lagging for pipes and appliances (e.g. stoves and heaters), and in ceilings and wall cavities.

(b) *Bound (non-friable)* material, which is captured in a matrix of other materials such as cement or vinyl. Examples of non-friable ACM include all asbestos cement products, paint, mortars, and a range of insulation products.

Depending on the strength of the matrixes involved, non-friable ACM can become friable if disturbed through, for example, weathering, machining (i.e. sawing or sanding) and damage. This is the case with ACM such as brake pads and gaskets.

1.2.1.1 Asbestos cement products

In the manufacture of asbestos cement products asbestos was mixed with cement to make lighter and stronger commercial and domestic building materials.

In general the matrixes in these products tend to be quite strong with asbestos dust only being released when the products are damaged, weathered or machined.

1.2.1.2 Insulations materials

Asbestos was commonly incorporated into a range of insulation products. One such product was fire insulation foam. This foam was sprayed on steel beams of buildings as a means of preventing the beams from buckling during a fire.

The matrixes within these insulation products tend to be weaker than those in asbestos cement products and asbestos insulation materials have a tendency to dry out and crumble, becoming extremely friable.

1.2.1.3 Asbestos friction products

Asbestos has been used in an array of friction products such as gaskets and brake linings in vehicles and in heavy machinery and plant because of its resistance to heat. As with asbestos cement products, these products tend to be quite strong however they may become friable and release asbestos dust when worn or weathered, such as during braking or from continued degradation in plant or machinery.

1.2.2 Occupational exposure

Table 3 outlines the lifetime risk of mesothelioma to workers in certain occupational settings. This information is based on data obtained through the Australian Mesothelioma Register for the period 1986 to 2000. Workers in these occupations were most likely to have been exposed to asbestos through the tasks outlined in Table 4.

TABLE 3: MESOTHELIOMA RISKS IN OCCUPATIONAL GROUPS[5]

Occupation	Lifetime Risk of Mesothelioma (%)
Wittenoom mine or mill worker	16.6
Power Station Worker	11.8
Railway Labourer	6.4
Navy/Merchant Navy	5.1
Wittenoom Town	3.1
Carpenter/Joiner	2.4
Waterside Worker	2.1
Plasterer	2.0
Boiler Maker/Welder	1.9
Bricklayer	1.8
Plumber	1.7
Painter/Decorator	1.2
Electrical Fitter, Mechanic Electrician	0.7
Vehicle Mechanic	0.7
All Australian Men	*0.39*
All Australian Women	*0.07*

TABLE 4: OCCURRENCE OF OCCUPATIONAL EXPOSURES TO ASBESTOS – 1945-1985*[6]

Occupational Exposure	Proportion of reported cases (%)
Repair and maintenance of asbestos materials	18
Para occupational, hobby and environmental	15
Shipbuilding	11
Asbestos cement production	7
Asbestos cement use	7
Railways	6
Wittenoom crocidolite mining/milling	6
Insulation manufacture/installation	4
Wharf labouring	3
Power stations	3
Boilermaking	2

* This table only includes exposures that contributed to 2 percent or greater of the total reported cases for the period.

5 Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', *Journal of Occupational Health and Safety Australia and New Zealand*, 17(5): 453-470

6 ibid

As can be seen from Table 3 and Table 4, if asbestos exposures associated with Wittenoom are discounted, exposure to asbestos fibres occurred predominantly during the processing of raw asbestos and the manufacture and end use of asbestos products. However, when more recent data from the Australian Mesothelioma Register is observed (see Table 5), the indication is that this trend is shifting to product, domestic, environmental and para-occupational exposures.[7] This shift can be attributed to the decline in the processing of asbestos and manufacture of asbestos products throughout the 1970's and 1980's, which occurred as a result of mounting evidence of the adverse health effects attributed to asbestos and the development of safer alternatives.

TABLE 5: OCCURRENCE OF OCCUPATIONAL EXPOSURES TO ASBESTOS – 1986-2000*[8]

Occupational Exposure	Proportion of reported cases (%)
Repair and maintenance of asbestos materials	13
Multiple exposures	12
Builder	6
Wittenoom	5
Para occupational, hobby and environmental	4
Carpenter	4
Asbestos cement production	4
Shipbuilding	3
Railways	3
Navy	3
Boilermaking	3
Power stations	3
Brake linings	2
Plumber	2
Wharf labouring	2

* This table only includes exposures that contributed to 2 percent or greater of the total reported cases for the period.

If this trend is considered in conjunction with the prohibition on the use of asbestos (see section 1.3.1.2), then it becomes evident that the majority of future exposures are likely to occur in situations where the prohibition does not apply, namely in situ ACM. Future exposure to asbestos fibres can therefore be expected to occur during operations relating to the:

- removal of ACM from buildings and structures, plant and equipment and automobiles;

[7] ibid
[8] ibid

- demolition of structures and plant containing ACM; and
- maintenance of in situ ACM.

Since some of the occupational exposures outlined in Table 5 either no longer exist or the tasks typically no longer involve the use of ACM (such as shipbuilding, navy, railways and wharf labouring) these activities are likely to include, the following occupations[9]:

- asbestos removalist;
- demolition contractor;
- carpenter;
- builder;
- plumber; and
- electrician.

Automotive mechanics are also likely to be exposed due to the use of chrysotile asbestos in automotive components such as brakes and gaskets.[10] Additionally, employees and others could potentially be exposed to asbestos where ACM are present in the workplace and become damaged or friable. Indeed, Table 4 and Table 5 indicate that environmental and para-occupational exposure has been a major source of exposure to asbestos fibres in previous years.

1.2.3 The risks of in situ materials in buildings and structures

The presence of both friable and non-friable ACM can represent a significant risk to the health of occupants of work places if the materials are not properly maintained and/or removed in an appropriate manner.

Listed below are five possible sources of exposure to asbestos within built work environments:

- Presence of naturally occurring atmospheric levels of asbestos;
- Natural decay of ACM;
- Presence of damaged ACM;
- Building or maintenance work involving ACM; and
- Removal of ACM.

Table 6 shows the levels of asbestos exposure that can arise from different sources in the work environment and measures of the associated lifetime risk of lung cancer. Risk estimates are based on the incidence of lung cancer, as this is the overriding risk from

9 WorkSafe Victoria (2002), *Regulatory Impact Statement – Proposed Occupational Health and Safety (Asbestos) Regulations 2003*.

10 WorkSafe Victoria (2002), *Regulatory Impact Statement – Proposed Occupational Health and Safety (Asbestos) Regulations 2003*.

asbestos exposure and insufficient dose-response data exists to estimate risks of mesothelioma.[11]

TABLE 6: LEVEL OF RISK ASSOCIATED WITH VARIOUS EXPOSURE SOURCES [12]

Exposure source	Exposure levels in fibres/ml	Risk of Lung Cancer*
Natural atmospheric levels	0.0005f/m – 0.002 l [13]	<0.1 – 0.35
Maintenance work on ACM	0.00 – 0.228 [14]	0 – 39
Damaged ACM	0.001 – 4 [15]	0.2 – 692
Gasket removal	0.0008 – 4.58 [16]	0.1 – 792
Brake service on cars	0.003 – 37.5 [17]	0.5 – 6,488
Uncontrolled removal of ACM	10 – 100 [18]	1,730 – 17,300

* Cumulative risk for lung cancer per 100,000 lifetimes.

Table 6 indicates that exposures levels may reach up to 100 fibres/ml during the uncontrolled removal of ACM. However, if business is assumed to comply with the current national exposure standard (NES) for asbestos of 0.1 fibres/ml then exposures above the NES will not occur. While it is assumed that business is compliant with the NES, where people are not aware of the existence of asbestos in materials, there is likelihood that where ACM is disturbed people will be exposed to levels of asbestos fibres in excess of the NES.

Table 7 provides an indication of the level of risk associated with exposure at the maximum NES for asbestos

11 NICNAS (1999), Chrysotile Asbestos, Priority Existing Chemical No. 9, Full Public Report.

12 NOSHC (2001), NOHSC Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

13 Corn, M., 'Airborne Concentrations of Asbestos in Non-occupational environments', *Annals of Occupational Hygiene*, 1994, Vol. 38, No. 4, pp. 495-502

14 ibid

15 Ganor, E. et al, 'Extreme airborne asbestos concentrations in a public building', *British Journal of Industrial Medicine*, 1992, Vol. 49, p.486-488.

16 NICNAS (1999), Chrysotile Asbestos, Priority Existing Chemical No. 9, Full Public Report.

17 NICNAS (1999), Chrysotile Asbestos, Priority Existing Chemical No. 9, Full Public Report.

18 Health Effects Institute-Asbestos Research (HEI-AR), Asbestos in public and commercial buildings: A literature review and synthesis of current knowledge – Executive Summary, 1991. Accessed on 20/09/2004 at http://www.asbestos-institute.ca/reviews/hei-ar/hei-ar.html

TABLE 7: LEVEL OF RISK ASSOCIATED WITH THE NATIONAL EXPOSURE STANDARD[19]

Year	Exposure Standard (fibres/ml)	Risk of Lung Cancer (per 100,000 persons exposed)
1988	1	173
2003	0.1	17

1.2.3.1 Reported cases of asbestos-related diseases connected to the occupancy of work places containing friable, damaged and poorly maintained ACM

In a number of epidemiological studies a direct link has been drawn between poor maintenance and removal practices of ACM and incidences of mesothelioma among building occupants.

For example, in a study of asbestos-related mesotheliomas in four American school teachers, whose only exposure to asbestos was from building products used in the construction of their work places, a direct connection has been made between poor maintenance practices for, and the uncontrolled removal of, ACM and the development of mesotheliomas among building occupants.[20]

In one of the four cases, a female teacher, in 1970, was ‘continuously exposed’ to asbestos dust while a demolition project was being undertaken in a room adjacent to where she taught. She was later diagnosed with malignant mesothelioma in 1985. When the ACM from the school was analysed it was found to contain between 30–100 percent chrysotile asbestos, with two samples containing 50-60 percent and 70-80 percent amosite respectively.

In another case a 43 year old teacher, who taught in a room where the asbestos containing ceiling panels were so badly damaged that chunks, powder, and ‘pieces that were like powder’ repeatedly fell into the classroom, was diagnosed with malignant mesothelioma in 1985. The teacher died in 1990 after a period of treatment that included the surgical removal of parts of her anterior chest wall, iridium implants, and chemotherapy.

Cases of mesothelioma among non-teacher building occupants were also noted in this study and included the case of an accountant, a computer programmer and a cleaning person. As with the teachers the only documented exposure to asbestos these mesothelioma sufferers had was to the ACM in their workplaces.[21]

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19 NOSHC (2001), NOHSC Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

20 Lilienfeld, D.E., ‘Asbestos–Associated Pleural Mesothelioma in School Teachers: A Discussion of Four Cases’, The third wave of asbestos disease: exposure to asbestos in place, *Annals of the New York Academy of Science*, Volume 643, The New York Academy of Science, 1991,pp.454-464.

21 Lilienfeld, D.E., ‘Asbestos–Associated Pleural Mesothelioma in School Teachers: A Discussion of Four Cases’, The third wave of asbestos disease: exposure to asbestos in place, *Annals of the New York Academy of Science*, Volume 643, The New York Academy of Science, 1991,pp.454-464., p.456.

In another study that examined the incidence of mesothelioma among Wisconsin school workers research concluded that "individuals occupationally exposed to in situ ACM are at risk for the subsequent development of mesothelioma"[22], and that the presence of damaged or friable ACM in workplaces "represents a serious concern and underscores the need for strict operations and maintenance programs including the repair and/or removal of such material".[23]

1.2.4 Extent of asbestos in the built work environment

Despite the fact that a general prohibition against the mining, importation and use of asbestos in any manufacturing process or product came in to force in Australia on December 31 2003, an enormous amount of ACM remains in situ in Australian workplaces.

Given that a large number of buildings still contain ACM, the maintenance, management and, where required, removal of these materials represents a significant occupational health and safety issue for the owners and occupants of buildings containing ACM.

In 1990, in Victoria alone, it was estimated that there were approximately 235,000 employer locations[24]. Of these, between 50 and 75 percent were estimated to contain ACM[25]. Utilising an average of 62.5%, it can be estimated that in 1990 there were approximately 146,875 employer locations that potentially contained ACM. If the average life of a building is assumed to be 40 years, this means that approximately 2.5% of buildings are demolished per year.[26] Thus over the 15 year period from 1990 to 2005, 37.5% of ACM containing buildings were demolished, leaving 91,797 Victorian employer locations that contain ACM as at 2005.

Table 8 provides a summary of the figures presented above.

TABLE 8: NUMBER OF EMPLOYER LOCATIONS IN VICTORIA CONATINING ACM IN 2004

Number of employer locations in Victoria in 1990	235,000
Average percentage of employer locations estimated as containing ACM	62.5%
Number of employer locations in Victoria containing ACM in 1990	146,875
Percentage of buildings demolished during period 1990-2005	37.5%
Number of employer locations in Victoria containing ACM in 2005	**91,797**

If the estimated 91,797 Victorian employer locations that contain ACM as at 2005 are compared with the estimated 325,900 total employer locations in Victoria in 2005 (see Table 9), then it can be estimated that approximately 28.2% of workplaces in 2005 still contain ACM. If this percentage is applied to the 2005 estimates of the number of workplaces in

22 Anderson, H. et al, 'Mesothelioma among employees and the likely contact with in-place asbestos-containing building materials', The third wave of asbestos disease: exposure to asbestos in place, *Annals of the New York Academy of Science*, Volume 643, The New York Academy of Science, 1991,pp.570.

23 Ibid

24 WorkSafe Victoria (2003), Regulatory Impact Statement: Proposed Occupational Health and Safety (Asbestos) Regulations 2003, Victoria WorkCover, 2003.

25 ibid

26 ibid

Australia, then it is possible that approximately 373,385 workplaces still contain ACM in 2005.

Table 9 below provides an account of the number of businesses in Australia in 2000-01, by state, and estimates of the number of businesses in Australia in 2005. These figures provide an estimate of the minimum number of workplaces in Australia, as some businesses will have more than one workplace.

TABLE 9: NUMBER OF EMPLOYER LOCATIONS BY STATE AND PROPORTION CONTAINING ASBESTOS– 2004[1]

	Total Number of Employing Businesses (2000-01) [1]	Estimated Number of Employing Businesses (2005) [2]	Estimated Number of Employing Businesses containing ACM (2005)[3]
NSW	384,100	437,400 (33%)	123,203
Vic	286,200	325,900 (24.6%)	91,797
Qld	224,600	255,800 (19.3%)	72,052
SA	83,500	95,000 (7.2%)	26,759
WA	130,500	148,600 (11.2%)	41,857
Tas	24,700	28,100 (2.1%)	7,915
NT	9,800	11,200 (0.8%)	3,155
ACT	20,700	23,600 (1.8%)	6,647
Total	**1,164,100**	**1,325,600 (100%)**	**373,385**

1 ABS Australian Bureau of Statistics (2001), 1321.0. *Small Business in Australia*.

2 During the period 1990-91 to 2000-01, the average annual rate of growth in the number of businesses was 3.3%. Assuming that the average rate of growth continued up to 2005, the number of employing businesses in 2004 was estimated by applying the 3.3% average growth rate to the number of employing businesses in 2000-01. See ABS Australian Bureau of Statistics (2003), *Year Book Australia 2003.* Accessed on 21/01/2005 at http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/3474CE916E52A361CA256CAE0010BBF6 .

3 These figures were calculated by applying the calculated 28.167229% (28.2% rounded) estimate of the percentage of the number of employer locations containing asbestos in Victoria in 2005.

4 Excludes the Agriculture, Forestry and Fishing industry.

5 These figures were calculated by applying the proportion of small businesses, as compared to all businesses, to the estimated number of businesses in 2004.

1.2.5 Extent of asbestos in friction materials

It is not possible to estimate the number of brake linings and gaskets that remain in situ. The use of chrysotile friction products has gradually declined throughout the 1990s, although the amount that continued to be imported into Australia until prohibition was still significant.

Approximately 770,550 asbestos brake linings and gaskets were imported in 1998 for industrial uses and passenger cars[27], however, approximately 99% of all clutch facings and brake linings are now thought to be asbestos free[28].

[27] NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report.

Asbestos friction products were predominantly imported for use in the automotive aftermarket where asbestos friction products continued to be used in older vehicles. This, together with the fact that 36% of all motor vehicles in Australia were manufactured prior to 1990[29] makes it likely that a large number of asbestos friction products remain in situ.

1.3 Asbestos regulation and guidance materials in Australia

1.3.1 Background to asbestos regulation

In 1993, NOHSC released a package of regulations, standards and codes of practice known as the National Hazardous Substances Regulatory Framework (HSRF). The package is a blueprint for the legislative control of hazardous substances used in the workplace and addresses issues and requirements such as:

- control measures;
- labelling;
- material safety data sheets (MSDS);
- exposure standards;
- classification and scheduling; and
- health surveillance.

The HSRF has been adopted by all jurisdictions, to provide a national approach to the control of hazardous substances in the Australian workplace, including asbestos.

In addition to hazardous substances legislation enacted by the Commonwealth, States and Territories, asbestos is also regulated under dangerous goods (transport) and environment legislation. Local governments also have specific requirements for building and construction work involving asbestos.

1.3.1.1 Asbestos guidance material

In May 1988, against a background of increased public concern over the health risks resulting from exposure to asbestos at work, NOHSC declared three guidance documents for asbestos; the *Guide to the Control of Asbestos Hazards in Buildings and Structures* (1988 Guide); the *Code of Practice for the Safe Removal of Asbestos* (1988 Removal Code), and the *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust* (1988 Guidance Note). These documents were released as a package.

1.3.1.2 Asbestos prohibition

Up until 2004, prohibitions on the use and import of asbestos did not generally include chrysotile, and in some cases specifically excluded chrysotile. On 17 October 2001, after wide consultation and with the support of all Australian governments, the NOHSC declared, under Section 38 of the NOHSC Act, an amendment to Schedule 2 of the *National Model Regulations for the Control of Workplace Hazardous Substances* [NOHSC: 1005 (1994)] to include the prohibition of all uses of chrysotile from 31 December 2003, with some time limited exemptions. The prohibition consolidates existing prohibitions on crocidolite (blue)

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28 ibid

29 Australian Bureau of Statistics (2003), 9309.0 *Motor Vehicle Census, Australia*. Accessed on 21/10/2004 at http://www.abs.gov.au/Ausstats/abs@.nsf/Lookup/06D0E28CD6E66B8ACA2568A900139408

amosite (brown), actinolite, anthophylite and tremolite asbestos. The 31 December 2003 prohibition date was chosen to give workplaces time to prepare for the ban. The prohibition was widely publicised by the occupational health and safety authorities in each state and territory and by NOHSC.

The objective of the prohibition is to reduce future death and illness resulting from exposure to asbestos fibres. The prohibition of uses includes manufacture, processing, sale, storage and re-use of asbestos and materials containing asbestos.

The prohibition specifically applies to workplace use and the importation/exportation of asbestos and asbestos products, however the scope of the prohibition contains limits. It does not apply to the use of asbestos in some specific circumstances. As such, an exemption to use asbestos in these circumstances is not required. For chrysotile asbestos the prohibition does not apply in the following circumstances:

- for bona fide research or analysis[30];
- when handled for storage awaiting disposal;
- for removal or disposal[31];
- where encountered during non-asbestos mining; or
- asbestos products in situ[32] at the time the prohibition took effect, but not to their replacements.

The prohibitions on amosite and crocidolite are for all uses, except:

- removal and disposal; and
- situations where they occur naturally and are not used for any new application.

The prohibition of all forms of asbestos took effect simultaneously under regulations in each state and territory from 31 December 2003. A Customs regulation to prohibit the import and export of asbestos and ACM was developed to coincide with the prohibition date of 31 December 2003.

To facilitate a nationally consistent exemption process to the prohibition, NOHSC declared a National List of Exemptions (List) in April 2003. The List was developed according to a guiding set of principles. The principles underpin, and provide reasoning for, the inclusion of a chrysotile asbestos product on the List. The principles emphasise that exemptions are to occur for time-limited periods, are to be limited in scope, and only apply where there are

[30] 'Research' includes the display of chrysotile containing items in historical and museum displays. The intent is to cover all aspects of work needed to display an item, i.e. preparation, handling, maintenance and conservation work, dismantling and public viewing. 'Analysis' includes laboratory testing and samples of asbestos fibres.

[31] 'Removal or disposal' of chrysotile includes replacement of chrysotile in situ with a non-chrysotile component. For example, during the re-manufacture of brake shoes, disposal of the chrysotile lining and re-manufacture of the shoe with non-chrysotile linings constitutes 'removal and disposal'.

[32] 'In situ' means 'in its original place'. In situ involves situations that do not constitute a risk to users until the chrysotile component is replaced or disturbed. Such uses of chrysotile include the linings in brake shoes of in-service motor vehicles, the existence of asbestos deposits in the ground and the presence of asbestos components in electrical meter boards and receptacles used for storage of acetylene gas under pressure.

substantially greater risks to safety if chrysotile asbestos is not used. The National List of Exemptions is based on a similar United Kingdom (UK) list.

1.3.1.3 National Exposure Standard

NES are airborne concentrations of individual chemical substances, which, according to current knowledge, should neither impair the health of, nor cause undue discomfort to, nearly all workers.[33] NES have been established for the various forms of asbestos to be used as part of the overall control of asbestos.

NOHSC undertook a review of the chrysotile NES to ensure worker safety is appropriate and relevant in the context of implementing a prohibition on workplace use of asbestos. Chrysotile was the subject of a Priority Existing Chemical (PEC) assessment by the National Industrial Chemicals Notification and Assessment Scheme (NICNAS) in 1999. This report recommended that the NES for chrysotile be lowered from the existing level of 1 fibre per millilitre of air (f/mL). In July 2003, NOHSC declared a revised NES for chrysotile asbestos of 0.1 f/mL TWA (8hrs).

1.3.1.4 International comparison of asbestos regulation

Exposure standards and supporting guidance material have been established worldwide to minimise occupational exposure to asbestos.

The U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) developed a set of asbestos standards to support its Permissible Exposure Limit (PEL) for exposure to airborne asbestos. The OHSA asbestos standards recognise that workers exposed to asbestos within the PEL continue to face significant adverse health effects. The OHSA standards prescribe mandatory work practices that aim to reduce the risk of asbestos-related disease. OHSA acknowledges that asbestos exposure is difficult to measure, and that prescribing work practices is more valuable to employers and employees than setting an exposure standard, in reducing occupational exposure to airborne asbestos fibres.

In the UK, the Health and Safety Executive (HSE) recently released updated and new guidance material for managing, controlling and removing ACM. This guidance has been revised in line with a UK prohibition on asbestos, upon which the Australian prohibition is based.

In both the USA and UK, codes of practice and guides for the management and removal of asbestos include the following requirements:

- management plans;
- presumption criteria;
- requirements to have hazard communication procedures in place, informing contractors and employees who might come into contact with ACM;
- processes for the identification of ACM;
- demarcation of boundaries for asbestos work and removal areas using warning signs and labels;

[33] NOHSC (1995), *Guidance Note on the Interpretation of Exposure Standards for Atmospheric Contaminants in the Occupational Environment* [NOHSC:3008(1995)].

- use of HEPA filter ventilation, and enclosures for work with friable ACM; and
- cleaning and waste disposal procedures.

1.4 Is there a 'market failure'?

Potential market failures include 'externalities' that arise from the impact on third parties. To some degree, employers engaged in the industries where there is exposure to asbestos already have a liability placed upon them in terms of insurance and compensation payouts. However, the difficulty in diagnosing diseases related to asbestos exposure and their long latency means that employers often do not face the full financial costs of workplace exposure.

In a study undertaken for NOSHC in 2004[34], it was found that employers incur only a small proportion of the total costs associated with occupational injury and disease. According to the report, around 3 percent of costs were paid for by employers with workers carrying 44% and the community carrying 53% of the total costs.[35]

The non-measurable costs faced by victims of work injuries and disease should be added to the measurable financial costs. The difficulties involved in quantifying these costs, do not make them any less important. In fact these costs reflect much of the real impact of the failure to implement OHS measures.

In such circumstances, insurance and compensation costs alone cannot provide an adequate safety incentive.

1.5 How is the problem being addressed?

In October 2003, NOHSC agreed to review the asbestos guidance material and amend the documents to support the nation-wide prohibition on asbestos. The review aimed to:

- ensure the technical accuracy of the documents;
- enable the introduction of best practice in health and safety measures into the Australian workplace for asbestos management, control and removal;
- provide a nationally consistent approach to the control of exposure to asbestos at workplace that is consistent with the prohibition and regulations;
- limit exposure to chrysotile asbestos, mainly in situations where the prohibition does not apply, or where there is an exemption to the prohibition; and
- provide a safer working environment that reflects the current level of knowledge about the health effects of exposure to asbestos.

In line with this review, NOHSC has developed new guidance material for asbestos including the:

[34] NOHSC (August 2004), The c*ost of work-related injury and illness for Australian employers, workers and the community*, Canberra

[35] Ibid, p.26.

- revised *Code of Practice for the Safe Removal of Asbestos* [NOHSC:2002(2005)] (Removal Code);
- revised *Guidance Note on the Membrane Filter Method for Estimating Airborne Asbestos Dust* [NOHSC:3003(2005)] (MFM Guidance Note); and
- new *Code of Practice for the Management and Control of Asbestos in Workplaces* [NOHSC:2018(2005)] (Management Code), which replaces the 1988 Guide.

The Management and Removal Codes have been developed in line with the UK and USA developments and are consistent with international best practice.

PART 2. OBJECTIVE

The objective of the Australian Government is to have workplaces free from injury and disease. This has been developed into a National OHS Strategy, which was endorsed by the Workplace Relations Ministers Council (WRMC) in 2002.

Asbestos is a significant contributor to the current levels of workplace related disease and death in Australia as a result of past exposures, and is expected to continue to be a significant contributor into the future due to the amount of asbestos containing materials that currently remain in the community.

The objective is to ensure appropriate management of in-situ asbestos to minimise future exposures so as to reduce the risk of people in the community of contracting asbestos related diseases and therefore reduce the incidence of death from this source, in the long term.

In order to reduce future exposures, asbestos containing material currently in the community needs to be identified and managed to ensure that the material is not disturbed so as to release asbestos fibres into the air. Most at risk from the present in-situ asbestos containing materials are workers who maybe exposed in the course of day-to day activities, especially those involved in activities that require interaction with existing buildings, plant and equipment, such as maintenance and service workers.

A critical element in minimising the release of asbestos fibres is knowing where asbestos containing materials are. This requires that all materials that may potentially contain asbestos are identified, records kept of the location of materials, and the information about the location communicated to people that come into contact with the material.

Once the material is identified, informed decisions can be made as to whether the asbestos can be safely left in-situ or will need to be removed. Where asbestos-containing material is to remain in-situ, it must be managed in such a way as to minimise disturbance and thereby prevent the release of asbestos fibres. Where a decision is made to remove asbestos, controls must be put in place so that asbestos fibres will not be released into the work, community and natural environments during the removal process.

The removal of ACM can be a high-risk process and so, despite the overlap of the requirements of the Management and Removal Codes, the Removal Code has remained as a separate, comprehensive guide to safe asbestos removal.

PART 3. OPTIONS

Consideration was given to two options to achieve the National OHS Strategy goal of workplaces free from injury and disease. Given the hazardous nature of asbestos and the current climate of public interest in asbestos and asbestos-related disease, current and accurate guidance for the safe management, control and removal of asbestos holds particular significance. As such, the revocation of the 1988 NOHSC asbestos guidance materials is not an appropriate option and will not be considered further. The two alternative options are described below. The costs and benefits of each option are outlined in Part 4.

3.1 Option One — The *Status Quo*

This option entails continuing with the current 1988 asbestos guidance materials. That is, do not provide new/additional guidance to manage and control exposure to airborne asbestos fibres from in situ ACM, and do not address the gaps in the 1988 NOHSC asbestos guidance materials and current Australian, State and Territory regulation of ACM in the workplace, which were identified in a gap analysis undertaken by NOHSC. The gap analysis assessed the current coverage and guidance of asbestos regulation in Australian States and Territories, as compared to the requirements of the Management and Removal Codes, (see Appendix C and Appendix D for details).

3.2 Option Two — Declare revised asbestos guidance material

This option involves declaring the new Management Code, the revised Removal Code and the revised MFM Guidance Note. NOHSC declared the current asbestos documents in 1988, comprising of a Code of Practice for the removal of asbestos, a Guide to the Control of Asbestos and a Guidance Note on the MFM. The 1988 Code, Guide and Guidance Note for asbestos, provide guidance for work with asbestos based on a NES of 1 f/mL. The declaration of a new NES of 0.1 f/mL for chrysotile asbestos in July 2003 outdated the 1988 information, specifically with regards to the safe work methods and required precautions for minimising exposure to respirable asbestos fibres. In addition, best practice work methods for asbestos have changed since the declaration of the 1988 Code, Guide and Guidance Note.

The Management and Removal codes have been developed from the 1988 Guide and Code. The MFM Guidance Note is a technical revision of the 1988 Guidance Note. The 1988 Management Guide has been upgraded to a Code to provide it with evidentiary status in courts, and allow more streamlined adoption under state and territory regulations. National codes of practice declared by NOHSC under *s38*(1) of the *National Occupational Health and Safety Commission Act 1985* (Cwlth) are documents prepared for the purpose of advising employers and workers of acceptable preventive action for averting occupational deaths, injuries and diseases in relation to workplace hazards. Codes of Practice provide advice on how to meet regulatory requirements. As such, codes are not legally enforceable, but they can be used in courts as evidence that legal requirements have or have not been met.

The 1988 Guide, Code and Guidance Note also provide guidance on the identification, management and removal of ACM. Specifically, these documents provide guidance in relation to ACM in buildings and structures. However, exposure information from Table 39,

Table 6 and Table 3 indicates that the risk of exposure to ACM is also likely to occur through work with plant and equipment, and friction products in vehicles.

The Management Code and Removal Code have been written with an increased scope, compared to the 1988 material, and are based on a risk management approach to the removal and management of ACM. As such, the Management Code and Removal Code can be applied to a wide range of circumstances.

The Management Code has been developed to enable employers or the person in control of premises to control the risk of in situ ACM in workplaces. It provides the steps to be taken to eliminate or minimise the risk of exposure to airborne asbestos fibres by identifying in situ ACM, performing a risk assessment of the in situ ACM and implementing control measures. The objective of these measures is to prevent workplace exposure to airborne asbestos fibres and reduce the incidence of asbestos related diseases such as mesothelioma, asbestosis and lung cancer.

The removal of ACM can be a high-risk process and so, despite the overlap of the requirements of the Management and Removal Codes, the Removal Code has remained as a separate, comprehensive guide to safe asbestos removal. The objective of the Removal Code is to provide advice for the safe removal of ACM found in workplaces, describing removal methods that minimise the release of airborne asbestos fibres during the removal of ACM.

The MFM Guidance Note provides updated guidance on the procedures and methods required to estimate personal exposure for the evaluation of asbestos exposure control measures.

Adoption of the Management and Removal Codes by the jurisdictions will provide consistency in the control of asbestos hazards in the workplace. A gap analysis undertaken to assess the current coverage and guidance of asbestos regulation in Australian States and Territories, as compared to the requirements of the Management Code, (see Appendix C for details) shows that adoption of the Management Code by each State and Territory would address gaps in terms of the added requirements for:

- a written management plan;
- the use of presumption criteria; and
- ensuring the competence of persons performing tasks such as identification of ACM, material sampling and risk assessments.

A gap analysis undertaken to assess the current coverage and guidance of asbestos regulation in Australian States and Territories, as compared to the requirements of the Removal Code, (see Appendix D for details) shows that adoption of the Removal Code by each State and Territory would address gaps in terms of the added requirements for:

- the security of the removal site and preventing the access of unauthorised persons;
- emergency and first-aid plans;
- waste disposal;

- control measures;
- re-entry to removal enclosures; and
- the use of control levels to guide when risks should be reassessed and asbestos removal work stopped.

By declaring the revised Management and Removal Codes and MFM Guidance Note, NOHSC will be providing guidance by which industry can meet their obligations under legislative requirements.

PART 4. COSTS AND BENEFITS

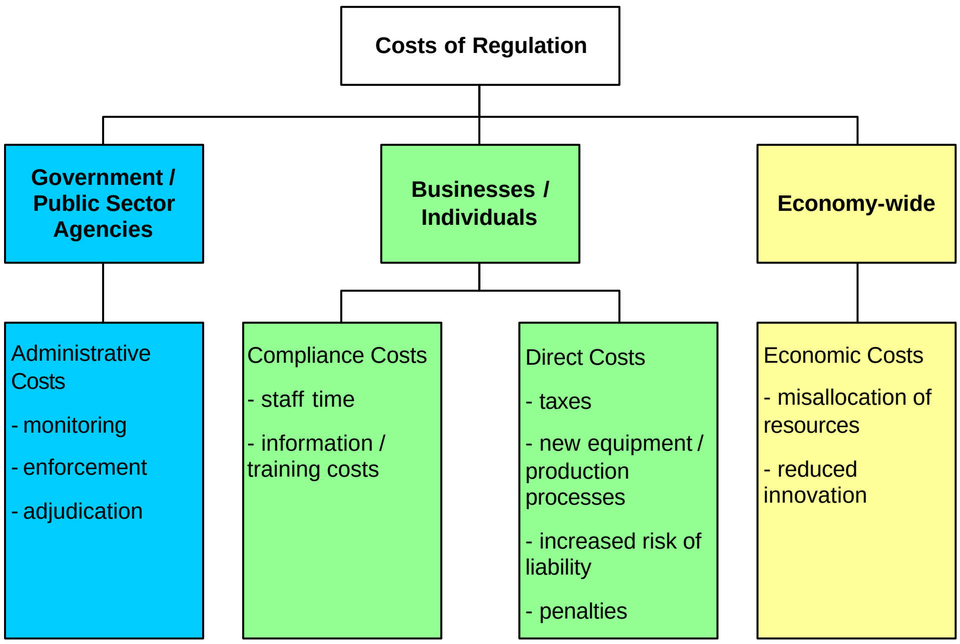
This part considers the actual or potential costs and benefits associated with the two options discussed in Part 3.

To some degree the nature (but not necessarily the quantum) of the benefits are relatively easy to understand, such as improved health outcomes. Specific dimensions of the benefits include:

- greater individual wellbeing due to reduced illness;
- improved productivity in the economy; and
- reduced health care expenses (doctor visits, hospital stays, medication, etc) due to reduced illness.

In contrast, the costs associated with the two options are more diverse and are shown in general terms in Figure 1. The framework in Figure 1 can be used to guide the analysis of each of the options.

FIGURE 1: FORMS OF COSTS[36]



In preparing regulatory impact statements, the general practice is, as far as possible, to undertake a cost-benefit analysis of the proposed options. The COAG Principles and

36 Adapted from the Ministry of Economic Development (2001), *Business Compliance Cost Statements: Guidelines for Departments*, Wellington, New Zealand, p.7.

Guidelines[37] identify cost-benefit analysis as most useful where monetary values can be assigned to the costs and benefits generated by the government action. When adequate quantitative data are not available, the usual approach is to use qualitative methods to describe these effects. Due to the difficulty involved in obtaining accurate and suitable quantitative data for the proposed government action, a number of assumptions have had to be made. As a result of this, although attempts are made to assign monetary values as far as possible to the overall costs and benefits of the proposed options, the accurate calculation of actual monetary values for costs and benefits is not feasible. Thus many of the costs and benefits in this analysis are presented in a qualitative format. As a result, the final outcomes and recommendations of this RIS are based on a cost-effectiveness analysis of the proposed options.

It should be noted that all of the analyses in this document are based on the assumption that all of industry complies with the current NES for asbestos (0.1 fibres/ml of air) and the current jurisdictional regulations for removal, control, and maintenance of asbestos. This assumption has been made due to the lack of information regarding industry compliance with OHS regulation and the fact that OHS regulators are not equipped to gather this type and amount of information.

4.1 The costs associated with adverse health effects as a result of exposure to asbestos

Costs associated with the adverse health effects of asbestos-related diseases fall into the following categories:

- Treatment expenses including medication and hospitalisation;
- Compensation, including statutory and common law settlements;
- Pain and suffering; and
- Deaths.

4.1.1 Compensation and medical costs

Treatment and compensation costs can appear to vary depending on the type of data used. In attempting to establish the medical and compensation costs of asbestos-related diseases, data from a 2001 RIS prepared by NOHSC for the Proposed Phase Out of Chrysotile Asbestos (Table 10) was compared with recent data from the Dust Diseases Board (DDB) of NSW Annual Report 2002-2003 (Table 11).

[37] COAG (2004), *Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies*. Accessed on 29/09/2004 at http://www.pc.gov.au/orr/reports/external/coag/index.html

TABLE 10: DISEASES LINKED TO CHRYSOTILE AND TREATMENT COSTS PER PERSON[38]

Disease	Treatment Cost (per year)	Statutory Compensation	Judgements and Settlements	Total Costs
Asbestosis	$2,200 Survival 20 years	$30,000	$150,000	$182,200 to $224,000
Lung Cancer	$57,000 Survival < 1 year	$160,000	$450,000	$667,000
Mesothelioma	$57,000 Survival < 1 year	$160,000	$450,000	$667,000
Other malignancies such as cancer of the larynx, oropharynx and upper and lower digestive tract.	$57,000 Survival < 1 year	$160,000	$450,000	$667,000

[38] NOSHC (2001), NOHSC Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

TABLE 11: COMPENSATED PAYMENTS MADE TO WORKERS AND BENEFICIARIES OF WORKERS IN NSW DURING THE FINANCIAL YEAR 2002 – 2003[39]

		Asbestosis	ARPD	Asbestosis / ARPD	Silico-Asbestosis	Mesothelioma	Carcinoma of the Lung[1]	Total[2]
Workers	Number of Workers	210	376	52	5	182	31	**856**
	Weekly[3] Compensation payments ($,000)	1,831	3,089	504	34	4,557	621	**$10,636,000**
	Hospital & Medical ($,000)	625	474	60	1	1,927	121	**$3,208,000**
	Funeral ($,000)	29	32	8	0	62	11	**$142,000**
	Total ($,000)	2,485	3,595	572	35	6,546	753	**$13,986,000**
Dependants	Number of Dependants	270	79	19	2	1,185	173	**1,728**
	Weekly[3] Compensation Payments ($,000)	1,651	305	80	12	10,936	1,557	**$14,541,000**
	Lump Sum Payments ($,000)	1,718	1,268	190	0	10,018	1,974	**$15,168,000**
	Total ($,000)	3,369	1,573	270	12	20,954	6,377	**$32,555,000**
Total	Number of Beneficiaries	480	484	71	7	1,367	204	**2,613**
	Total Payments ($,000)	5,854	5,168	842	47	27,500	7,130	**$46,541,000**

1 Including asbestos, Asbestosis and ARPD.

2 These totals have been converted to $,000.

3 This is the total per annum. On average each worker received approximately $12,425 for the year, or $239 per week.

[39] The Workers Compensation Dust Diseases Board Annual Report 2002-2003, accessed on 27/09/04 at http://www.ddb.nsw.gov.au/DDB_annual_report%20V.1.pdf

From Table 10, combined treatment and compensation costs in 2001 were estimated at between $182,000 and $667,000 per case, assuming a survival rate of less than one year among non-asbestosis sufferers. In cases where the sufferer lives more than a year the cost of treatment could be substantially higher. In documented cases like that of the 43 year old school teacher who survived for five years after being diagnosed with mesothelioma (see 1.2.3.1) the additional cost would be $228,000 in treatment expenses.

When comparing NOHSC's 2001 figures (Table 10) with the DDB 2002 – 2003 compensation figures (Table 11), we can see that according to the DDB figures compensated hospital and medical expenses amounted to only $12,271 per case or 7% of the estimated 2001 treatment costs for lung cancer, mesothelioma, and other malignancies such as cancer of the larynx, oropharynx and upper and lower digestive tract. This discrepancy of 93% is indicative of a form of market failure know as 'externalities' where the costs of injury and disease are transferred away from the producer and consumers of goods and services to employees, their families, and society. In the case of asbestos-related disease in NSW, the public health system carries many of the costs.

In terms of compensation payments made to sufferers and their dependents, the DDB 2002-2003 figures only represent payments made in that period which may underestimate the full compensation costs. That is, under the DDB current benefit structure, sufferers receive weekly income replacement payments, travel, medical, hospital, ambulance, and funeral expenses.[40] Upon the sufferer's death, dependents are entitled to a payment that can either be taken as a lump sum or redeemed as a weekly benefit.[41] As such, the DDB 2002-2003 data does not account for the full cost of each case where DDB lump sums are paid on a weekly basis because the cost of compensating dependents is spread over some years.

In spite of the propensity of compensation data to understate costs, the DDB figures demonstrate that, of all the asbestos-related diseases, Mesothelioma is the most expensive to treat in relative terms.

4.1.2 Estimated lives lost and associated costs

While there are good statistics showing trends in the incidence of asbestos-related diseases in Australia, the long latency periods of the diseases means that many recently diagnosed cases are the result of historical exposures from sources that are no longer in place (eg mining, processing and manufacturing). For the purposes of conducting an analysis of the regulatory options for dealing with in situ ACM it is necessary to estimate the number of deaths that may occur as a result of exposure to friable, damaged or poorly maintained in situ ACM in workplace scenarios.

It is possible to make such an estimate based on information from a variety of sources, although it must be stressed that the estimate is indicative only, due to the limitations in the data and the assumptions that must be made about the nature of the hazard and the exposure. Due to the specific information that is available concerning asbestos in workplaces, it is possible to make an estimate for Victoria and then extrapolate this estimate to the National workforce.

40 Dust Diseases Board (July 2004), Current Benefit Structure –Workers. Accessed on 29/09/2004 at http://www.ddb.nsw.gov.au/workers_benefit.doc

41 Dust Diseases Board (July 2004), Current Benefit Structure – Dependants. Accessed on 29/09/2004 at http://www.ddb.nsw.gov.au/dependents_benefit.doc

Given that compensation payments tend to underestimate the economic costs of occupational injury, disease, and death, a method known as the 'statistical value of a life year' (VLY), is used to estimate a dollar value for lives lost or impaired due to industrial disease or accident. This dollar value of a statistical life year was estimated by NOHSC at $112,500.[42]

In determining the application of the VLY method to the impact of asbestos-related disease it became evident that the VLY method should not be used to determine costs for several reasons:

1. the VLY method only looks at the economic worth of an individuals life and due to the late onset of asbestos-related diseases this method provides a result far less than would otherwise be expected;

2. the information used to calculate the VLY was based on data sources of counts of injuries and disease, however, the injuries data was of a more superior quality than that available for diseases. As a result of this, the VLY does not accurately represent the cost of asbestos-related disease.

3. the VLY does can not value the quality of a life and the cost of pain and suffering is an average of the costs associated with a disease sufferer as compared with an injury sufferer. Since asbestos-related diseases are generally quite severe and debilitating, the cost of pain and suffering used to calculate the VLY does not accurately account for the pain and suffering that may be associated with an asbestos-related disease and the resulting decrease in quality of life.

Alternative estimates derived through academic studies value a statistical life (VSL) using the more accepted 'willingness to pay' approach to reduce risk, estimate the value at between $1.5 million and $6.1 million, or an average of $3.8 million per statistical life.[43] This average value, which closely aligns with studies of age-based measures of the VSL conducted in the United States, is used in this RIS to provide an estimate of the quantifiable benefits of reduced exposure to asbestos.

But estimates based on the VSL also have their limitations. The length of morbidity, prognosis and 'fear' factor associated with illness such as asbestosis and mesothelioma affect individuals 'willingness to pay' to reduce the risks of contracting them. Hence benefits from measures that reduce the risk of exposure to asbestos are likely to be far greater than values derived on the basis of either avoided costs (medical and compensation payments) or academic estimates of VSL suggest.

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[42] NOHSC (August 2004), The c*ost of work-related injury and illness for Australian employers, workers and the community*, Canberra, pg.28.

[43] NOSHC (2001), NOHSC Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

4.1.2.1 The extent of exposure

4.1.2.1.1 Extent of exposure from friable, damaged or poorly maintained in situ ACM in the built work environment

From 1.2.4 it has been estimated that at least 373,385 workplaces in Australia still contained ACM in 2004. In 2001, there was an average of seven employees per business in Australia.[44] If it is assumed that growth rates for business and employment are consistent, then it is estimated that 2,613,695 persons[45] are employed in Australia in locations that contain ACM in 2005.

While the presence of ACM in general is of interest, the presence of friable, damaged or poorly maintained ACM is more likely to result in exposure to fibres following accidental or other disturbance.

The best indication of how much in situ ACM may be friable, damaged or poorly maintained comes from building surveys conducted in the United States. In a 1989 survey of public and private schools, the New York State Department of Education found that there was a total of 23,485,506 m^2 of asbestos in the State's schools and that approximately 9% of this was deteriorated or friable.[46] In another survey conducted in 1988 by the New York City Department of Environmental Protection it was found that of 900 buildings surveyed, 600 (67%) contained in situ asbestos. Of those that contained asbestos, 19% contained deteriorated or friable asbestos.[47] The number of buildings containing deteriorated or friable asbestos accounted for 13% of all buildings surveyed.

If it is assumed that ACM in Australian workplaces is subject to similar patterns of deterioration to the surveyed New York buildings, then of Australian workplaces that contain ACM, 19% may contain ACM in a friable form. Given this, it is then possible that, in 2005, there were approximately 70,943[48] workplaces containing friable, damaged or poorly maintained ACM in Australia with approximately 496,601[49] workers working in these locations.

It is difficult to reliably estimate the percentage of workers that may have an actual exposure to fibres from friable, damaged or poorly maintained ACM. The fact that wage and salary earners may work at locations containing friable, damaged or poorly maintained ACM does not in itself indicate the extent of actual exposure. In many cases the ACM may be physically inaccessible resulting in negligible exposure to fibres. However, conversely, where friable, damaged or poorly maintained ACM is disturbed, whether accidentally or deliberately, there is a likelihood of widespread dispersion of, and significant exposure to, asbestos fibres. Friable asbestos can release fibres into the air when disturbed, and these fibres may be further distributed on air currents to areas beyond the immediate vicinity where the disturbance occurred. Given this propensity for contamination beyond the immediate location

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44 Australian Bureau of Statistics (2001), 1321.0 *Small Business in Australia 2001* - Electronic Publication. Accessed on 15/10/2004 at http://www.abs.gov.au/Ausstats/abs@.nsf/0/97452f3932f44031ca256c5b00027f19?OpenDocument

45 Number of employer locations containing ACM (388,296) x Average Number of employees per business (7) = 2,718,072.

46 Landrigan, P.J., 'A population of children at risk of exposure to asbestos in place' , The third wave of asbestos disease: Exposure to asbestos in place, *Annals of the New York Academy of Science*, Volume 643, The New York Academy of Science, 1991, p.283.

47 Ibid, p.283.

48 This figure is calculated by multiplying the average number of work places containing ACM (388,296) by 0.19 (or 19%).

49 This figure is calculated by multiplying the average number of work places containing friable ACM (73,776) by 7 (the average number of workers).

of the friable ACM, it is reasonable to assume that where friable, damaged or poorly maintained ACM is disturbed at least 5% of workers in the workplace would have an actual exposure. Based on this assumption, approximately 24,830 Australian workers would be exposed to asbestos fibres. It is acknowledged that the exposure rate of 5% is an arbitrary value, however, it is considered a reasonable scenario for the purposes of the costing exercise. This value could also be expected to vary depending on the size of the workplace and number of employees present. For example, a small business comprising 10 employees could be reasonably expected to be housed in small premises. If friable, damaged or poorly maintained ACM is present in this workplace and is disturbed, there is a greater chance that, because of the small size of the workplace, 100% of the employees would be exposed to asbestos fibres. Comparatively, a larger workplace would expect to have a smaller percentage of workers exposed through a similar incident.

The estimates for workplace exposure to asbestos from friable, damaged or poorly maintained in situ ACM are based on the following assumptions:

- the risk of contracting asbestos-related disease from particular levels of asbestos exposure remains constant;

- the percentage of workplaces containing friable, damaged or poorly maintained ACM is constant throughout Australia; and

- wage and salary earners are evenly distributed over workplaces that do and do not contain friable, damaged or poorly maintained ACM.

Table 12 provides a summary of the figures used to calculate the likely extent of exposure of workers to asbestos from friable, damaged or poorly maintained ACM in the built work environment.

TABLE 12: SUMMARY OF FIGURES USED FOR ESTIMATING THE NUMBER OF WORKERS IN AUSTRALIA THAT MAY BE EXPOSED TO ASBESTOS FROM THE PRESENCE OF FRIABLE, DAMAGED OR POORLY MAINTAINED ACM IN THE BUILT WORK ENVIRONMENT *

Australia - 2005	
Number of workplaces in Australia	1,325,600
Average number of workers per business in Australia	7
Number of workplaces containing ACM	373,385
Persons employed in workplaces containing ACM	2,613,695
Percentage of ACM-containing workplace locations thought to contain friable, damaged or poorly maintained ACM	19%
Number of workplace locations containing friable, damaged or poorly maintained ACM	70,943
Number of workers working in locations containing friable, damaged or poorly maintained ACM	496,601
Percentage of wage and salary earners actually exposed in cases where friable, damaged or poorly maintained ACM is present in the workplace location	5%
Numbers of workers actually exposed to asbestos fibres	24,830

It should be recognised that as ACM in the built work environment are removed and replaced with non-asbestos materials, the incidence of exposure to asbestos in these situations will gradually decline. However, it should also be noted that, given that current asbestos regulation does not impose requirements to remove asbestos that is in situ. As a result, workplaces which contain ACM would be unlikely to remove the ACM.

Approximately 62.5% of all asbestos containing buildings, erected prior to the disuse of ACM building materials, remained in use in 2005, (see 1.2.4). If the rate of demolition of buildings containing ACM is assumed to remain constant at a rate of 2.5% per year, then ACM in buildings could be expected to be encountered for another 25 years up to 2030. Based on this rate, the number of new cases of asbestos-related disease due to exposure to friable, damaged or poorly maintained in situ ACM would be expected to be zero in 2030.

4.1.2.1.2 Extent of exposure from asbestos friction products

The amount of asbestos friction products, which remain in situ, cannot be determined due to the lack of detailed information. However, based on information provided by Victorian WorkCover Authority during the development of the Regulatory Impact Statement for the Proposed Phase Out of Chrysotile Asbestos[50], it is estimated that 2 in 5 (or 40%) employees in motor vehicle service and repair would be exposed to asbestos fibres from work with asbestos friction products. Based on ABS data from 2004, approximately 101,000 were employed in this industry in Australia.[51] Therefore, some 40,400 employees in motor vehicle service and repair could potentially be exposed to asbestos fibres from asbestos friction materials.

The number of workers exposed to asbestos friction products through the maintenance of plant and equipment is unknown.

The number of workers exposed through work with asbestos friction products could be expected to decrease over time as the brake pads and clutch linings etc are removed and replaced with non-asbestos components. Given that, in Australia in 2003, the average passenger vehicle travelled 15,300 kilometres per year[52] and that the average life of an asbestos brake pad is on average approximately 27,500 kilometres[53], this decrease in the number of motor vehicle service and repair workers exposed to asbestos through friction products could be expected to be seen approximately 2 years after implementation of the asbestos prohibition.

Approximately 2 years after implementation of the prohibition (31 December 2005), the majority of asbestos friction products in vehicles would have been removed and replaced with non-asbestos products. However, many other asbestos friction products will remain is use for an extended period due either to differing life expectancies as a result of the method of use (i.e. asbestos gaskets for use in plant and equipment as opposed to vehicles) and

50 NOSHC (2001), Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

51 Information taken from the Australian government, Australian Careers Website and includes those persons employed in the broad occupational groupings of 'Car Parts and Accessories' (10,900) and 'Motor Mechanics' (101,000). Accessed on 8/2/2005 at http://jobsearch.gov.au/joboutlook/default.aspx?PageId=AscoDesc&ASCOCode=4211. These figures are based on ABS data from ABS Labour Force Survey, Australia (cat. no. 6203.0) – February, 1990 to 2004.

52 Australian Bureau of Statistics (2003), 9208.0 'Survey of Motor Vehicle Use, Australia'. Accessed on 25/01/2005 at http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/00B05A9CEE83A73DCA2568A90013941C

53 NOSHC (2001), Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

irregular usage (e.g. vintage cars). As a result of this, many asbestos friction products could still be expected to be encountered after the initial decline.

It is not possible to determine the total number of asbestos friction products that will remain in situ, however, it is reasonable to assume that virtually all friction products will be removed over the next 5 years. By utilising a basic rule of thumb, asbestos-related diseases resulting from work with asbestos friction products will reduce by 20% per year and could be expected to be zero in 2010.

4.1.2.1.3 Extent of exposure from maintenance and building tasks involving ACM

Available information only provides employment numbers for broad occupational groupings such as ‘construction workers’. More detailed information on the numbers of people employed in specialist occupations, such as ‘asbestos removalist’, is not available. Therefore, in order to determine how many employees may be exposed to asbestos through routine maintenance and building tasks, several broad occupational categories have been selected that most appropriately cover the main sources of exposure to asbestos as identified in Table 5. Table 13 provides an indication of the number of workers in Australia in broad occupational groupings that may potentially involve exposure to asbestos from maintenance and building tasks.

Table 13 shows that as in 2004, 451,400 persons worked in occupations where there was a potential for exposure to asbestos from performing maintenance and building tasks. Since the occupational groupings do not allow for a more detailed analysis of the numbers of persons employed in specialised occupations such as asbestos removal, and that not all employees are likely to perform the same tasks, this figure is likely to overstate the number of persons actually exposed to asbestos. However, given the extent of ACM which remains in situ in buildings, plant and equipment throughout Australia, it is likely that a proportion of workers similar to that of employees in the motor vehicle service and repair industry (i.e. 2 in 5 or 40%), who work in the occupational groups identified in Table 13, will be exposed to asbestos. If this proportion is applied to the 451,400 persons employed in these occupations then a more accurate number may be derived. Therefore approximately 180,560 persons in these occupations in Australia may be exposed to asbestos through performing maintenance and building tasks.

Given that there are numerous occupations that may potentially involve exposure to asbestos while performing maintenance and building tasks; that there is a lack of detailed data on the number of people working in these occupations; and that asbestos was used in such a wide array of applications, the derived figure of 180,560 persons may significantly understate the number of persons potentially exposed to asbestos, therefore this figure should be considered a best case scenario.

TABLE 13: NUMBER OF PERSONS IN AUSTRALIA WHO MAY BE POTENTIALLY EXPOSED TO ASBESTOS, BY OCCUPATIONAL GROUPING, 2004[54]

Broad occupational grouping		Number of persons employed
Electrician		101,700
Carpenter and Joiner		99,100
Boilermaker and Welder		70,900
Plumber		59,400
Construction Worker		48,400
Painter and Decorator		43,500
Insulation and Home Improvement Installer		17,900
General Machine Operator*		9,500
Lagger**		1,000
	Total	**451,400**

* This occupational grouping includes asbestos removalists.

** This occupational grouping originally included ‘crane chaser’ with a total of 2,000 persons employed. It was assumed that the total number of persons employed was evenly distributed across the two occupations. Thus 1,000 persons were assumed to be employed as ‘laggers’.

As previously indicated in section 4.1.2.1, it should be recognised that as ACM in the built work environment are removed and replaced with non-asbestos materials, the incidence of exposure to asbestos through maintenance and service tasks will gradually decline. However, it should also be noted that, given that current asbestos regulation does not impose requirements to remove asbestos that is in good condition, workplaces where ACM are present would be unlikely to remove the ACM.

Based on current rates of demolition, the number of workplaces containing ACM can be expected to be zero in 2030. The number of new cases of asbestos-related disease due to exposure from maintenance and service work on ACM could therefore be expected to be zero in 2030.

4.1.2.1.4 Extent of exposure during removal of ACM

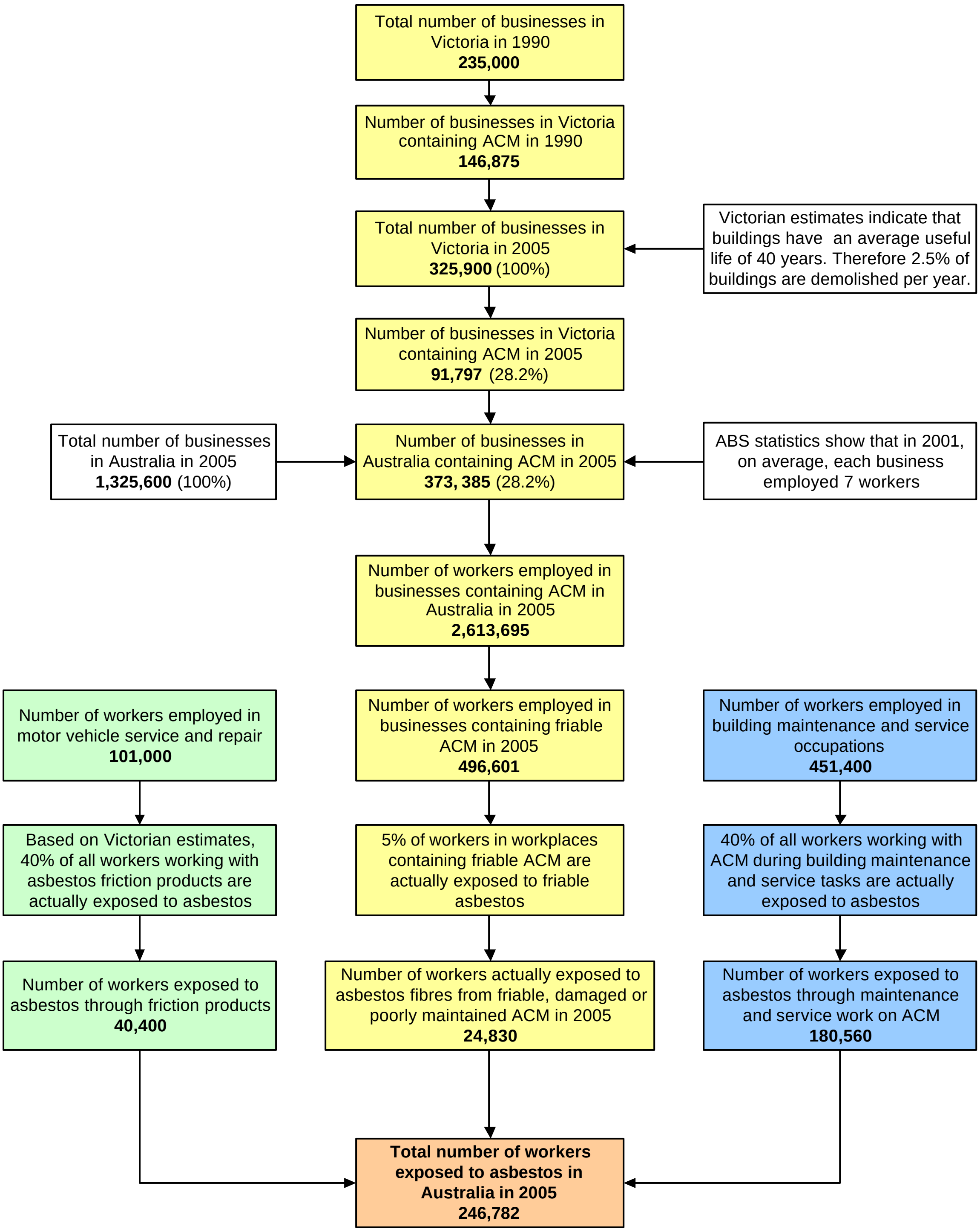
Assuming that there is 100 percent compliance with the 1988 Removal Code, exposures during the removal of ACM are expected to be as low as 1 case of asbestos-related disease per year. This is based on the current exposure standard for all forms of asbestos of 0.1 fibres/ml of air and that, during the removal of ACM, all state and territory OHS regulations require that personal protective equipment such as respirators and coveralls be worn at all times during the removal task. Furthermore, strict decontamination procedures prevent the transport of respirable asbestos fibres outside the designated asbestos removal site. The combination of these requirements ensures that exposures are extremely low and likely only to occur as a result of accidental exposure through equipment malfunction or human error.

54 Information taken from the Australian government, Australian Careers Website. Accessed on 5/10/2004 at http://jobsearch.gov.au/joboutlook/default.aspx?pageId=CategorySearch&WHCode=2&TextOnly=0. These figures are based on ABS data from ABS Labour Force Survey, Australia (cat. no. 6203.0) – February, 1990 to 2004.

4.1.2.2 Summary of exposures

Figure 2 below provides a summary of the assumptions and information used to derive the estimated number of workers exposed to asbestos through working in workplaces containing friable, damaged or poorly maintained ACM, working with friction products and maintenance and building tasks involving ACM.

FIGURE 2: SUMMARY FLOWCHART OF THE NUMBER OF WORKERS EXPOSED TO ACM



4.1.2.3 Risk of disease and death

The cumulative risk of lung cancer from exposure to asbestos at levels that may result from the presence of damaged asbestos products has been calculated at 0.2 - 692 per 100,000 lifetimes, while the risk from friction products and maintenance activities is 0.1 – 6,488 and 0 – 39 respectively (see Table 6). Under the 1988 exposure standard of 1 fibre/ml, it was estimated that up to 173 cases of asbestos related lung cancer could expected per 100,000 persons exposed[55]. In 2003 a new NES for chrysotile asbestos was declared. By lowering the exposure standard to 0.1 fibres/ml, the cumulative risk of lung cancer from exposure to asbestos is reduced to an estimated 17 cases per 100,000 persons exposed (see Table 7). By assuming that the exposure standard reduces the risk of lung cancer from exposure to asbestos to a maximum of 17 cases per 100,000 the span of the calculated cumulative risk is reduced from a range of 0 to 6,488 cases per 100,000 lifetimes to a range of 0 to 17 cases per 100,000 lifetimes. This effectively caps the risk estimates at a maximum of 17 cases per 100,000 persons exposed.

It should be noted that the estimate accounts for deaths due to lung cancer only. There is no data available to indicate the number of cases of asbestosis likely to develop at current exposure levels. Nor is there data available to indicate the number of cases of other malignancies.[56]

While dose response data in respect of mesothelioma is limited, studies are emerging, some of which have suggested that there may be as many as two lung cancer cases for every case of malignant mesothelioma.[57]

If the cumulative risk factors for lung cancer for the respective tasks are applied to the relevant occupational grouping, the lower, middle and upper estimates for the total future number of cases of asbestos related lung cancer that could be expected to occur as a result of work in 2004 are 0, 20 and 40 respectively. Using the conclusion that 2 cases of asbestos related lung cancer occur for every diagnosed case of mesothelioma, the lower, middle and upper estimates of the total future cases of mesothelioma for the year 2004 could be expected to be 0, 11 and 20 respectively. Table 14 provides a summary of the figures used to determine these estimates.

Given the poor prognosis for sufferers of asbestos-related lung cancer and mesothelioma, it is likely that all of the estimated cases would result in death. Using the calculated median number of total cases of asbestos-related lung cancer and mesothelioma from Table 14, it is estimated that some 31 people could be expected to contract and ultimately die from an asbestos-related disease under current regulatory arrangements for the year 2004.

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55 NOSHC (2001), NOHSC Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

56 NOHSC (2001), Regulatory Impact Statement of the Proposed Phase Out of Chrysotile Asbestos. Accessed on 15/10/2004 at http://www.nohsc.gov.au/PDF/Standards/hazsubsChrysotileAsbestosRIS.pdf

57 Omenn, G.S., Merchant, J., Boatman, E., Derment, J., kusehner, M., Nicholson, W.J., Peto, J. & Rosenstock, L. (1986), contribution of environmental fibres to respiratory cancer, *Environmental Health Perspectives* 70:51-56

TABLE 14: SUMMARY OF FIGURES USED FOR ESTIMATING THE FUTURE NUMBER OF LUNG CANCER AND MESOTHELIOMA CASES THAT MAY OCCUR IN AUSTRALIAN WORKERS AS A RESULT OF WORKING WITH ASBESTOS IN 2005

Type of exposure	Number of workers exposed	Risk of developing lung cancer[1] (per 100,000 lifetimes)	Number of Lung Cancer cases[2]	Number of Mesothelioma cases[3]	Total future cases expected from exposure to in situ asbestos[4]
Damaged ACM in the built work environment	24,830	0.2 to 17 (median 8.6)	Lower - 0 Middle – 2 Upper – 4	Lower - 0 Middle – 1 Upper – 2	Lower - 0 Middle – 3 Upper – 6
Asbestos friction products	40,400	0.1 to 17 (median 8.5)	Lower - 0 Middle – 3 Upper – 7	Lower - 0 Middle – 2 Upper – 3	Lower - 0 Middle – 5 Upper – 10
Maintenance and building tasks involving ACM	180,560	0 to 17 (median 8.5)	Lower - 0 Middle – 15 Upper – 31	Lower - 0 Middle – 8 Upper – 15	Lower - 0 Middle - 23 Upper – 46
Total	246,782	N/A	Lower - 0 Middle – 20 Upper – 41	Lower - 0 Middle – 11 Upper – 20	Lower - 0 Middle – 31 Upper – 61

1 The risk of developing lung cancer has been capped at 17 to account for the 2003 NES of 0.1 fibre/ml. See Table 1.

2 The number of cases for lung cancer is calculated by dividing the ‘number of workers exposed’ by 100,000 (lifetimes) and multiplying the result by the risk of developing lung cancer. Figures are rounded to the nearest whole number.

3 The number of mesothelioma cases is calculated by halving the estimated number of lung cancer cases.

4 Total cases are calculated by adding the lower, middle and upper estimates for lung cancer and mesothelioma respectively.

Table 45, at Appendix E, provides an extrapolation of the number of cases of mesothelioma and asbestos-related lung cancer that may occur over the next 25 years due to exposures to friable, damaged or poorly maintained ACM and maintenance and service work involving ACM. This extrapolation is made based on the current rate of demolition of buildings containing ACM, and the following assumptions:

- that the average number of employees per workplace remains constant (i.e. at 7 workers per workplace);
- the proportion of maintenance and service workers per workplace remains constant; and
- the incidence of mesothelioma and lung cancer is constant.

Although there is no available data on the number of workers exposed to asbestos through work with asbestos friction products, a basic rule of thumb may be applied to complete the extrapolation. Based on the information provided in Table 14, cases of mesothelioma and asbestos-related lung cancer due to work with asbestos friction products may be estimated at 1.6 times the number of expected cases for exposure through working in workplaces which contain friable, damaged or poorly maintained ACM.

Based on data from the extrapolations made at Appendix E, under current regulation approximately 341 cases of mesothelioma and asbestos-related lung cancer could be expected to occur as a result of exposure to asbestos through work with asbestos friction products, maintenance and service work involving ACM and exposure to friable, damaged or poorly maintained in situ ACM for the period 2005 2030.

4.1.3 Summary of costs of asbestos-related disease

Using the data from previous sections it is possible to determine a range of potential costs associated with the adverse health effects from work with in situ ACM and exposure to damaged or friable ACM in the work place. These costs are based on the assumption that the 1988 asbestos documents have been 100% successful in achieving industry compliance with the 2003 NES for chrysotile of 0.1 fibres/ml.

Where Industry does not currently comply with the existing NES, any costs of compliance that might be incurred to meet the existing NES should not be associated with the options contained within this document. In line with cost benefit analysis principles these costs can not be counted twice in terms of their impact on industry and as such are not addressed in this document.

Based on the medical and compensation costs presented in Table 10 and the median number of expected cases of mesothelioma and asbestos-related lung caner presented in Appendix E, at least 341 cases of asbestos-related lung cancer or mesothelioma could be expected under current regulatory arrangements for the period 2005-2030. This is at an approximate cost of $264,132,000. By comparison, if the figures from the academic studies identified in section 4.1.2 (i.e. $1.5 million and $6.1 million) are applied then the cost of mesothelioma and asbestos-related lung caner over the same period is between $511.5 million and $2.08 billion, or an average of approximately $1.3 billion ($3.8 million per case). The VLY measure calculated by NOHSC has not been used in these calculations for the reasons stated in section 4.1.2.

Table 15 provides a summary of the costs discussed above.

TABLE 15: ESTIMATED COST OF ASBESTOS-RELATED LUNG CANCER AND MESOTHELIOMA 2004-2030

Value applied	Estimated Cost per case of Mesothelioma and Asbestos-related lung cancer	Number of cases of Mesothelioma and Asbestos-related lung cancer (2004-2030)	Total cost of Mesothelioma and Asbestos-related lung cancer (2004-2030)
Medical and Compensation Costs	$667,000	341	$227,447,000
Cost from Academic studies			
Minimum	$1,500,000	341	$511,500,000
Maximum	$6,100,000	341	$2,080,100,000

As can be seen from these figures, there are large differences in costs that can be attributed to the value of a human life depending on the source of information selected. It is these large discrepancies that make it difficult to apply these figures with any degree of reliability, thus they are referred to for information purposes only and as an indicator of the potential costs and benefits of the proposed options.

Using the breakdown of costs by employer, employee and the community, which was identified in a study by NOHSC (see section 1.4) the costs of mesothelioma and asbestos-related lung cancer to each of these stakeholders is provided in Table 16.

TABLE 16: PROPORTIONATE BREAKDOWN OF COSTS OF MESOTHELIOMA AND ASBESTOS-RELATED DISEASE BY EMPLOYER, EMPLOYEE AND COMMUNITY

341 Lives lost	Total Cost	Employer (3%)	Employee (44%)	Community (53%)
Minimum	$227,447,000	$6,823,410	$100,076,680	$120,546,910
Maximum	$2,080,100,000	$62,403,000	$915,244,000	$1,102,453,000

Also, although there is no data available to indicate the number of cases of asbestosis likely to develop at current exposure levels, the risk of developing asbestosis is considered by NOHSC to be low. Nevertheless, asbestosis is a chronic illness resulting in some 20 years of treatment at an estimated cost per case of $2,200 per annum, together with statutory compensation of $30,000 and judgments/settlements of $150,000 (see Table 10).

It should be noted that the costs of adverse health effects outlined above are only indicative in the sense that employer costs such as loss of goodwill and corporate image[58] have not been included given they can only be calculated on enterprise specific incident by incident bases. Sufferer costs in terms of pain and suffering have also been excluded from these calculations since no reliable data are available to assist in this calculation.

4.2 Option One — The Status Quo

4.2.1 Cost to business

The 1988 NOHSC Code, Guide and Guidance Note are now out of date, and maintaining them in their current form sustains risks to workers and members of the public resulting from work-related exposures to in situ asbestos. General occupational health and safety legislation requires that employers take all reasonable steps to identify assess and control all risks to health in the workplace. As a result of this general requirement, maintaining the 1988 NOHSC documents will increase costs for businesses seeking to meet their legal responsibilities under existing OHS legislation. Business will be required to allocate resources to identify areas where the 1988 documents are deficient and to subsequently seek up-to-date information in those areas. Small business is least able to support these increased costs.

By maintaining the 1988 NOHSC documents, which do not provide adequate guidance for situations other than where ACM is encountered in buildings and structures, business will

58 NOHSC (August 2004), The c*ost of work-related injury and illness for Australian employers, workers and the community*, Canberra, p.8.

continue to experience costs attributable to occupational exposures to asbestos. Additionally, the 1988 Removal Code is predominantly focused on the removal of friable ACM and as a result of this little guidance is provided for the removal of non-friable ACM such as asbestos cement sheeting (fibro), which, although is considered to be a lesser risk than friable ACM, is also more commonly encountered.

Based on the estimates from section 4.1.2.3 and 4.1.3, under current regulatory arrangements at least 341 employees may contract an asbestos-related disease due to occupational exposure. As a result of this the costs to employers could be expected to be between $6.82 million and $62.4 million over the period 2005-2030.[59]

4.2.2 Benefit to business

There is no perceived benefit to business from maintaining the 1988 NOHSC documents as the information contained in the 1988 NOHSC documents is now outdated and does not reflect current industry best practice.

4.2.3 Cost to government

The maintenance of the 1988 NOHSC documents could lead to a sustained incidence of asbestos-related diseases and subsequent resources required by governments to manage these diseases. To fill the gap left by the out of date 1988 NOHSC documents, State and Territory Governments would need to allocate resources to develop local guidance material. NOHSC has currently invested approximately $160,000 to undertake the review of the 1988 documents. Each State and Territory government would need to invest a similar amount of resources to develop and implement alternative guidance material.

4.2.4 Benefit to government

There is no benefit to the Australian Government or State or Territory governments by maintaining the 1988 NOHSC documents.

4.2.5 Costs to general community

Maintaining the 1988 NOHSC documents will not reduce exposures to asbestos, however, due to the current rate of demolition of buildings containing ACM, it is reasonable to expect that all ACM will be removed from workplaces by approximately 2030. As indicated previously, although the 1988 NOHSC documents provide guidance for minimising exposures to asbestos, there are gaps in the application of the documents and in relation to current best practice methods for managing, controlling and removing ACM. These gaps mean that workplace exposures may still occur.

As previously indicated in section 4.1.2.1, current asbestos regulation does not impose requirements to remove asbestos that is in good condition. As a result workplaces which contain ACM would be unlikely to remove the ACM.

Based on the estimates from section 4.1.2.3 and 4.1.3, the costs to the community associated with these exposures could be at least 341 lives to 2030, at a cost of between

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59 NOHSC (August 2004), The c*ost of work-related injury and illness for Australian employers, workers and the community*, Canberra.
The NOHSC study revealed discrepancies between the payments made by industry, employees, their families and the community, with the community carrying 53%, employees carrying 44% and employers paying only around 3% of costs (see section 4.1.3 and 1.4).

$220.62 million and $2.017 billion, of which between $100.08 million and $915.24 million (44%) will be borne by employees, their families and carers, and between $120.55 million and $1.102 billion (53%) will be borne by the community at large (see section 1.4).[60]

In addition to the costs above, due to the image and history of asbestos use in Australia, fear and concern still exists in the community about persons being exposed when in contact with asbestos products. The family and friends of asbestos exposed workers incur social costs associated with this fear and concern about potential danger to loved ones. These social costs cannot be calculated.

4.2.6 Benefit to general community

There is no benefit to the general community to be obtained by retaining the 1988 NOHSC guidance on asbestos.

4.2.7 Implications for New Zealand

Option one is not expected to have any implications for New Zealand since the Codes only apply to Australian Workplaces and will not have an impact on trade activities.

4.3 Option Two — Revise existing guidance

4.3.1 Cost to business

4.3.1.1 Cost from additional regulation under the Management Code

Assuming that industry already complies with existing jurisdictional regulations for the control and maintenance of asbestos, the costs of adopting the Management Code will be limited and will vary from jurisdiction to jurisdiction.

Table 18 provides an overview of the number of points of regulation[61] of the Management Code that will incur additional costs in each state and territory. These additional points of regulation will fill the gaps identified in the gap analysis and presented in Table 41.

Of the 16 points of regulation contained within the Management Code, 8 are covered by existing regulations in each state and territory and therefore have no additional cost impact. The other 8 points may require business expenditure to attain compliance. In the Queensland (QLD) for example, as can be see from Table 18, there are only four new points of regulation that will require some degree of expenditure on behalf of business because their requirements are not present in the existing QLD regulations. However, a further 5 points of regulation, which are currently covered in the QLD regulations, are optional. As such, some businesses, which opted not to undertake the extra provisions, may be required to perform reassessments of the workplace to identify and assess previously unidentified/not recorded ACM if the Management Code is declared and adopted by QLD.

The activities and associated costs for each additional point of regulation in the Management Code are summarised in Table 17. While it is evident from this table that there will be some continuing costs to business (e.g. reviewing the management plan and risk assessments),

60 ibid

61 The Points of regulation were identified in the gap analysis and are listed in Appendix C, Table 41

these costs will decline over time as ACM is removed and the number of workplaces with ACM declines.

TABLE 17: NEW POINTS OF REGULATION AND ASSOCIATED COSTS FOR THE MANAGEMENT CODE

Activities	Point of Regulation	Costs
Risk assessment and monitoring	Competent person to conduct risk assessment	Training / Labour
	Material sampling and analysis	Labour
Signage and labelling	Labelling of asbestos products	Labour / Materials
	Signage for maintenance work	Labour / Materials
Planning	Presumption Criteria	Potential cost saving
	Management plan	Labour
	Review of management plan	Labour
	Procedures to control access to, and maintenance on, ACM.	Labour

TABLE 18: NEW POINTS OF REGULATION, BY JURISDICTION, ARISING FROM THE MANAGEMENT CODE.

Jurisdiction	New points of regulation (Total of 18 new points in the Management Code)	New Points of Regulation with an Associated Cost
ACT	3	3
NSW	4	3
NT	6	5
QLD	4 (+ 5 partial compliance)	8
SA	4	2
TAS	6	5
VIC	3	3
WA	5	4

The direct costs to business associated with complying with the new points of regulation are presented in Table 19. The costs provided are only indicative of the potential costs that may arise from State or Territory adoption of the Management Code, and will vary between workplaces. Aspects which may effect the actual costs in different workplaces include the:

- size of the workplace and number of work sites;
- number of employees;

- degree of OHS training previously provided;
- training provider costs;
- degree of reliance on external consultants to undertake the required work; and
- extent to which ACM is present.

TABLE 19: COSTS TO BUSINESS ASSOCIATED WITH NEW POINTS OF REGULATION OF THE MANAGEMENT CODE

Regulation Requirement	Task Performed	Components	Costs (Labour Hours[62] and Materials)	Total Component Cost
Identification and risk assessment	Training to visually identify ACM.	Training of an employee in visual identification of ACM[63]. One day training per person • $110 Course fees • 6 hrs study time	$110 + (6hrs x $25/hour)	= **$260**
	Identification performed by an internal OHS professional.[64]	One to two days labour	7.5 to 15hrs x $25/hour	= $187.50 to $375 **Average Cost = $281.25**
	Risk assessment performed by an internal OHS professional.	One to two days labour	7.5 to 15hrs x $25/hour	= $187.50 to $375 **Average Cost = $281.25**
	Identification and risk assessment conducted by an external consultant.	One to two days professional identification and risk assessment of ACM	7.5 to 15hrs x $180/hour	= $1,350 to $2,700 **Average Cost = $2,025**
Material sampling and analysis[65]	Professional Analysis by a National Association of Testing Authorities (NATA) approved Laboratory	$55 - $275 per sample tested	Average Cost ($55 + $275)/2	= $165 per sample

62 Daily hours worked are based on a 37.5 hour working week (7.5 hours per day). Hourly wage rates have been calculated at a rate of $25 per hour for a OHS Professional. Information taken from the Australian government, Australian Careers Website. Accessed on 5/10/2004 at http://jobsearch.gov.au/joboutlook/default.aspx?PageId=AscoDesc&AscoCode=2543. This information is based on ABS data from *Employee Earnings, Benefits and Trade Union Membership*, August 2003, Publication Number 6310.0.

63 One to two days training per person in a course such as the Construction Industry Training Centre Inc's 'Asbestos Identification & Registers' course. Accessed on 5/10/2004 at http://www.citc.com.au/files/Asbestos%20ID%20&%20Registers.pdf

64 An internal OHS professional is recognised as a person holding the appropriate training or qualifications to undertake the task. This may include managers and OHS representatives.

65 Indicative quote in an email obtained from Pickford and Rhyder Consulting on 6/10/2004.

Regulation Requirement	Task Performed	Components	Costs (Labour Hours[62] and Materials)	Total Component Cost
	Professional Sampling	$0 - $99/hour travel time to site	Average Cost ($0 + $99)/2	= $50/hour
		$60 - $200/hour for on site sample collection	Average Cost ($60 + $200)/2	= $130/hour
	Assuming 10 potential asbestos hazards identified – 10 samples taken and analysed (4 samples collected per hour) and one hour of travel time.		(165 x 10) + 50 + (130 x 2.5hrs)	= **$2,025**
	Note: The costs associated with material sampling and analysis may be negated by utilising the presumption criteria, which is an inclusion of the Management Code (see 4.3.3.3).			
Maintenance of the asbestos register.	Register maintained by an internal OHS professional.	One to two days labour per work site per annum to keep the ACM register up to date.	7.5 to 15hrs x $25/hour	= $187.50 to $375 p.a. **Average Cost = $281.25**
Labelling of asbestos products.	Labelling performed by an internal OHS professional.	One to two days labour per work site.	7.5 to 15hrs x $25/hour	= $187.50 to $375 p.a. **Average Cost = $281.25**
		or		
		Labour - 10 labels/hour	$25/hour	= **$25/hour**
		or		
		Labour - 2 hazard warning signs/hour	$25/hour	= **$25/hour**
	Signage materials for maintenance work – Retail	Materials	(See Table 20) 3 Warning Signs and 50 metres of hazard tape (materials are reusable).	= **$221**
Signage for maintenance work.	Erection of signage and barriers performed by an internal OHS professional.	One to two days labour per work site per year	7.5 to 15hrs x $25/hour	= $187.50 to $375 p.a. **Average Cost = $281.25**
	Signage materials – Retail	Materials	(See Table 20)	
Development of a management plan.	Management Plan developed by an internal OHS professional.	One to five days labour per work site.	7.5 to 37.5hrs x $25/hour	= $187.50 to $937.50 **Average Cost = $562.50**

Regulation Requirement	Task Performed	Components	Costs (Labour Hours[62] and Materials)	Total Component Cost
Review of the management plan.	Review conducted by an internal OHS professional.	One to two days labour per work site per year.	7.5 to 15hrs x $25/hour	= $187.50 to $375 p.a. **Average Cost = $281.25**
Procedures for controlling access to, and maintenance work, on ACM.	Performed by an internal OHS professional.	One to two days labour per work site per year.	7.5 to 15hrs x $25/hour	= $187.50 to $375 p.a. **Average Cost = $281.25**
		or		
		One to two hours per object or hazard site per year.	Assuming five hazards 5 x (1 to 2hrs x $25/hour)	= $125 to $250 p.a **Average Cost = $187.50**

TABLE 20: ASBESTOS LABELLING AND SIGNAGE COSTS

Type	Material	Size	Price (inc GST)	Qty
Hazard / Warning Stickers[66]	Self Adhesive Vinyl Sticker	150mm x 100mm	$27.50	Pack of 5
Hazard / Warning Signs[67]	2mm PVC sign	300mm x 200mm	$22.00	1
Hazard / Warning Tape[68]	0.1mm Polyethylene printed Hazmat Tape	75mm x 300	$77.50/m	25m

Table 21 below provides and indication of the initial costs of implementation of the new points of regulation to business by State. These figures are based on information on costs presented in Table 19. Appendix F provides a detailed break down of the individual cost components as they apply to individual states and territories.

66 Catalog price obtained from Seton's website, 5 October 2004, http://www.seton.net.au/product_detail.cfm/hurl/Masterno=18860W/product_detail.cfm

67 E-mail quote received by the NOHSC Office from SIGNWAVE Penrith, 5 October 2004.

68 ibid

TABLE 21: COST OF REGULATION UNDER THE MANAGEMENT CODE TO BUSINESS BY STATE

State	Average first year cost per business	Number of Businesses[1]	Total first year cost
NSW	$1,997	123,203	$246,036,400
Vic	$1,997	91,797	$183,318,600
Qld	$4,580.50	72,052	$330,034,200
SA	$843.75	26,759	$22,577,900
WA	$1,346.00	41,857	$56,339,500
TAS	$4,303	7,915	$34,058,200
NT	$4,303	3,155	$13,576,000
ACT	$1,064.75	6,647	$7,077,400
Total	-	**373,385**	**$893,018,200**

1 Figures taken from Table 9.

As can be seen from the extrapolation and estimates in Table 46 at Appendix G, at the current rate of removal of ACM from workplaces the additional requirements of the Management Code could be expected to incur costs of approximately $2.15 billion over the next 25 years.

However, given that the current rate of removal of ACM from workplaces is based on the estimated useful life of a building of 40 years and does not take into account current rates of voluntary removal of ACM (which cannot be determined due to a lack of information in this area), it is reasonable to assume that implementation of the Management Code will result in a 100% increase on the base removal rate from workplaces for ACM. Using the 100% increase in removal rate scenario, the total implementation and ongoing costs of the Management Code may be approximately $1.5 billion over 13 years to 2018. Appendix I provides a detailed breakdown of the potential impact of each scenario provided at Appendix J with regards to the ongoing costs of the Management Code.

4.3.1.2 Cost from additional regulation under the Removal Code

Assuming that industry already complies with existing jurisdictional regulations for the removal of asbestos, the costs of adopting the Removal Code will be limited and will vary from jurisdiction to jurisdiction. The costs outlined here will generally apply to licensed asbestos removalists; however, these costs may be passed on to clients in the form of higher costs for removal of ACM.

Where gaps occur in the current regulation, some of these gaps are already self-regulated within the removal industry. Based on feedback from NOHSC workshops, the requirements of the Removal Code represent best practice in the asbestos removal industry, with the majority of the added provisions already being employed. Thus in many circumstances the added provisions of the Code will not significantly increase costs to business. The estimated cost to business calculated for the purpose of this RIS represents a worst-case scenario, as it is assumed that businesses do not already comply with the new points of regulation.

Table 23 provides an overview of the number of new points of regulation of the Removal Code in each state and territory. The additional points of regulation will fill the gaps identified in the gap analysis and presented in Table 43 in Appendix D.

Of the 17 points of regulation in the Removal Code[69], 2 are covered by existing regulations in all states and territories and therefore have no cost impact. Of the remaining 15 points, 8 are expected to require some form of business expenditure to ensure compliance; 7 provide clarification on current practices for preventing contamination and transportation of asbestos dust. Expenditure cost categories are outlined in Table 22.

TABLE 22: NEW POINTS OF REGULATION AND ASSOCIATED COSTS FOR THE REMOVAL CODE

Activities	Point of Regulation	Costs
Disposal	All plastic sheeting used for enclosures not to be reused and to be disposed of as asbestos waste.	Equipment
Enclosures	Stop work upon detection of a leak.	Labour
	Repeat smoke test after detection of a leak.	Labour
	Person to be stationed outside the enclos ure.	Labour
Planning	Emergency and First Aid Plan	Labour
	Asbestos removal control plan.	Labour
	Risk assessment to be performed before commencing work.	Labour
	Risk assessment to be reviewed when new asbestos found.	Labour

During consultation with asbestos removal industry representatives during the draft Codes and Guidance Notes public comment period, NOHSC was informed that the two new points of regulation relating to the disposal of plastic sheeting used for asbestos enclosures and requirement to stop work upon detection of a leak are already asbestos removal industry best practice. Therefore, the provision of these requirements in the Removal Code is a reflection of current best practice precautions. As a result of this information, the costs associated with these two points of regulation have not been costed in the final costs provided in . Indicative costs of these two additional points of regulation have, however, been provided in Table 24 for information purposes.

69 While 18 new points of regulation were identified in Table 43, only 17 points have been counted for costing purposes. The expanded scope is not expected to have a direct cost impact itself, rather the remaining 17 points will have cost implications for workplaces previously not covered by the original guidance, but which are now covered under the expanded scope.

TABLE 23: NEW POINTS OF REGULATION, BY JURISDICTION, ARISING FROM THE REMOVAL CODE.

Jurisdiction	New points of regulation (Total of 17 new points in the Removal Code)	New Points of Regulation with an Associated Cost
ACT	15	8
NSW	9	4
NT	13	8
QLD	5	2
SA	10	5
TAS	13	8
VIC	8	4
WA	14	8

The cost implications of the new points of regulation to asbestos removalists is presented in Table 24. It is difficult to determine the likely cost implications of the Removal Code given the number of variables, which may impact on the cost incurred. Thus, the costs provided in Table 24 are indicative only of the potential costs that may arise from state or territory adoption of the Removal Code. The costs will vary among workplaces and are based on assumptions of the likely requirements to undertake each task costed.

Aspects which may effect the application of the costs include the:

- size of the workplace and number of work sites;
- number of employees;
- amount of ACM to be removed;
- type of ACM to be removed; and
- individual state and territory waste disposal costs.

Although there are a number of variables which impact upon the costs of the proposed new points of regulation, an attempt has been made to calculate the average cost to an asbestos removalist. Appendix H attempts to provide a breakdown of potential average costs to an asbestos removalist by State of operation, based on assumptions of an average removal job.

The cost of the new regulation to businesses engaging an asbestos removalist is somewhat more difficult to calculate. One of two scenarios is possible. Under the first scenario, asbestos removalists may pass on all of the additional costs of regulation to customers. Alternatively, under the second scenario, the costs incurred by business could be absorbed by business as a result of market pressures to maintain pricing. However, given the size of the estimated costs (i.e. approximately $2,600 to $3,800, see Table 26), a more feasible outcome is likely to be a mixture of scenario one and scenario two, with a proportion of costs being absorbed by asbestos removalists and the remaining portion being passed on to consumer businesses. The number of variables which may impact upon the apportioning of these costs makes it impossible to reliably calculate the final impact of the proposed additional regulation on both the asbestos removal industry and consumer businesses.

TABLE 24: COSTS TO BUSINESS ASSOCIATED WITH NEW POINTS OF REGULATION OF THE REMOVAL CODE

Regulation Requirement	Task Performed	Components	Costs (Labour Hours[70] and Materials)	Total Component Cost
Disposal	Disposal of plastic sheeting as asbestos waste.[71]	Materials	(See Table 25) Average Cost = $0.66m^2$	
Large-scale removal - stop work upon detection of a leak.	All work by the licensed asbestos removalist stopped. Costs incurred through downtime until the leak is sealed.	Hourly cost of labour - Cost will depend on variables such as number of employees and time taken to find and seal any leaks.	1hr x $23/hour = $23/hr per employee engaged	**5 employees = $115**
Large scale removal - repeat smoke test after detection of a leak	All work by the licensed asbestos removalist stopped. Costs incurred through downtime.	Hourly cost of labour - Cost will depend on variables such as number of employees, size of the removal area and time taken to smoke test the enclosure.	1hr x $23/hour = $23/hr per employee engaged	**5 employees = $115**
Large scale removal - person to be stationed outside the enclosure	Licensed asbestos removalist to oversee removal from outside enclosure.	Labour	$23/hour	**$23/hr or $172.50 per day**
	Assuming an average large-scale removal task will take approximately 15 working days.			**$2,587.50**
Emergency and First Aid Plan	Emergency and first aid plan developed by the asbestos removalist or OHS professional, taking into account current building and worksite emergency plans.	Two to three hours labour	2 to 3hrs x $23/hour	= $46 to $69 **Average Cost = $57.50**

70 Daily hours worked are based on a 37.5 hour working week (7.5 hours per day). Hourly wage rates for a licensed asbestos removalist have been calculated at an average rate of $23 per hour (nearest dollar), based on an average weekly earning of $848.70 in the construction industry, and 37.5 hours worked. This figure does not include employer costs such as leave entitlements and insurances. Information taken from the Australian Bureau of Statistics (ABS), Average Weekly Earnings, Australia 2004, publication number 6302.0.

71 Disposal costs for disposing of asbestos waste at a licensed waste facility capable of accepting asbestos wastes varies significantly according to jurisdiction and has not been costed here.

Regulation Requirement	Task Performed	Components	Costs (Labour Hours[70] and Materials)	Total Component Cost
Asbestos Removal Control Plan	Asbestos removal control plan developed by asbestos removalist.	One to three days labour - Cost will depend on variables such as friability of the ACM, amount of ACM to be removed.	7.5 to 22.5hrs x $23/hour	= $172.50 to $517.50 **Average Cost = $345**
Risk assessment to be performed before commencing work.	Risk assessment performed by asbestos removalist[72].	One hour to one day labour - Cost will depend on variables such as friability of the ACM, amount of ACM to be removed.	2 to 7.5hrs x $23/hour	= $46 to $172.50 **Average Cost = $218.50**
	Risk assessment performed by an internal OHS professional or internally trained asbestos removalist.	Competency training for asbestos removal work: • Course fees[73] – • one day = $150 • three days = $500	(7.5hrs x $23/hour) + $150 to (22.5hrs x $23/hour) + $500	= $322.50 to $1,017.50 **Average Cost = $670**
		One to two days labour	7.5 to 15hrs x $25/hour	= $187.50 to $375 **Average Cost = $281.25**
			Total average cost	**$951.25**
	Note: The costs associated with performing a risk assessment may be negated by utilising previous risk assessments conducted for similar tasks (i.e. a risk assessment for the removal of a set of asbestos brake pads may be reused for the removal of another set of asbestos brake pads).			
Risk assessment to be reviewed when new asbestos found.	Risk assessment performed by asbestos removalist[3].	Cost estimated at half the cost to perform the original risk assessment.	1 to 3.75 x $23/hour	= $23 to $86.25 **Average Cost = $54.65**

[72] Assuming a licensed removalist is required to be competent in performing a risk assessment in order to obtain an asbestos removal license.

[73] Asbestos training courses and fees obtained from several sources and accessed on 12/10/2004 at:

Construction, Forestry, Mining and Energy Union (CFMEU), *Encapsulate and Remove Asbestos* - http://www.myfuture.edu.au/services/default.asp?FunctionID=5350&CourseID=18678

NSW TAFE, *Asbestos Removal* - http://www.hunter.tafensw.edu.au/images/uploaded/Commercial_1_2005.pdf

Master Plumbers and Mechanical Services Association of Australia, *Asbestos Removal* - http://www.plumber.com.au/plumbingindustry/Education/courses.asp

Construction Skills Training Centre, *Safe Removal and Disposal of Asbestos* - http://www.cstc.com.au/cstc

Ibid, *Safe Treatment, Removal and Disposal of Asbestos Cement Sheeting* - http://www.cstc.com.au/cstc

TABLE 25: PLASTIC SHEETING COSTS

Type[74]	Material	Size	Price (inc GST)
Plastic Sheeting (black)	Poltethylene – industrial grade	2m x 50m x 200µm	$57.26 ($0.57m ^{2})
Plastic Sheeting (clear)	Poltethylene – industrial grade	2m x 50m x 200µm	$76.53 ($0.77m ^{2})
Plastic Sheeting (black)	Poltethylene – industrial grade	4m x 50m x 200µm	$99.80 ($0.50m ^{2})
Plastic Sheeting (clear)	Poltethylene – industrial grade	4m x 50m x 200µm	$159.74 ($0.80m ^{2})

It is not possible to determine the number of removal jobs that may be required to remove all asbestos from workplaces. However, if a basic rule of thumb is applied that all workplaces containing ACM will require at least one job, and that all workplaces containing friable ACM will also require one friable removal job (i.e. workplaces with friable asbestos will require one typical removal job as well as one friable removal job) then the cost of implementing the Removal Code may be approximately $261,196,686 if it is assumed that 100% of the increased costs are passed on to consumers. This cost is a static cost that is not impacted upon by the varying rates of removal of ACM from workplaces.

Table 26 below provides an indication of the likely costs associated with implementation of the Removal Code by State. The figures presented in Table 26 are based on information and estimates from Appendix H.

[74] Material costs obtained online from http://www.etsonline.com.au/default.php?cPath=4_66. Accessed on 13/10/2004.

TABLE 26: AVERAGE COST OF REGULATION UNDER THE REMOVAL CODE TO BUSINESS, PER JOB, BY STATE

State	Number of Workplaces Containing ACM (2005)	Number of Workplaces Containing Friable ACM (2005)[1]	Average Additional Cost for All Asbestos Removal Work	Average Additional Cost for Friable Asbestos Removal Work	Additional Cost for All Asbestos Removal [2]	Additional Cost for Friable Removal [3]	Total Additional Cost [4]
NSW	123,203	23,409	$0	$2,703	$0	$63,274,527	**$63,274,527**
Vic	91,797	17,441	$57.50	$2587.50	$5,278,328	$45,128,588	**$50,406,915**
Qld	72,052	13,690	$57.50	$2587.50	$4,142,990	$35,422,875	**$39,565,865**
SA	26,759	5,084	$57.50	$2,703	$1,538,643	$13,742,052	**$15,280,695**
WA	41,857	7,953	$1,042.05	$2,702.50	$43,617,087	$21,492,983	**$65,110,069**
TAS	7,915	1,504	$1,042.05	$2,702.50	$8,247,826	$4,064,560	**$12,312,386**
NT	3,155	599	$1,042.05	$2,702.50	$3,287,668	$1,618,798	**$4,906,465**
ACT	6,647	1,263	$1,042.05	$2,702.50	$6,926,506	$3,413,258	**$10,339,764**
Total	**373,385**	**70,943**	**$4,341**	**$21,391**	**$73,039,048**	**$188,157,641**	**$261,196,686**

1 These figures are 19% of the Number of Workplaces Containing ACM (see section 4.1.2.1)

2 **Additional Cost for All Asbestos Removal =** Number of Workplaces Containing ACM (2005) x Average Additional Cost for All Asbestos Removal Work

3 **Additional Cost for Friable Removal =** Number of Workplaces Containing Friable ACM (2005) x Average Additional Cost for Friable Asbestos Removal Work

4 **Total Additional Cost =** Additional Cost for All Asbestos Removal + Additional Cost for Friable Removal

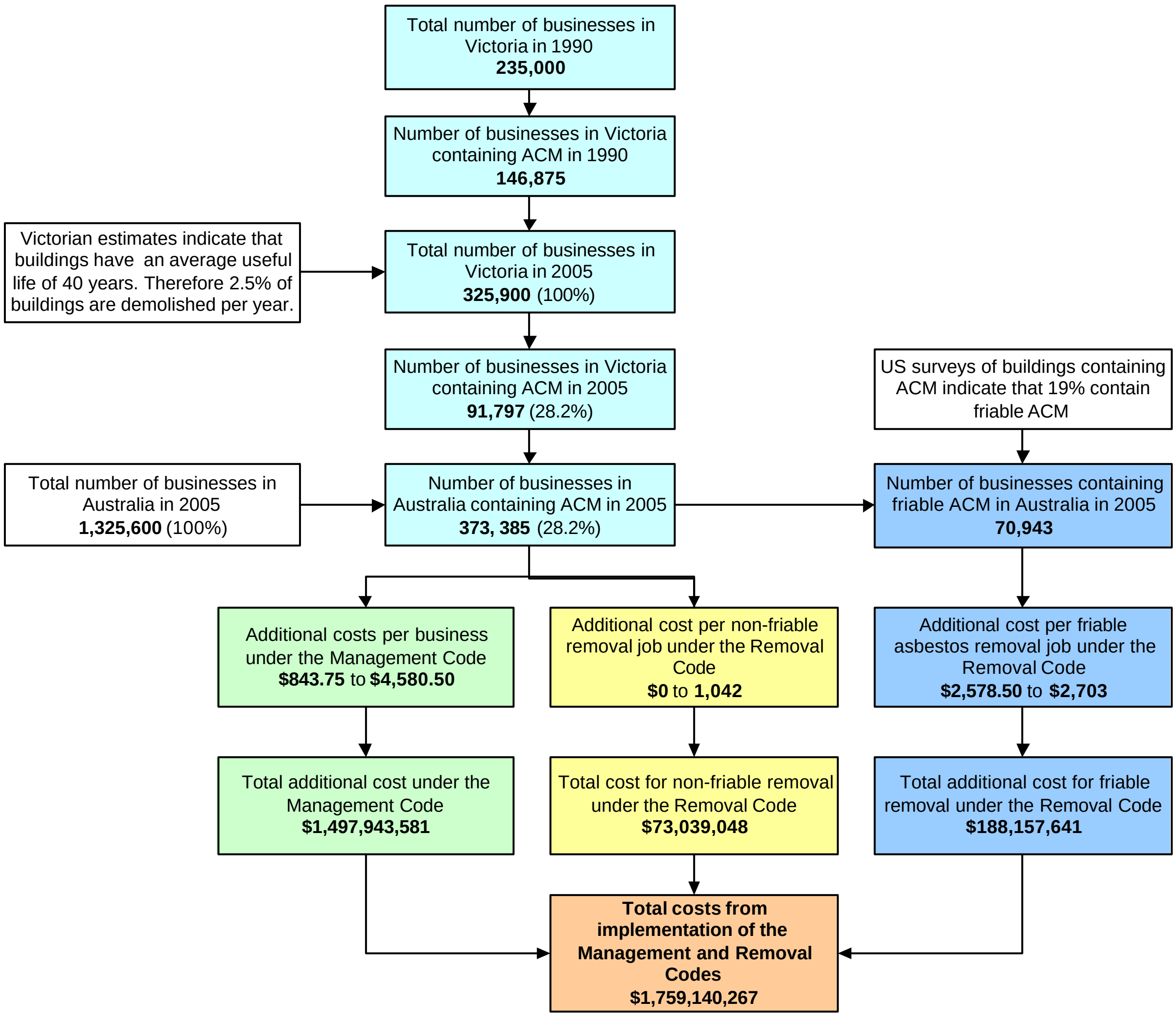
4.3.1.3 Summary of Costs to Business

The total cost that may be expected from implementation of Option Two is approximately $1.76 billion over 13 years to 2018. Of this total, approximately $261 million relates to costs of the Removal Code and $1.5 billion relates to costs of the Management Code (see Table 27).

TABLE 27: SUMMARY OF COSTS TO BUSINESS ASSOCIATED WITH OPTION 2

	Total Estimated Cost
Management Code	$1,497,943,581
Removal Code	$261,196,686
Total	**$1,759,140,267**

FIGURE 3: SUMMARY FLOWCHART OF COSTS TO BUSINESS OF NEW MANAGEMENT AND REMOVAL CODES



4.3.2 Overall benefits

Under current regulation at least 341 cases of mesothelioma and asbestos-related lung cancer could be expected to occur over the next 25 years as a direct result of work-related exposure to respirable asbestos fibres. This estimate is based on the current rate of demolition of buildings containing ACM. By implementing the Management Code, several new regulatory aspects will be introduced, the main of which is a provision for the development of an asbestos management plan wherever asbestos is identified in a workplace. The management plan focuses on the management of friable and poorly maintained or damaged ACM out of workplaces and thus will effectively increase the rate at which asbestos is removed from workplaces. It is not possible to calculate the increase in the rate of removal of ACM from workplaces as a result of implementation of the Management Code. However, several scenarios may be posed and estimates made to provide an indication of the potential benefits from implementation of the Management Code. Appendix I provides a detailed analysis of potential costs from implementation of the Management Code based on varying increases in the rate of removal of asbestos from workplaces. Table 28 below provides a summary of the information provided at Appendix I.

TABLE 28: BENEFITS FROM IMPLEMENTATION OF THE MANAGEMENT CODE

	Current rate of removal of ACM remains unchanged at 2.5% of original total per year	10% increase in rate of removal of ACM	25% increase in rate of removal of ACM	50% increase in rate of removal of ACM	75% increase in rate of removal of ACM	100% increase in rate of removal of ACM	150% increase in rate of removal of ACM	200% increase in rate of removal of ACM
Total new cases of asbestos-disease [1]	341	314	280	239	208	185	154	131
Lives saved	0	27	61	102	133	156	187	210
Min Value of Lives saved ($,000)	-	$18,009	$40,687	$68,034	$88,711	$104,052	$124,729	$140,070
Max Value of Lives Saved ($,000)	-	$164,700	$372,100	$622,200	$811,300	$951,600	$1,140,700	$1,281,000

1 Includes mesothelioma and asbestos-related lung cancer. Excludes asbestosis.

As can be seen from the estimates provided at Appendix J, the benefits from implementation of the Management Code, which will lead to increased removal of ACM, vary significantly depending on the rate at which removal of ACM increases.

Given that the current rate of removal of ACM from workplaces is based on the estimated useful life of a building of 40 years and does not take into account current rates of voluntary removal of ACM (which cannot be determined due to a lack of information in this area), it is reasonable to assume that implementation of the Management Code will result in a 100% increase on the base removal rate from workplaces for ACM. Using the 100% increase scenario summarised in Table 28, it can be estimated that implementation of the Management Code will save at least 156 lives at a value of between $104 million and $951.6 million.

Any increase or decrease in the rate of removal above or below the 100% increase will also impact upon the likely ongoing costs of the Management Code since as ACM is managed out of more workplaces, fewer workplaces will incur the associated ongoing costs of managing in situ ACM and vice-versa.

Table 29 provides a breakdown of employer, employee and community savings. These calculations are derived from the proportions identified in section 1.4, as applied to the value of lives saved through implementation of the Management and Removal Codes based on a 100% increase in the rate of removal of asbestos.

TABLE 29: PROPORTIONATE BREAKDOWN OF EMPLOYER, EMPLOYEE AND COMMUNITY SAVINGS THROUGH LIVES SAVED

156 lives saved	Total Saving	Employer (3%)	Employee (44%)	Community (53%)
Minimum	$104,052,000	$3,121,560	$45,782,880	$55,147,560
Maximum	$951,600,000	$28,548,000	$418,704,000	$504,348,000

Conversely Table 30 provides a breakdown of the employer, employee and community costs that will continue to be incurred as a result of the remaining 185 cases of asbestos-related lung cancer and mesothelioma that would still occur.

TABLE 30: PROPORTIONATE BREAKDOWN OF CONTINUING EMPLOYER, EMPLOYEE AND COMMUNITY COSTS THROUGH LIVES LOST

185 lives lost	Total Cost	Employer (3%)	Employee (44%)	Community (53%)
Minimum	$123,395,000	$3,701,850	$54,293,800	$65,399,350
Maximum	$1,128,500,000	$33,855,000	$496,540,000	$598,105,000

4.3.3 Benefit to business

Several benefits can be derived for business by implementing the Management and Removal Codes. These benefits include:

- National consistency (see section 4.3.3.1);
- Decreased employee exposure and compensation premiums (see section 4.3.3.2); and
- Material testing costs savings through use of the 'presumption criteria' (see section 4.3.3.3).

In addition to these benefits, business could also be expected to benefit through other factors such as decreased down-time due to industrial action sparked by workplace asbestos concerns. However, it is not possible to place a monetary value on the benefits these factors may incur.

4.3.3.1 National consistency

A nationally consistent approach to the management, control and removal of asbestos will mean that national corporations will only need to comply with one set of regulations. This will result in savings in terms of money, time and labour, which would otherwise be required to ensure compliance with individual State and Territory regulations.

4.3.3.2 Decreased employee exposure – compensation premiums

In general terms workers compensation insurance premiums are based on past industry and individual workplace experience. Fewer claims mean a lower worker compensation for that business. A business may influence the premium by introducing occupational health and safety management systems and prevention strategies.

The State/Territory governments advocate the use of occupational health and safety management systems as a way for business to reduce their workers compensation premiums. In NSW a Premium Discount Scheme (PDS) is offered whereby a business, which among other things incorporates risk management and process control strategies, can save significant amounts off their insurance premium. Thus, by implementing the requirements of Management and Removal Codes, businesses may experience savings in insurance premiums, ranging into thousands of dollars per employer.

If the base rate of removal of ACM is increased by 100%, as summarised at Table 28, then the lives of at least 156 employees could be saved at a value of between $104 million and $951.6 million. Section 1.4 identified the apparent distribution of costs from work-related injury and disease between the employer, employee and the community. From the research conducted it was estimated that 3% of the total costs of work-related injury and disease is born by employers. Given this information, employers could expect to save between $3.12 million and $28.55 million (see Table 29).

4.3.3.3 Presumption criteria: Material testing cost savings

The inclusion of the presumption criteria in the Management Code allows cost savings to be made by business in the identification of ACM. Rather than taking samples of asbestos material to determine whether it contains asbestos, the person in control may presume the material contains asbestos. Once such a presumption is made, the material must be treated as if it has been identified as ACM until it is either removed, or testing has been carried out that establishes that it does not contain asbestos. For example, this may apply where there are wall cavities or ceiling spaces that are likely to contain ACM such as asbestos insulation. It may be more cost effective to apply the presumption criteria rather than carry out sampling and analysis of suspect ACM, which would otherwise be required to rule out the presence of asbestos.

The application of the presumption criteria would be based on a simple cost/benefit analysis of the number of potential ACM, the cost of conducting sampling and analysis to either prove or disprove the presence of asbestos and the likelihood of a positive result (i.e. that asbestos is present), against the total cost of treating the materials as ACM and sealing or removing the materials as if they were ACM.

The potential cost savings arising from this part of the Management Code will vary from workplace to workplace and under different circumstances. An example of how the potential cost savings may be realised is shown below.

Example: Savings from use of the presumption criteria

A controller of premises has conducted a survey of the workplace to identify ACM. The survey indicates that there are 10 confirmed materials/items/locations that contain asbestos (evident through means not requiring sampling or analysis, such as the presence of labels and/or knowledge that the material is asbestos i.e. fibro) and that a further 20 could contain asbestos.

The controller of the premises intends to remove all ACM, regardless of friability. A quote obtained from a professional analyst indicates that the cost of sampling and analysis would be approximately $4000 (i.e. using costs presented in Table 19 and based on 20 samples, 5 hours for sample collection and one hour travel time).

Two quotes are also obtained from a licensed asbestos removalist to remove either 10 or 30 items of ACM (e.g. fibro panels, gaskets, insulation etc). The quotes are $10,000 and $35,000 respectively[75].

Since asbestos has been identified as present in 10 items in the workplace, there is a high likelihood that the other 20 potential ACM contain asbestos.

If the controller of the premises chooses to treat the 20 potential ACM as ACM, then a saving of $4,000 is made, assuming that all potential ACM did in fact contain asbestos.

If, however, the 10 confirmed ACM were confined to a particular area of the workplace, such as gaskets, seals and lagging on an item of plant, and the 20 potential ACM were located throughout the rest of the premises in various forms and locations, then the likelihood that the potential ACM would in fact be ACM could be low. Under these circumstances, the controller of the premises may decide to have samples of the 20 potential ACM taken and analysed. If all results were negative for asbestos, then the cost of analysing 20 samples and removing 10 ACM would be $14,000, or a saving of $21,000 (based on the quote to remove 30 ACM).

4.3.4 Implications for Small Business

Implementation of the Asbestos Codes is expected to impact upon all business, regardless of size. However, the degree to which new costs associated with the Codes will impact upon businesses will vary according to the amount of asbestos present in the workplace.

It is recognised that small businesses may be less likely to absorb the new costs of the Management and Removal Codes, however, several factors, which are embedded within the Codes, provide alternative cost-saving measures that can be applied without compromising employee's health. These factors include:

[75] These figures are examples only and do not indicate the actual costs of removal for friable and non-friable ACM. They are provided solely for the purpose of highlighting the application of the presumption criteria. The figures are, however, based on the removal costs presented in the WorkSafe Victoria (2003), Regulatory Impact Statement: Proposed Occupational Health and Safety (Asbestos) Regulations 2003, Victoria WorkCover, 2003, p.33.

- The provision of the presumption criteria, discussed above in section 4.3.3.3, will allow small business to reduce the costs that may otherwise be associated with identification of ACM, which is currently required under the majority of State and Territory asbestos regulation (all except Queensland which only requires the identification of friable ACM as opposed to other States and Territories requiring identification of all ACM);
- While all businesses with ACM at the workplace will be required to prepare an asbestos management plan, small businesses are expected to have less complex operating environments than larger businesses and therefore asbestos management plans for small business are not expected to be onerous or costly; and
- Although removal is listed as a primary consideration, options such as the maintenance and safe management of in situ materials are also provided. Therefore, small businesses, which cannot afford immediate removal as the primary consideration, may elect to manage in situ ACM so long as it remains in good condition and does not pose a risk to health.

4.3.5 Costs to government

The majority of States and Territories have adopted the 1988 Removal Code and it is anticipated that the revised Removal Code will similarly be adopted by the jurisdictions. As such there would be no change in inspectorate costs, as it is assumed that the OHS authorities already have a compliance role in relation to asbestos. Adoption of the Removal Code will result in costs associated with awareness programs. Such costs will be diminished by the extent of costs that would have been expended on awareness and maintenance of the 1988 Code and may overlap into awareness strategies already in place for the prohibition of chrysotile asbestos.

Most jurisdictions have adopted the 1988 Code, Guide and Guidance Note into their regulations, therefore revised NOHSC documents should not significantly impact on costs associated with updating jurisdictional regulation beyond the cost of adoption and provision of advice to business.

The 1988 Code, Guide and Guidance Note have been reviewed at a cost of approximately $160,000, borne by the Australian Government as consultant and administration costs. The costs include the use of NOHSC resources to finalise the declaration and release the revised NOHSC documents.

4.3.6 Benefit to government

A component of Governments overall aims are to support and encourage business growth. Publication of the Management and Removal Codes and the MFM Guidance Note will provide a nationally consistent OHS model for businesses to adopt. National consistency promotes business growth and investment in Australia.

Benefits to Government, at a federal and state level, arise primarily from the avoidance of increased health, legal and social costs from the incidence of asbestos-related diseases.

At the State/Territory level, provision of the revised NOHSC Codes and Guidance Note provides a useable nationally consistent model on which to base educational programs. The use of a nationally consistent model enables the States and Territories to share expertise and so minimise the costs associated with developing individual training packages.

A continuing Australian Government initiative is to reduce the incidence and severity of occupational injury and disease in Australia. By implementing Option Two, the Australian Government will be able to fulfil its obligations to achieve this outcome.

4.3.7 Cost to general community

The costs to the general community cannot be quantified as these depend on the employer and market response to the increased costs that will result from a declaration of the revised Management and Removal Codes and MFM Guidance Note. Two scenarios could result.

Under the first scenario, declaration of the revised Management and Removal Codes and MFM Guidance Note may lead to increased costs to the community through increased fees for services where asbestos is involved. Given that guidance material already exists for asbestos, these costs are expected to be minimal. Domestically, increased costs could apply to situations such as maintenance work on an asbestos meter board or the removal of household ACM. In these situations added requirements for personal protective equipment, maintenance procedures, decontamination of the work area and associated training are likely to incur additional costs to business, which will be passed on to consumers. The proportion of these costs that will be passed on to the general community in not known.

However, given that the provisions of the Management and Removal Codes incorporate allowances such as the generic application of risk assessments to specified tasks and the use of presumption criteria, the likely costs could be minimised and spread across the business, thereby reducing the cost impact on any one consumer.

Alternatively, under the second scenario, the costs incurred by business could be absorbed by business as a result of market pressures to maintain pricing.

Additonally, costs to the community are further mitigated by the fact that the majority of costs that would result from the Management and Removal Codes costs apply to the removal of friable ACM, which, as discussed in section 4.1.2.1, is estimated to comprise approximately 20% of all ACM. Friable ACM is generally found in items such as lagging and insulation for pipes and is less common in domestic premises than could be expected in workplaces.

4.3.8 Benefit to general community

The benefit to the general community will be a greater consistency in the management, control and removal of in situ asbestos, leading to improved health and safety outcomes.

As discussed in section 4.3.2, savings in terms of lives and the economy will be directly related to the rate at which ACM is removed from workplaces and as the prohibition does not currently present a timeframe for achieving an asbestos-free workplace, it is difficult to reliably calculate the actual savings that may be achieved through Option 2. However, based on assumptions and calculations previously stated in this RIS, an attempt has been made to identify the approximate numbers of asbestos-related lung cancer and mesothelioma that may be expected to occur in Australia over the period 2005-2030. these estimates are presented at Table 47 at Appendix J.

Under the scenario for a 100% increase in the rate of removal of ACM from workplaces, implementation of the Management and Removal Codes may result in the prevention of up to 156 cases of asbestos-related disease (therefore saving up to 156 lives). Thus resulting in a reduction in the number of cases of asbestos-related lung cancer and mesothelioma (and associated deaths) to 185. The prevention of these 156 cases would result in savings of between $104.05 million and $951.6 million of which between $45.78 million and $418.7 million (44%) would be saved by employees, their families and carers, and between $55.15 million and $504.35 million (53%) by the community at large[76] (see section 1.4 and section 4.3.2).

It should also be noted, that the economic benefits of this option would not be immediately recognised as asbestos-related diseases, such as lung cancer and mesothelioma, generally take between 20 and 40 years to manifest. Thus the savings discussed here may not become evident until at least 2025. The

Table 31 provides a summary of the figures presented above.

TABLE 31: SAVINGS TO GENERAL COMMUNITY

Cost to community of maintaining current guidance	**New cases of Mesothelioma and asbestos-related lung cancer (2005-2030)**	341
	Total Cost	
	Cost to Employees	Min - $100,076,680 Max - $915,244,000
	Costs to Community	Min - $120,546,910 Max - $1,102,453,000
Benefit to community of declaring revised NOHSC documents based on an increase in the rate of removal of 100%	**Lives saved (2005-2030)**	156
	Total Savings	
	Savings to Employees	Min - $45,782,880 Max - $418,704,000
	Savings to Community	Min - $55,147,560 Max - $504,348,000

While 156 cases of asbestos-related lung-cancer and mesothelioma will be prevented it should still be noted that 185 cases could still be expected to occur under this option at a total cost to the community of between $119.7 million and $1.09 billion. Of this cost, employees their families and carers will continue to burden a cost of between $54.29 million and $496.54 million while the general community will continue to burden between $65.4 million and $598.11 million (see Table 30).

4.3.9 Implications for New Zealand

Option two is not expected to have any implications for New Zealand since the Codes only apply to Australian Workplaces and will not have an impact on trade activities.

4.4 Summary of options considered

The estimated monetary costs and benefits associated with Option One and Option Two indicate respective costs of approximately $1.2 billion and $2.4 billion. A basic comparison of

[76] NOHSC (August 2004), The c*ost of work-related injury and illness for Australian employers, workers and the community*, Canberra.
The NOHSC study revealed discrepancies between the payments made by industry, employees, their families and the community, with the community carrying 53%, employees carrying 44% and employers paying only around 3% of costs.

these results shows that implementation of Option Two will approximately cost an additional $1.2 billion over the period 2005-2030.

Under Option Two, although the initial implementation of the Management and Removal Codes is expected to incur significant costs, these costs are expected to be outweighed by the long-term benefits associated with a reduction in the number of new cases of mesothelioma and asbestos-related lung cancer.

However, it must be reiterated that the monetary cost and benefit figures provided in this RIS only provide an indication of some of the possible costs and benefits associated with the options considered and, due to a lack of data, many other potential costs and benefits could not be quantified. These include:

- the costs of pain and suffering to workers suffering an asbestos-related disease, and their families and friends, and the benefits that may be obtained by reducing these costs;
- the social costs resulting from the fear surrounding exposure to asbestos, which, regardless of the amount of information provided, is still likely to be an extremely emotive and highly publicised issue; and
- industry downtime due to industrial action sparked by workplace asbestos concerns.

A summary of the impacts on industry, government and the community, associated with each of the options, is provided in Table 32.

TABLE 32: COMPARISON OF COSTS FOR OPTION ONE AND OPTION TWO

		Option One - 341 lives lost	Option Two – 185 lives lost (156 lives saved)
		Cost	Cost
Additional Implementation Costs			
• **Business**		-	**$1,759,140,267** [1]
• **Government**		-	**$160,000**
Cost of lives lost			
• **Employer**	Minimum	$6,823,410	$3,701,850
	Maximum	$62,403,000	$33,855,000
• **Employee**	Minimum	$100,076,680	$54,293,800
	Maximum	$915,244,000	$496,540,000
• **Community**	Minimum	$120,546,910	$65,399,350
	Maximum	$1,102,453,000	$598,105,000
Average Total Cost of Lives Lost		**$1,153,773,500**	**$625,947,500**
Overall Cost		**$1,153,773,500**	**$2,385,247,767**

1 See Table 27.

Regardless of the monetary value of each option, the significant factor in these two options is the reduction in the number of new cases of asbestos-related lung cancer, mesothelioma and other diseases which could be expected to occur as a result of Option Two.

Under Option One, as a result of work-related exposure to asbestos, it was estimated that at least a further 341 cases of asbestos-related lung cancer and mesothelioma could be expected to occur up to 2030 as a result of work with asbestos. By comparison, under Option Two, the number of new cases of asbestos-related lung cancer and mesothelioma that could be expected to occur over the same period is 185. This amounts to a reduction of 156 cases.

Since asbestos-related lung cancer and mesothelioma typically result in death after as little as one year following diagnosis, the minimum 156 cases of asbestos-related lung cancer and mesothelioma prevented would result in the saving of at least 156 lives.

TABLE 33: SUMMARY OF COSTS AND BENEFITS OF OPTION 1

	Government	Industry	Community	Comment
Benefit	• No benefit • There is no anticipated impact of this option for New Zealand.	• No benefit	• No benefit	• There are no anticipated benefits to be gained by maintaining the status quo.
Cost	• State and Territory governments required to develop and maintain guidance to address shortfalls in the current guidance material. • Duplication of guidance material requires duplication of resources spent. • There is no anticipated impact of this option for New Zealand.	• Industry costs associated with identifying and addressing shortfalls in the current guidance material. • Estimated costs of between approximately $6.82 million and $62.4 million associated with workers compensation and medical costs for workers contracting asbestos-related lung-cancer and mesothelioma. • It was not possible to estimate the costs of other asbestos-related diseases and conditions such as asbestosis and pleural plaques.	• 341 lives at an estimated value of between $220.62 million and $2.017 billion. • Costs of pain and suffering to workers contracting an asbestos-related disease. It is not possible to estimate these costs. • Social costs as a result of fear and concern for family and friends exposed to asbestos. It is not possible to estimate these costs.	• By maintaining the status quo at least 341 new cases of asbestos-related lung cancer and mesothelioma could be expected to occur as a result of exposures over the next 25 years. This could cost the Australian economy between $227.45 million and $2.08 billion.
Overall Benefit/Cost	• The average overall costs of maintaining the status quo are approximately 341 lives and $1.2 billion over the next 25 years.			

TABLE 34: SUMMARY OF COSTS AND BENEFITS OF OPTION 2

	Government	Industry	Community	Comment
Benefit	• Most States and Territories have adopted the 1988 Code, Guide and Guidance Note into their regulations, therefore revised NOHSC documents should not significantly impact on costs associated with updating jurisdictional regulation beyond the cost of adoption and provision of advice to business. • Costs to the Australian Government to date has been approximately $160,000 in consultant and administration costs. • There is no anticipated impact of this option for New Zealand.	• Increased national consistency of asbestos regulation and an associated decrease in costs relating to ensuring compliance with multiple regulations. • Savings of between $3.12 million and $28.55 million as a result of reduced cases of asbestos-related lung cancer and mesothelioma. • It was not possible to estimate savings from a reduction in other asbestos-related diseases and conditions such as asbestosis and pleural plaques. • Reduced insurance premiums. This value could not be calculated. • Provisions exist in the proposed regulations to alleviate the impact on small business (i.e. presumption criteria).	• Greater consistency in the management, control and removal of in situ asbestos, leading to improved health and safety outcomes. Over the period 2005-2030 at least 156 cases of asbestos-related lung cancer and mesothelioma will be prevented, thereby saving at least 156 lives at a value of between $104.05 million and $951.6 million. Of these savings between $45.78 million and $418.7 million will be saved by employees, their families and carers, and between $55.15 million and $504.35 million by the community in general. The remaining portion is a saving to industry. • It was not possible to calculate the community benefits that may be gained as a result of decreased fear, pain, suffering and anguish for asbestos-disease sufferers, their family, friends and the community or the quality of those lives and their potential contributions to the community.	• By implementing Option Two at least 156 cases of asbestos-related lung cancer and mesothelioma could be expected to be prevented as a result of reduced exposures to asbestos over the next 25 years. This could save the economy between $104.05 million and $951.6 million.
Cost	• Nationally consistent OHS model for asbestos regulation. • Fulfil Australian Government stated objectives to reduce the incidence and severity of occupational injury and disease. • There is no anticipated impact of this option for New Zealand.	• Total costs of approximately $1.76 billion over 13 years to 2018 with approximately $893.02 million of this total relating to the initial implementation of the Codes and the remaining portion relating to ongoing costs associated with the management and removal of in situ ACM.	• Possible increase in costs of services for asbestos removal to owners of domestic premises as a result of more stringent requirements for asbestos removalists. These costs could not be calculated. • Continuing costs to the community of between $119.7 million and	• Implementation of Option Two is expected to incur operational costs of approximately $1.76 billion over the next 25 years. • Continuing costs due to the 185 remaining cases of asbestos-related disease are expected to be between $123.4 million and $1.128 billion.

		• Costs for individual businesses will vary according to the size of the workplace and number of work sites; number of employees; degree of OHS training previously provided; training provider costs; degree of reliance on external consultants to undertake the required work; the extent to which ACM is present and the amount to be removed; the type of ACM to be removed; and individual state and territory waste disposal costs. • The MFM Guidance Note is not expected to incur any additional costs.	$1.09 billion due to 185 new cases of asbestos-related disease.	
Overall Benefit/Cost	• The average overall costs from Option Two are the loss of 185 lives and $2.4 billion over the next 25 years. • The average cost to business of complying with the additional requirements of the Management Code in the first year of operation is estimated at between $843.75 (SA) and $4,580.50 (QLD). The average additional cost, per job, for all forms of asbestos removal under amendments to the Removal Code is estimated at up to $1,042.05 (WA, TAS, NT and ACT). The average additional cost, per job, for friable asbestos removal work is estimated at between $2,587.50 (QLD, NSW) and $2703 (other States and Territories). • Revising the 1988 Removal Code and MFM Guidance Note, and upgrading the 1988 Guide to a Code of Practice, will result in the prevention of at least 156 cases of asbestos-related lung cancer and mesothelioma over the next 25 years. The overall benefits from Option Two are the saving of at least 156 lives and between $104.05 million and $951.6 million over the next 25 years. Since asbestos-related lung cancer and mesothelioma typically result in death, the prevention of these diseases equates to the saving of at least 156 lives.			

PART 5. EVALUATION OF OPTIONS

5.1 Option One — The Status Quo

Retaining the status quo assumes that no additional action will be taken to reduce adverse health outcomes associated with exposure to asbestos. This option would result in a failure to address a range of gaps, which were identified by NOHSC in an analysis of existing jurisdictional regulation, and would result in continuing costs to the economy of approximately $1.2 billion (see Table 32) as a result of an estimated 341 cases of asbestos-related lung cancer and mesothelioma that could be expected to occur over the period 2005-2030. These costs are considered to be a minimum based on the fact that a lack of data meant that other asbestos-related diseases such as asbestosis could not be costed and that the number of new cases is based on the median of a calculated range. By maintaining Option One, the Australian Government would fail to fulfil its obligations under the National OHS Strategy to reduce the incidence and severity of occupational injury and disease in Australia.

5.2 Option Two — Revise existing guidance

This entails publishing the Management and Removal Codes and the MFM Guidance Note. This option will address the gaps identified in the NOHSC analysis of current asbestos regulation in Australia and help to prevent the loss of at least an estimated 156 lives due to asbestos-related disease resulting from exposures to asbestos occurring through the gaps in the current regulation. These lives have an average estimated value of approximately $527.83 million, however this value should be considered a minimum as other associated savings, as a result of reduced pain, suffering, fear and anguish, cannot be calculated.

The costs which could reasonably be expected to result as a result this option are estimated to be approximately $1.76 billion in operational costs and costs of $625.95 million due to the 185 continuing cases of asbestos-related disease. The overall average monetary cost of this option is approximately $2.4 billion.

The intention of the 1988 NOHSC Code, Guide and Guidance Note is to provide practical guidance for the safe removal of asbestos; controlling asbestos hazards in buildings and structures, and measuring airborne asbestos fibres. Revising the documents and changing the *Guide to the Control of Asbestos Hazards in Buildings and Structures* to a Code of Practice will provide up-to-date information on approaches to minimise potential exposure to asbestos, as well as providing practical guidance on work associated with in situ asbestos, where removal is not appropriate. Codes of Practice are not regulatory documents, rather they provide practical advice and guidance on how to meet regulatory requirements.

Without the publication of the Management and Removal Codes, there is no single set of regulatory requirements, or information and guidance material relevant to the management and control of in situ ACM. The 1988 Guide provides guidance on the identification, evaluation and control of hazards from in situ asbestos in the working environment but does not capture work associated with asbestos not covered under the prohibition. This gap is addressed in the Management Code. The Management Code will also complement and support the Removal Code.

Incorporation of a risk management approach in the Management and Removal Codes, makes the Codes readily adaptable to all workplaces, enabling the guidance material to be applied in a much broader range of workplaces and situations than the original materials. The Management and Removal Codes have been written with a focus on the risks of exposure to asbestos, and stressing that there is no known safe level of asbestos exposure.

Furthermore, all jurisdictions already reflect the majority of the requirements of the existing Codes and Guidance Note in their workplace hazardous substances legislation. It is therefore highly efficient to utilise the existing framework in each jurisdiction, and extend the scope of existing codes.

5.3 Recommended option

As a result of the above considerations Option 2 is the recommended option. This approach is consistent with the agreed Australian Government objective to reduce the incidence and severity of occupational injury and disease and provides an overall estimated saving to Australia of at least 156 lives over the next 25 years.

PART 6. CONSULTATION

Due to the hazardous nature of asbestos, the adverse health effects related to breathing asbestos fibres and public interest in asbestos, an extensive program of consultation was undertaken as part of the document development process and to inform the RIS. In developing the Management and Removal Codes and MFMF Guidance Note, consultation occurred through established NOHSC tripartite processes. Additional consultation occurred through a 12-week period for public comment, public comment workshops, and the establishment of a tripartite public comment review group.

6.1 Drafting of the new and revised Codes and Guidance Note

The draft asbestos documents were developed in consultation with the Asbestos Code of Practice Working Group (ACPWG). This group comprised representatives from State and Territory OHS Authorities, the Australian Council of Trade Unions (ACTU) and the Australian Chamber of Commerce and Industry (ACCI).

The Management and Removal Codes and MFM Guidance Note were considered by the NOHSC committee structures, including the:

- NOHSC Chemical Standards Sub-Committee (CSSC); representing the Australian Chamber of Commerce and Industry (ACCI), the Australian Council of Trade Unions (ACTU), and states and territories;
- NOHSC Prevention Committee (PC), representing all OHS Authorities, ACCI, ACTU, COMCARE, and the Department of Employment and Workplace Relations, and the Department of Health and Ageing; and
- The National Occupational Health and Safety Commission (representation as for Prevention Committee, minus Comcare representation).

6.2 Public comment period

In early 2004, NOHSC developed a Preliminary Regulation Impact Statement (PRIS) for the Management and Removal Codes and MFM Guidance Note in consultation with the ORR. In accordance with *s38(4)b* of the *National Occupational Health and Safety Commission* Act 1985, the PRIS, and draft versions of the Management and Removal Codes and MFM Guidance Note were released for a 12-week public comment period in March 2004.

Advertisements and notices, which called for public comment on the PRIS, Management and Removal Codes and the MFM Guidance Note, were placed in national newspapers, Government Notices Gazette, Chemicals Gazette, and on the NOHSC Internet site. The public comment period produced a total of 25 submissions.

6.3 Workshops

Based on the relatively small number of submissions made in response to the call for public comment, NOHSC held several workshops on the proposed asbestos documents to elicit further comment. A significant amount of feedback was gained from the workshops, which involved asbestos removalists, union and employer associations, employer/industry representatives and State/Territory WorkCover representatives.

6.4 Review of public comment

Once the comment period had closed, and information from the workshops had been collated, all public comment was assessed by expert review groups. Comment on the Management and Removal Codes was assessed by the Asbestos Public Comment Review Group (APCRG). Comment on the MFM Guidance Note was assessed by the Membrane Filter Method Working Group (MFMWG). The working groups consisted of representatives from the NOHSC Office, State and Territory OHS Authorities, ACCI and ACTU.

6.5 Cost issues raised during public comment

The public comment paper released with the draft Management and Removal Codes and MFM Guidance Note called for comment on the likely costs of implementing the revised guidance material.

Responses indicated that implementation costs would be incurred in meeting the identification and labelling requirements of the Management Code and from the increased scope of both the Management and Removal Codes to incorporate all ACM.

In particular, the requirement in the Management Code to identify and label all ACM was identified as representing a significant cost to government and industry. In some cases it was believed that this requirement would result in little if any reduction in the risk of exposure to airborne asbestos fibres. In consideration of these comments, the APCRG modified the identification and labelling requirements of the Management Code to incorporate a risk based approach and further developed the presumption criteria to increase its usefulness.

It was also suggested that the broadened scope of the Codes, to include all ACM (both friable and non-friable), would increase the costs of implementing the codes, compared with the current guidance material and legislative requirements. In particular, current legislative requirements in Queensland for the control of ACM in the workplace only apply to some types of friable ACM. In this instance, increased costs would include conducting, and in some cases the reconduction, of comprehensive asbestos surveys and extensive risk assessments to consider non-friable ACM, for the development of an asbestos register and the establishment of an asbestos management plan. The requirements of the asbestos removal control plan also require formalised risk assessments and controls. The application of the presumption criteria can reduce some of the analysis costs associated with an asbestos identification survey.

However, the Asbestos Industry Association (AIA) of Queensland opposed this view. The AIA has indicated that all Queensland Government buildings have been inspected for both friable and non-friable ACM (approximately 10,000 buildings in total). In addition, most large companies (e.g. banks) and local councils have been inspected for both friable and non-friable ACM, and most smaller organisations who do not obtain inspections for non-friable ACM because they are not aware of the differences between friable and non-friable ACM. The following information on inspections for ACM were provided in the AIA submission:

Company W Of 200 asbestos inspections carried out, only 1 owner (0.5%) insisted on having an inspection for friable ACM only.

Company X *Larger organisations*: 500 out of 2500 (20%) opted for friable inspections only.

Local Authorities: 3 out of 25 (12%) Councils opted for friable inspections only.

Private individuals and small businesses: 1950 out of 2000 (97.5%) opted for friable inspections only. The driving factor for this was predominantly based on cost.

Company Y Less than 2% of building owners opted for friable inspections only when informed of the difference and their responsibilities and the possibility that inspections may have to be re done. These were companies focusing on cost.

Company Z Surveys for government and private organisations with large portfolios of buildings show that all have opted to be inspected for both friable and non-friable ACM.

The AIA also highlighted that adoption of the revised NOHSC documents would prevent exposure to asbestos through work on ACM, which was not identified through the requirements of the Management and Removal Codes. This especially has benefits in the identification of second-hand/recycled ACM, which may have been used. In Queensland, asbestos regulations only require that inspections for some friable ACM be conducted in buildings built under a building approval given before 1 January 1990. This means that recycled ACM that may have been installed in a building built after 1 January 1990 may never be identified, as the building is not required to have an asbestos audit, even though ACM, whether friable or non-friable, could be present in the workplace.

The AIA concluded, “Any strengthening of the asbestos laws and regulations in Queensland [through adoption of the revised NOHSC documents] would be beneficial. Currently legislation in Queensland is well behind that of other states in content and policing, and adoption of a new federal standard would serve to close the loopholes still used by those trying to cut corners and would mean less asbestos-related illness in the community”.

Respondents to the public comment period also commented that the requirement in the Removal Code to provide and use a full decontamination unit, where not previously required, would be an additional cost. In some instances, a less costly alternative, i.e. a partial decontamination facility, would provide adequate control. In consideration of these comments, the APCRG modified the Removal Code to incorporate a risk-based approach to the determination of appropriate decontamination requirements for some asbestos removal tasks.

PART 7. IMPLEMENTATION AND REVIEW

Subject to Workplace Relations Ministers' Council (WRMC) endorsement of the Management and Removal Codes and the MFM Guidance Note, NOHSC will declare them as advisory documents. It is the expectation of NOHSC that the OHS Authorities will then adopt and implement the Codes and Guidance Note.

The timing of the introduction of new or revised regulations reflecting the Management and Removal Codes and the MFM Guidance Note will influence implementation of these documents in each jurisdiction. Business compliance may therefore be governed by the implementation schedule in each jurisdiction to adopt the revised documents.

Nonetheless given the nature of the changes in the Management and Removal Codes and the MFM Guidance Note, a national business could apply them before they are adopted in each jurisdiction that the company operates in. The benefits of the new documents to business could then be derived ahead of time.

Since in situ ACM is prevalent throughout Australia, and there is no timeframe for removal of in situ ACM, up to date guidance material for managing, controlling and removing ACM will continue to be required to prevent exposures to asbestos fibres. The Management and Removal Codes and the MFM Guidance Note will be reviewed after a period of 10 years. This 10-year review period is in accordance with COAG Principles and Guidelines.[77]

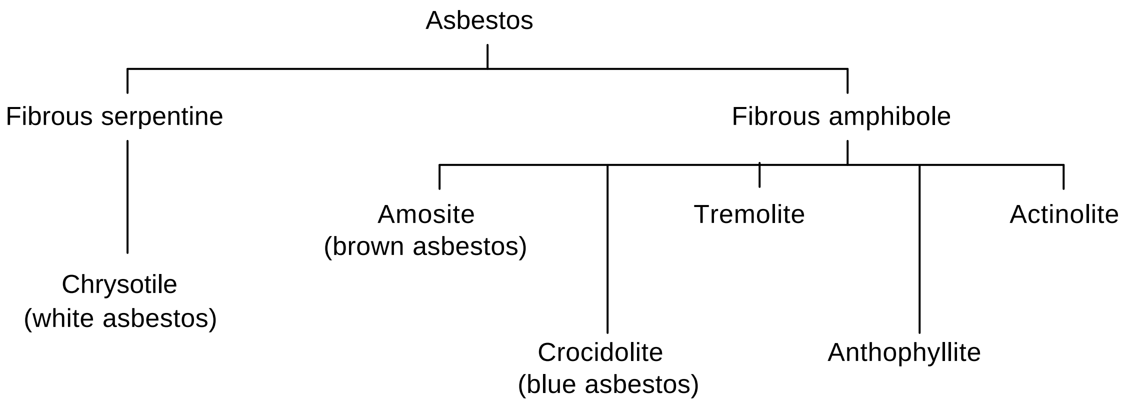
[77] COAG (2004), *Principles and Guidelines for National Standard Setting and Regulatory Action by Ministerial Councils and Standard Setting Bodies*. Accessed on 29/09/2004 at http://www.pc.gov.au/orr/reports/external/coag/index.html

APPENDIX A

1 What is asbestos?

Asbestos is a generic term for a group of six naturally occurring, fibrous[78] silicate minerals that have been widely used in commercial products. Asbestos minerals fall into two groups or classes; serpentine asbestos and amphibole asbestos. The most common asbestos types are chrysotile (white asbestos), a fibrous serpentine mineral, and amosite (brown asbestos) and crocidolite (blue asbestos), which are both amphibole minerals. Other forms of asbestos include actinolite, anthophyllite and tremolite. Of the six types of asbestos, only chrysotile, amosite, crocidolite and to a lesser extent anthophyllite are mined for commercial use.[79] Tremolite and actinolite have not been mined commercially although they can be found as impurities in other commercially available mineral products.

FIGURE 4: ASBESTOS MINERALS[80]



In its natural state, asbestos occurs throughout much of the planet. It is found in two-thirds of the rocks in the earth's crust.[81] Asbestos minerals form under special physical conditions that promote the growth of fibres that are loosely bonded in a parallel array (fibre bundles) or matted masses. The individual fibrils, which are readily separated from the bundles of fibres, are finely acicular[82], rodlike crystals. Chrysotile asbestos, which belongs to the serpentine group, possesses relatively long and flexible crystalline fibres that are capable of being woven. Amphibole asbestos, which includes the minerals amosite, crocidolite, tremolite, anthophyllite, and actinolite, form crystalline fibres that are substantially more brittle than

78 Serpentine and amphibole minerals also occur in non-fibrous or non-asbestiform forms. These non-fibrous minerals, which are not asbestos, are much more common and widespread than the asbestiform varieties.

79 Agency for Toxic Substances and Disease Registry (ATSDR) (2001), '*Toxicological profile for asbestos*'. Accessed on 10/05/2004 at http://www.atsdr.cdc.gov/toxprofiles/tp61.html

80 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report

81 The Asbestos Institute, 'Chrysotile Asbestos: An Overview', Canada. Accessed on 10/05/2004 at http://www.asbestos-institute.ca/main.html

82 Having the shape of a needle.

serpentine asbestos and are more limited in textile uses. Table 35 provides an overview of the six main types of asbestos.

TABLE 35: COMPARISON BETWEEN DIFFERENT FORMS OF ASBESTOS[83]

	Chrysotile	Amosite	Crocidolite	Tremolite	Anthophylite	Actinolite
Colour	White, grey, green, or yellowish.	Brown, grey, or greenish.	Lavender, blue, or green.	White to light green.	Grey, white, brown-grey, or green.	Colour unknown.
Physical state	Solid	Solid	Solid	Solid	Solid	Solid
Flexibility	Good	Fair	Good	Brittle	Fair to Brittle	Fair to Brittle
Crystalline Form	Polymeric, extended sheet	Polymeric, double chain	Polymeric, double chain	Polymeric, double chain	Polymeric, double chain	Polymeric, double chain
Melting point/ decomposition temperature	800-850 °C	600-900 °C	No data	1040 °C	950 °C	800 °C
Specific gravity	2.55	3.43	3.37	2.9-3.2	2.85-3.1	3.0-3.2
Solubility						
– Water	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
– Organic Solvents	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble	Insoluble
– Acids	56.00	12.00	3.14	No data	2.13	No data
– Bases	1.03	6.82	No data	No data	1.77	1.2
Length distribution in UICC reference samples						
– %>1 µm	36-44	46	36	No data	46	No data
– %>5 µm	3-6	6	3	No data	5	No data
– %>10 µm	1-3	1	0.7	No data	1	No data
Flammability limits	Non-flammable	Non-flammable	Non-flammable	Non-flammable	Non-flammable	Non-flammable
Location	Mined from rock formations.	Mined from rock formations.	Mined from rock formations.	Mined from rock formations.	Mined from rock formations.	Mined from rock formations.
Uses and products *	Asbestos: cement, insulation board, sprayed coatings, pipe insulation / lagging, rope, cloth paper, gaskets, friction products, vinyl floor tiles, bitumen, paints, reinforced plastics, mastics, sealants, putties and adhesives.	Asbestos: cement, sprayed coatings, pipe insulation / lagging, and asbestos reinforced plastics.	Asbestos: sprayed coatings, pipe insulation / lagging, and millboards.	Little or no commercial value. Rarely used commercially. Previously used in fire retardant devices, for heat protection and insulation purposes.	Little or no commercial value. Rarely used commercially.	Little or no commercial value. Rarely used commercial ly. Previously used in fire retardant devices, for heat protection and insulation purposes.

* These are an indication only of the common commercial uses of asbestos.
UICC Union Internationale Centre le Cancer

83 Agency for Toxic Substances and Disease Registry (ATSDR) (2001), '*Toxicological profile for asbestos*'. Accessed on 10/05/2004 at http://www.atsdr.cdc.gov/toxprofiles/tp61.html

As can be seen from Table 35, asbestos is a versatile mineral, which because of its composition and fibrous structure, possesses good insulation capabilities and a high resistance to heat. It is these qualities that made it such an attractive material in the manufacture of an array of building, textile and other products throughout most of the 1900's.

2 History of asbestos use and production in Australia

Crocidolite and chrysotile asbestos were mined in Australia for over 100 years. Chrysotile mine sites were located in New South Wales (Baryugil, Woods Reef and Jones Creek), Western Australia (Lionel and Nunyerrie) and Tasmania (Andersons Creek). Crocidolite was mined in South Australia (Robertstown) and Western Australia (Wittenoom).[84] Amosite has never been mined in Australia.[85]

Asbestos production in Australia peaked at 92,418 tonnes in 1980.[86] Crocidolite was the dominant form of asbestos produced in Australia until the closure of the Wittenoom mine in 1966. The manufacture of crocidolite products ceased in 1968. The manufacture of amosite products ceased in the following years[87]:

- Insulation materials – 1974;
- Building products – 1983; and
- Pipes – 1986.

Shortly after this, in the mid 1980's, the use of crocidolite (blue) and amosite (brown) asbestos was banned in Australia.

Chrysotile mining continued in Australia until 1983 when the last asbestos mine, a dry milling plant at Woods Reef, closed due to an inability to meet dust control regulations.[88] However, Australia continued to import approximately 1500 tonnes of raw chrysotile asbestos and asbestos products annually until prohibition on 31 December 2003. Raw chrysotile imports were predominantly used in the production of friction products (i.e. brake pads and linings) and compressed asbestos fibre (CAF) sheeting for the manufacture of gaskets. The majority of imported chrysotile products were brake linings/pads and clutch facings.[89]

84 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report

Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', Journal of Occupational Health and Safety Australia and New Zealand, 17(5): 453-470

85 Hughes RJ (1977) Asbestos in Australia - its occurrence and resources, *Australian Mineral Industry Quarterly*, 30(3): 119-127

86 Virta RL (2003), '*Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000*', US Geological Survey – Open-file Report 2003-83, US Department of the Interior. Accessed on 10/09/2004 at http://pubs.usgs.gov/of/2003/of03-083/of03-083.pdf

87 James Hardie (2004), Hardie News, April 2004, Volume 4, Issue 1. Accessed on 25/11/2004 at http://www.ir.jameshardie.com.au/repositories/files/HardieNews_April2004.pdf

88 Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', *Journal of Occupational Health and Safety Australia and New Zealand*, 17(5): 453-470

89 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report

Asbestos is thought to have had more than 3,000 applications worldwide, and was used extensively throughout Australia. Asbestos usage in Australia peaked at approximately 73,192 tonnes in 1975.[90]

Many asbestos products that were used in the past are still present (in situ) in the community. It is estimated that approximately 25 percent of all houses built in Australia until the 1960's were clad in asbestos cement sheeting. In NSW alone, some 70,000 asbestos cement (fibro) houses were built between 1945 and 1954 (52% of all houses built during the period).[91]

[90] Virta RL (2003), '*Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000*', US Geological Survey – Open-file Report 2003-83, US Department of the Interior. Accessed on 10/09/2004 at http://pubs.usgs.gov/of/2003/of03-083/of03-083.pdf

[91] NOHSC (2004), The Incidence of Mesothelioma in Australia 1999 to 2001, *Australian Mesothelioma Register Report 2004*.

APPENDIX B

1 Adverse health effects that may result from exposure to asbestos

1.1 General health aspects of exposure to asbestos

Adverse health risks from asbestos exposure are associated with the inhalation of asbestos fibres into the lungs and the dispersion of these fibres within the lungs. The adverse health effects of asbestos are largely concentrated on the lungs (as fibres are inhaled) and, depending on the associated health effect, can be fatal. When asbestos fibres are inhaled, a large proportion are exhaled or removed by the body's normal defence mechanisms, however, a proportion of them may become lodged in the lungs where they can cause various lung diseases.[92] Exposure to asbestos fibres is associated with increased incidences of a range of lung diseases including asbestosis (scarring of the lungs), lung cancer and mesothelioma (a cancer of the inner lining of the chest wall or abdominal cavity). Asbestos fibres can affect the lining of the abdominal cavity and are thought to affect other organs as well. Evidence that asbestos is the cause of health problems in other organs is, however, disputed in some quarters, and as such the information provided in this RIS concentrates on the main accepted medical conditions.

The adverse health effects most readily attributable to exposure to respirable asbestos fibres are:

- Mesothelioma;
- Asbestosis;
- Asbestos-related lung cancer;
- Diffuse pleural thickening;
- Pleural plaques; and
- Heart effects.

Unlike many occupational diseases, there is a long latency period before asbestos-related disease manifests. This may extend to 20 or 30 years, or, in the case of mesothelioma, as long as 40 or 50 years. The current incidence of asbestos-related diseases is therefore a measure of exposure to asbestos fibres many years ago.[93]

The form and severity in which asbestos-related diseases manifest often depend on a number of factors including the:

- Level of exposure (count of fibres inhaled);
- duration of the exposure;
- frequency of exposure;

[92] Gore, D & Sleateor, A (1999), House of Commons Research Paper 99/81, 5 October 1999, UK. Accessed on 09/09/2004 at http://www.parliament.uk/commons/lib/research/rp99/rp99-081.pdf

[93] ibid

- size, shape and chemical makeup of asbestos fibres;
- individual risk factors, such as a person's history of tobacco use (smoking) and other pre-existing lung disease; and
- the individual's natural body resistance.

Scientific research has found a correlation between fibre type and size and the ability to induce asbestos-related disease. Increasing evidence indicates that amphibole asbestos fibres and more hazardous than serpentine (chrysotile) fibres.[94] Fibres with a diameter of less than 3 µm and length greater than 5 µm, with a length to diameter ratio greater than 3:1 are more likely to cause disease. These long and thin fibres are more respirable than short and wide fibres. Long and thin fibres travel deeper into the lungs, reaching the lower airways and alveolar regions. These fibre types are commonly referred to as 'respirable asbestos fibres'. Generally, fibres below 3 µm in diameter and greater than 8 µm in length are potentially carcinogenic and the risk of cancer increases as fibre diameter decreases. The risk of cancer also increases with increased exposure to asbestos, and vice versa.

1.1.1 Carcinogen classification

All forms of asbestos are recognised internationally as carcinogenic.[95] Table 36 provides an overview of the various international carcinogen classifications for asbestos.

TABLE 36: CARCINOGEN CLASSIFICATION OF ASBESTOS

International Body	Carcinogen Classification
International Agency for Research on Cancer (IARC)	Asbestos (actinolite, amosite, anthophylite, chrysotile, crosidolite, tremolite) – Group 1 human carcinogen[96]
National Institute of Occupational Safety and Health (NIOSH, USA)	Asbestos – potential occupational carcinogen[97]
National Toxicology Program (NTP, USA)	Asbestos – known to be a human carcinogen[98]
American Conference of Governmental Industrial Hygienists (ACGIH)	Asbestos – A1 (Confirmed Human Carcinogen)[99]
European Union (EU)	Asbestos – may cause cancer[100]

94 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report, p.69.

95 IARC (1982), Chemicals, Industrial Processes and Industries Associated with Cancer in Humans, '*IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans*', Supplement 4. 292 pp. Lyon, France: IARC.

IARC (1987), Overall Evaluations of Carcinogenicity, *'IARC Monographs on the Evaluation of Carcinogenic Risks to Humans*', Supplement 7. 440 pp. Lyon, France: IARC.

96 accessed on 8/09/2004 at http://193.51.164.11/htdocs/monographs/suppl7/asbestos.html

97 accessed on 8/09/2004 at http://www.cdc.gov/niosh/npotocca.html

98 accessed on 8/09/2004 at http://ehp.niehs.nih.gov/roc/tenth/profiles/s016asbe.pdf

99 accessed on 8/09/2004 at http://www.hc-sc.gc.ca/hecs-sesc/whmis/pdf/carcinogenicity_a-m.pdf

100 accessed on 8/09/2004 at http://www.ilo.org/public/english/protection/safework/cis/products/safetytm/clasann4.htm

1.1.2 Mesothelioma

Mesothelioma is a form of malignant cancer. Formerly rare, it is increasing in incidence throughout the industrial world and is very frequently associated with past exposure to asbestos. Australia has the world's highest incidence rate of mesothelioma.[101]

Mesothelioma is caused by the inhalation of asbestos fibres, which can travel deep into the lungs, where, because of their needle like structural nature, they can cause damage to mesothelial cells in the body, which may result in cancer. There are 3 types of mesothelioma associated with asbestos exposure, pleural mesothelioma and, more rarely, peritoneal or pericardial mesothelioma.

Pleural mesothelioma is the most common form of the disease where the cancerous cells attack the pleura, which is a membrane that covers the lungs and lines the chest cavity to allow smooth movement during breathing. Symptoms can include shortness of breath, persistent coughing, swallowing difficulties, lower back pains, chest pains, weight loss and pleural effusions, which refers to an accumulation of fluid between the lining of the lungs and the chest cavity.

Peritoneal mesothelioma is associated with the peritoneum, a membrane lining the abdominal cavity and covering the abdominal organs. Symptoms include abdominal swelling, stomach pains, swelling of the feet, bowel obstruction, loss of appetite, nausea, vomiting and blood clotting difficulties.

Pericardial mesothelioma is the rarest of the three forms of mesothelioma and is associated with the pericardium, a membrane that lines the heart. Symptoms include chest pains, shortness of breath, palpitation and persistent coughing.

The latency period of mesothelioma is generally between 35 and 40 years, but may be longer[102]. It is a very difficult disease to detect prior to the point of illness. Since mesothelioma is usually diagnosed at an advanced stage, prognosis is extremely poor and treatment is largely palliative. Malignant mesothelioma is an invariably fatal disease, with almost all cases dying within 2 years of diagnosis.[103] The average survival time from diagnosis is between 3 and 12 months, however, some patients have been known to survive for up to 5 years. Mesothelioma is irreversible and incurable.

Dr John Moore-Gillon, speaking at a conference on asbestos induced diseases in 1997, highlighted this depressing outlook:

> People with mesothelioma all die, usually after a few months of increasing pain and breathlessness. There can be no condition which is more distressing to the patient, relative and to the completely powerless doctor as these individuals plough inexorably downhill.[104]

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101 Tossavainen, D (2004), 'Global Use of Asbestos and the Incidence of Mesothelioma', *International Journal of Occupational and Environmental Health* 2004, 10:22-25

102 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report.

103 Gore, D & Sleateor, A (1999), House of Commons Research Paper 99/81, 5 October 1999, UK. Accessed on 09/09/2004 at http://www.parliament.uk/commons/lib/research/rp99/rp99-081.pdf

Moore-Gillon, Dr John (1997), Consultant Physician, St Bartholomew's and Royal London Hospitals and Chairman British Lung Foundation, Asbestos-related Diseases.

104 ibid

1.1.3 Asbestosis

Asbestosis is a form of pulmonary fibrosis (pneumoconiosis) caused by inhalation of asbestos fibres and is progressive and irreversible in nature. Asbestos fibres in the lungs cause irritation and inflammation. The body's defence mechanisms respond to these foreign fibres by attacking them, and some or all of these defence mechanisms lead to further inflammation and cell damage. Eventually a fibrosis, or scar tissue, develops in the small narrow spaces around the airways and alveoli (air sacs in the lung). The thickening and scarring impedes the functioning of the lungs by preventing oxygen and carbon dioxide from travelling between the alveoli and the blood cells, and reduces the elasticity of the lungs, which leads to breathlessness. Asbestosis can appear and progress many years after exposure to asbestos has ceased[105] and has a latency period ranging from about 15 to 25 years. Epidemiological data indicate that the disease incidence rate increases and becomes more severe with increasing dust levels and duration of exposure.[106]

Asbestosis typically leads to subsequent respiratory disability. In the most severe cases, asbestosis may lead to death from pulmonary hypertension and cardiac failure. Symptoms may include shortness of breath, dry cough, clubbing of the fingers and chest pain.

Unlike other forms of asbestos disease, such as mesothelioma, asbestosis is not cancerous, however, asbestosis has been found to increase the risk of lung cancer.[107] The effects of smoking may also further multiply this risk.

1.1.4 Asbestos-related lung cancer

Lung cancer has been shown to be caused by all types of asbestos. Available data indicates a similar lung cancer risk per fibre exposure for chrysotile, amosite and crocidolite.[108] The average latency period of the disease (from first exposure to asbestos) ranges from 20 to 30 years.[109] Lung cancer symptoms are rarely felt until the disease has developed to an advanced stage. Symptoms can include constant chest pain, chronic cough that worsens over time, fatigue, shortness of breath, swollen lymph nodes, coughing up blood (hemoptysis), dyspnea (breathing difficulty), wheezing, loss of appetite and weight loss.

The International Programme on Chemical Safety (IPCS)[110] has found that combined exposure to asbestos and cigarette smoke increases the risk of lung cancer. Together they act synergistically and the combined risk is much greater than the individual risks for exposure to asbestos or for smoking in isolation.[111]

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105 Asbestos Resource Centre. Accessed on 12/05/2004 at http://www.asbestosresource.com/asbestosis/

106 NICNAS (1999), '*Chrysotile asbestos: Priority existing chemical No 9 – Full public report*', AGPS, Canberra, Australia.

107 Weill, H. (1994), 'Biological Effects: Asbestos Cement Manufacturing', *Annals of Occupational Hygiene*, 38(4), pp.533-538.

108 IPCS (1996), 'Health effects of interactions arising from tobacco use and exposure to chemical, physical or biological agents', Draft Monograph, World Health Organization, Geneva.

109 Nicholson WJ., Raffin E. (1995), 'Recent data on cancer due to asbestos in the USA and Denmark', Med Lav, Vol. 86, pp. 393-410.

110 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report.

The International Program on Chemical Safety (IPCS) is a joint programme established by the World Health Organization (WHO), the International Labour Organization (ILO) and the United Nations Environment Programme (UNEP), and headed by the WHO. The ICPS main roles are to establish the scientific basis for safe use of chemicals, and to strengthen national capabilities and capacities for chemical safety.

111 IPCS (1996), 'Health effects of interactions arising from tobacco use and exposure to chemical, physical or biological agents', Draft Monograph, World Health Organization, Geneva.

The question of whether asbestos induced lung cancer can develop in the absence of asbestosis has been the subject of intense debate.[112] Autopsy investigations in some workers have shown that asbestos induced lung cancer can develop in association with asbestosis.[113] Evidence includes similarities in dose-response relationships, latency periods for development and similar dependencies on fibre length and type. These findings are consistent with the view that asbestos is a lung carcinogen by virtue of its fibrogenicity.[114]

1.1.5 Diffuse pleural thickening

The pleura is a membrane that lines the lungs and allows smooth movement during breathing.[115] Diffuse pleural thickening is the result of fibrosis, which can result from exposure to asbestos fibres, and thickening of the visceral pleura[116], which may effect a single side of the lungs, but is most often associated with both sides. As a result of this, a pleural effusion may form (an accumulation of fluid between the lining of the lungs and the chest cavity). This diffuse pleural thickening is often slowly progressive and extends over a large area, causing increasing breathlessness. Those with diffuse pleural thickening are at risk of lung cancer or mesothelioma, although to a lesser extent than those with asbestosis.[117]

1.1.6 Pleural plaques

These are localised areas of pleural thickening, usually without any clinical symptoms, which can calcify over time. Pleural plaques rarely cause disablement or directly lead to other disease, but as a marker of previous exposure to asbestos, pleural plaques indicate that the individual may be at risk of other asbestos-related adverse health conditions.[118]

1.1.7 Heart effects

In severe cases, fibrosis in the lungs can lead to prolonged increases in the blood pressure in the arteries and veins of the lungs (pulmonary hypertension). Pulmonary hypertension is poorly tolerated by the right side of the heart, which pumps blood to the lungs. The results of pulmonary hypertension can be enlargement (hypertrophy) of the right ventricle to compensate for pumping at elevated high pressure. Symptoms can include fatigue, difficult or laboured breathing, intolerance of exercise, chest pains, and swelling of the feet and ankles. This group of symptoms is known as *cor pulmonale*. At its most severe, this can lead to heart failure and death.

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112 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report.

113 Newhouse ML, Berry G & Wagner JC (1985), Mortality of factory workers in east London 1933-80, *British Journal of Industrial Medicine*, 42: 4-11

Kipen HM, Lilis R, Suzuki Y, et al (1987), Pulmonary fibrosis in asbestos insulation workers with lung cancer: A radiological and histopathological evaluation, *British Journal of Industrial Medicine*, 44: 96-100

Wagner JC, Newhouse ML, Corrin B et al (1988), Correlation between fibre content of the lung and disease in east London asbestos factory workers, *British Journal of Industrial Medicine*, 45(5): 305-308

114 NICNAS (1999), Chrysotile asbestos, Priority Existing Chemical No. 9, Full Public Report.

115 Gore, D & Sleateor, A (1999), House of Commons Research Paper 99/81, 5 October 1999, UK. Accessed on 09/09/2004 at http://www.parliament.uk/commons/lib/research/rp99/rp99-081.pdf

116 Gottlieb, LS (1989), *The Range of Medical Abnormalities Resulting from Asbestos Exposure*, in Peters, GA & Peters BJ (1989), Asbestos Medical Research, Vol 4 of the Sourcebook on Asbestos Diseases: Medical Legal and Engineering Perspectives, garland Law Publishing, New York USA

117 Moore-Gillon, Dr John (1997), Consultant Physician, St Bartholomew's and Royal London Hospitals and Chairman British Lung Foundation, Asbestos-related Diseases.

118 Gore, D & Sleateor, A (1999), House of Commons Research Paper 99/81, 5 October 1999, UK. Accessed on 09/09/2004 at http://www.parliament.uk/commons/lib/research/rp99/rp99-081.pdf

1.2 Trends in incidence of asbestos-related diseases

The incidence of asbestos-related disease in Australia has been steadily increasing over the last 20 years. However, since mesothelioma is the most closely attributable to past exposure to asbestos, the most reliable and accessible data relates specifically to mesothelioma. Thus for the purposes of this RIS, information and statistics on mesothelioma are used extensively.

Information on the incidence of asbestos-related diseases, mainly mesothelioma, is derived from several main sources in Australia, with the most notable of these being the Australian Mesothelioma Surveillance (AMS) Program, the Australian Mesothelioma Register (Register), and the Dust Diseases Board of NSW.

1.2.1 Australian Mesothelioma Surveillance (AMS) Program and Australian Mesothelioma Register

The Australian Mesothelioma Surveillance (AMS) Program was conducted by NOHSC and began in January 1980 and concluded at the end of 1985. The AMS Program was implemented to monitor the incidence of mesothelioma and to explore occupational and other associations with mesothelioma. Formal voluntary notification of cases was actively sought from a network of respiratory physicians; pathologists; general and thoracic surgeons; medical superintendents; medical records administrators; State and Territory departments of occupational health and safety; cancer registries; compensation authorities; or any other source.[119]

From 1 January 1986, a less detailed notification system has operated, with a short questionnaire history, which is followed up by mail. In the case of all Western Australian (WA) notifications detailed occupational and environmental exposure histories from interview are available from the WA Mesothelioma Register. Only histologically confirmed cases are accepted but there is no pathology panel diagnosis confirmation. This is now known as the Australian Mesothelioma Register but is a continuation of the AMS Program and continues to be maintained by NOHSC. Cross checks with State cancer registries are regularly carried out.[120]

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[119] NOHSC (2004), The Incidence of Mesothelioma in Australia 1999 to 2001, *Australian Mesothelioma Register Report 2004.*

[120] ibid

1.2.2 Incidence of mesothelioma in Australia

The incidence of mesothelioma in Australia has steadily increased over the last 20 years. According to data from the AMS Program and the Register, a total of 8,191 cases of mesothelioma have been reported in Australia during the period 1945 to 30 June 2004, although figures for 2002, 2003 and 2004 are still awaiting reconciliation checks with state cancer registries.[121]

TABLE 37: NUMBER OF MESOTHELIOMA CASES IN AUSTRALIA 1945 – 31 MARCH 2003

Period	1945 to 1979[122]	1980 to 1985[123]	1986 to 31 March 2003[124]	Total
Number of Cases	658	903	6,630	**8,191**

Recent extrapolations based on data collected up to the year 2000 estimate that the total number of mesothelioma cases in Australia from 1945 to 2020 is likely to be approximately 18,000.[125] Thus, there could be 11,000-12,000 cases of mesothelioma still to occur in Australia as a result of past exposure to asbestos fibres. Similarly, estimates of asbestos-related lung cancer indicate diagnosed cases of between 30,000 and 40,000 by 2020.[126]

Graph 1 shows the trend in the incident cases of mesothelioma in Australia and indicates a consistent increase in the number of new cases of mesothelioma up to the year 1999 when 490 new cases were reported. Given that mesothelioma has a latency period of between 30 and 40 years, the continued increase in reported mesothelioma cases until 1999 can generally be attributed to the heavy production and use of ACM throughout the late 1960s, 1970s and early 1980s.

While cases of mesothelioma appear to have decreased significantly in 2000 and 2001, with 356 and 355 new cases reported respectively, the incidence of new cases is expected to rise again on a wave of end use exposures from work with ACM. Researchers have suggested that "although classic cohorts related to insulation work and crocidolite mining will have the highest risks, occupations such as carpenters, builders, plumbers and electricians, because of the numbers employed, will generate similar case loads".[127]

Graph 2 shows the incidence of mesothelioma in Australia by state up to 2001 and Graph 3 shows the incidence of mesothelioma among Australian men and women up to 2001. The higher incidence of mesothelioma among men (see Graph 3) can generally be attributed to the dominance of male workers in the higher risk industries of production, manufacturing and construction, and trades such as carpentry, plumbing and electrical.

121 Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', *Journal of Occupational Health and Safety Australia and New Zealand*, 17(5): 453-470

122 NOHSC (2004), The Incidence of Mesothelioma in Australia 1999 to 2001, *Australian Mesothelioma Register Report 2004*

123 NOHSC (1986), The Incidence of Mesothelioma in Australia 1986, *Australian Mesothelioma Register Report 1986*

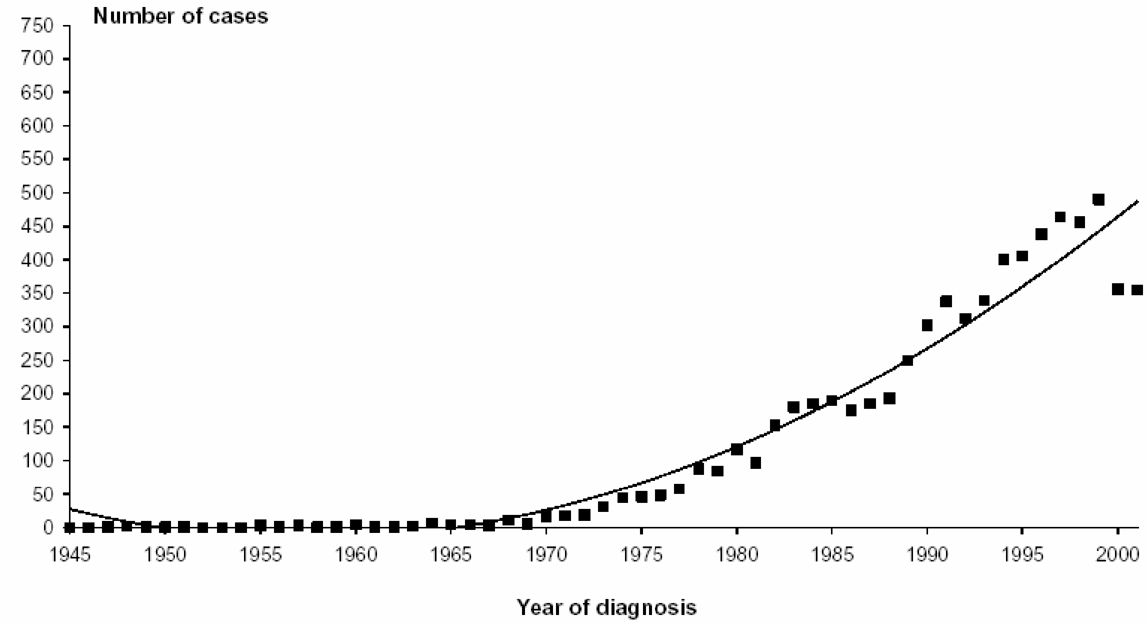
124 NOHSC (2004), The Incidence of Mesothelioma in Australia 1999 to 2001, *Australian Mesothelioma Register Report 2004*

125 Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', *Journal of Occupational Health and Safety Australia and New Zealand*, 17(5): 453-470

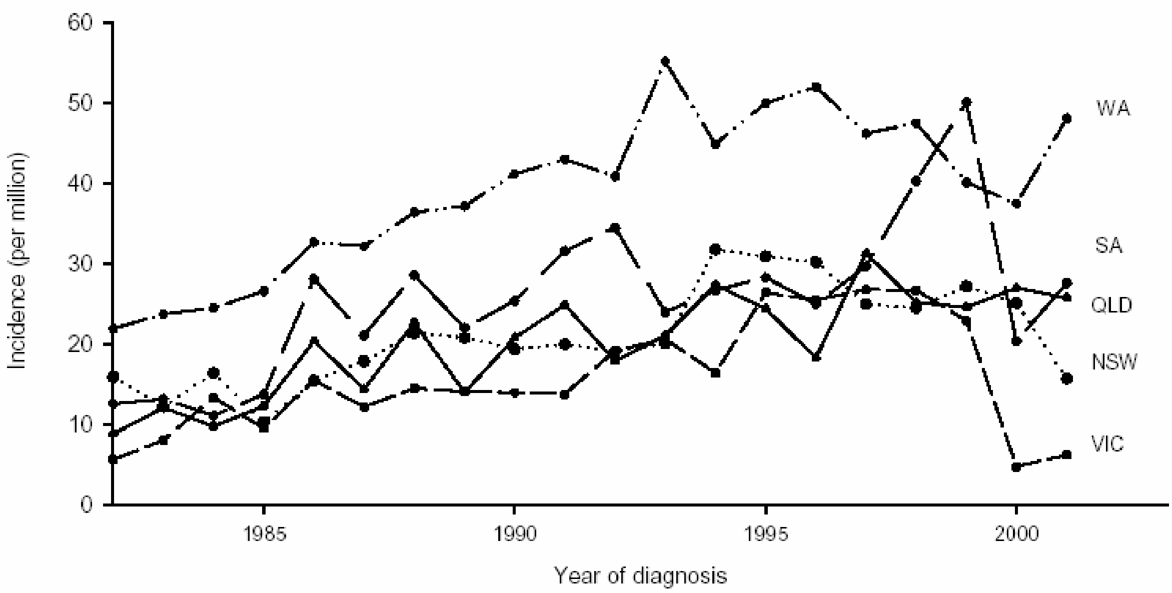
126 ibid

127 ibid, p.467

GRAPH 1: INCIDENT CASES OF MALIGNANT MESOTHELIOMA, AUSTRALIA 1986-2001[128]



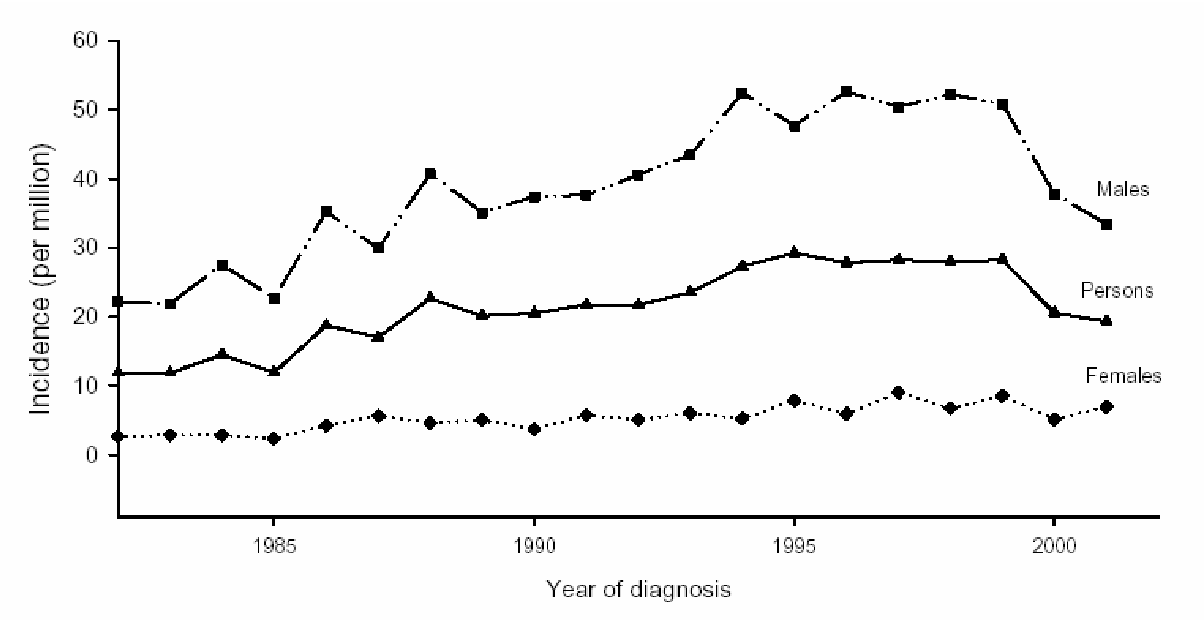
GRAPH 2: TRENDS IN AUSTRALIAN INCIDENCE OF MESOTHELIOMA PER MILLION PERSONS, BY JURISDICTION, 1982-2000 (*STANDARDISED TO WORLD POPULATION 20 YEARS OF AGE OR GREATER*)[129]



128 NOHSC (2004), The Incidence of Mesothelioma in Australia 1999 to 2001, *Australian Mesothelioma Register Report 2004*.

129 ibid

GRAPH 3: TRENDS IN AUSTRALIAN INCIDENCE OF MESOTHELIOMA PER MILLION PERSONS, BY SEX, 1982-2000 (*STANDARDISED TO WORLD POPULATION 20 YEARS OF AGE OR GREATER*)[130]



Statistics obtained from the Dust Diseases Board (DDB) of NSW indicate that a total of 2,757 deaths were the direct result of a dust disease contracted during employment. Of this total, 2,072 (see Table 38) dust diseases deaths were asbestos-related. In NSW mesothelioma was responsible for approximately 60 percent of all dust diseases deaths, and 79 percent of all asbestos-related deaths.

130 ibid

TABLE 38: NUMBER OF REPORTED DEATHS DUST DISEASE CASES IN NSW — FEBRUARY 1968 – 2003[131]

Disease	Number of Deaths 1968 -2003	
	Average Age (yrs)	Due to dust (no.)
Asbestosis	**71.26**	**291**
Silicosis	70.5	398
Byssinosis	71.83	11
Hard metal Pneumoconiosis	63.43	2
Farmers Lung	61.17	1
Aluminiosis	-	0
Bagassosis	-	0
Asbestos-related Pleural Disease (ARPD)	**74.85**	**79**
Silico-Tuberculosis	62.80	8
Mesothelioma	**67.28**	**1,644**
Emery Pneumoconiosis	-	0
Talcosis	65.74	1
ARPD / Lung Cancer	**74.78**	**8**
Silica Induced Carcinoma	73.1	12
ARPD / Asbestosis	**75.06**	**17**
Silico-Asbestosis	**65.99**	**9**
Asbestosis and Associated Lung Cancer	**70.02**	**12**
Silicosis and Silica Associated Lung Cancer	64.56	1
Carcinoma of the Lung*	64.99	250
Mixed Dust Pneumoconiosis	61.47	1
Lung Cancer in Association with Asbestosis	**71.18**	**12**
Total	68.5	2,757
Asbestos-related Total**	**71.30**	**2,072**

* Includes Hexavalent salt induced, asbestosis and asbestos exposure
** Carcinoma of the Lung has been excluded from this total as it can be attributed to factors other than exposure to asbestos

131 Dust Disease Board of New South Wales, Annual report 2003-2003. Accessed on 13/09/2004 at http://www.ddb.nsw.gov.au/DDB_annual_report%20V.1.pdf

1.2.3 Australian comparison with World incidence of mesothelioma

Australia has the highest incidence of mesothelioma in the world. This is generally attributed to:

- the high rates of consumption of asbestos materials in Australia throughout the 1970's and early 1980's[132];
- poor hygiene practice;
- relatively high amphibole use in asbestos cement products; and
- an excessive focus on Wittenoom to the exclusion of other common exposures.

Asbestos consumption in Australia peaked in about 1975 at approximately 73,192 tonnes.[133] On a per capita basis, Australia consumed more asbestos than any other country.[134]

Table 39 below provides an overview of the incidence of mesothelioma and the corresponding consumption for 11 industrialised countries, including Australia.

TABLE 39: MESOTHELIOMA INCIDENCES AND USE OF ASBESTOS[135]

	Mesothelioma Incidence			Tonnes / Year		Use of Asbestos	
Country	**Cases / year**		**Cases / Million / Year**			**Kg / Capita / Year**	**Tonnes / Mesothelioma**
Australia	**490**	**(2000)**	**35**	**70,000**	**(1970)**	**5.5**	**140**
Finland	74	(1999)	18	11,000	(1970)	2.4	150
France	750	(1996)	16	143,000	(1970)	2.7	190
Germany	1,007	(1997)	15	230,000	(1975)	2.9	230
Great Britain	1,595	(1999)	33	170,000	(1970)	3.1	110
Italy	930	(1995)	19	140,000	(1975)	2.5	150
Netherlands	377	(1997)	30	49,000	(1976)	3.6	130
New Zealand	50	(1996)	18	8,000	(1970)	2.8	160
Norway	48	(1995)	14	8,000	(1970)	2.0	170
Sweden	105	(1996)	15	20,000	(1970)	2.5	190
United States	2,800	(2000)	14	552,000	(1975)	2.6	200
ALL COUNTRIES	8,236	-	18	1,401,000	-	2.8	170

132 Leigh, J, Davidson P, Hendrie L & Berry D (2001), 'Malignant Mesothelioma in Australia 1945-2000', *Journal of Occupational Health and Safety Australia and New Zealand*, 17(5): 453-470

133 Virta RL (2003), '*Worldwide Asbestos Supply and Consumption Trends from 1900 to 2000*', US Geological Survey – Open-file Report 2003-83, US Department of the Interior. Accessed on 10/09/2004 at http://pubs.usgs.gov/of/2003/of03-083/of03-083.pdf

134 Tossavainen, D (2004), 'Global Use of Asbestos and the Incidence of Mesothelioma', *International Journal of Occupational and Environmental Health* 2004, 10:22-25

135 Table adapted from Tossavainen, D. (2004), 'Global Use of Asbestos and the Incidence of Mesothelioma', *International Journal of Occupational and Environmental Health* 2004, 10:22-25

APPENDIX C

Gap Analysis: Comparison of the current regulation instruments and the New Management Code

A gap analysis was undertaken to assess the current coverage of asbestos guidance material and regulation in Australian states and territories as compared to the requirements of the Management Code. This assessment was undertaken to determine what is currently required, that is, what OHS regulators in the states and territories consider necessary and reasonable for the safe management and control of asbestos in the workplace. In performing the gap analysis, the primary regulations in each state and territory and supplementary Codes, Standards and Guidance Notes, or their equivalent, were examined regarding specific requirements for the management and control of asbestos in the workplace.

The gap analysis undertaken identified that, although many of the requirements under the Management Code are already covered, to a varying degree, either under current State or Territory regulation, or through the adoption of the 1988 Guide, the Management Code provides added guidance and current best practice requirements for work with asbestos.

Table 40 shows the adoption of the 1988 Guide by the jurisdictions. Table 41 shows the results of the gap analysis, identifying where there are gaps in the current coverage of State and Territory regulation as it relates to the requirements of the Management Code. However, it is acknowledged that, while attempts were made to identify all relevant asbestos regulation, asbestos may also be regulated under provisions other than State and Territory OHS regulation (e.g. mining and construction legislation). As such, this legislation may already cover some of the identified gaps. Therefore, the gap analysis provided should be considered to be a worst-case scenario of the scope of regulation of asbestos.

TABLE 40: GAP ANALYSIS – ADOPTION OF THE 1988 GUIDE BY JURISDICTION

Jurisdiction	Adopted 1988 Guide
NSW[136]	Yes - s44 & s259 refer to the 1988 Guide
VIC[137]	No - Uses VIC Regs
QLD[138]	No - QLD Asbestos Advisory Standard 2004
SA[139]	Yes – 1988 Guide adopted as the South Australian Code of Practice for Asbestos Work (excluding asbestos removal)
WA[140]	Yes - s5.43b refers to the 1988 Guide
TAS[141]	No
NT[142]	No
ACT[143]	Yes - Adopts NOHSC documents as Codes
Commonwealth[144]	Yes – 1988 Guide picked up under Commonwealth legislation

TABLE 41: GAP ANALYSIS – CODE OF PRACTICE FOR THE MANAGEMENT AND CONTROL OF ASBESTOS IN WORKPLACES.

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2005)]	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Identify ACM through inspection (buildings and structures, plant and equipment)	R	R	PC	R	R	R	R	R
Material sampling and analysis	R	R	PC	R	R	Gap	Gap	R
Presumption criteria*	Gap	R	R	Gap	Gap	Gap	Gap	R
Develop and maintain an asbestos register	R	R	PC	R	R	R	R	R
Must notify employees and contractors of the asbestos register (i.e. induction / training) and provide a copy if requested	R	R	R	R	R	R	R	R

136 NSW Occupational Health and Safety Regulation 2001
137 VIC Occupational Health and Safety (Asbestos) Regulations 2003
138 QLD Workplace Health and Safety Regulation 1997
139 SA Occupational Health Safety and Welfare Regulations 1995
140 WA Occupational Safety and Health Regulations 1996
141 TAS Workplace Health and Safety Regulations 1998
142 NT Work Health (Occupational health and Safety) Regulations 2003
143 ACT – No applicable legislation
144 Commonwealth – Occupational health and Safety (Commonwealth Employment) (National Standards) Regulations 1994

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2005)]	**NSW**	**VIC**	**QLD**	**SA**	**WA**	**TAS**	**NT**	**ACT**
Perform a risk assessment and monitoring of identified ACM	R	R	PC	R	R	R	R	R
Competent person to conduct risk assessment	Gap	Gap	PC	R	R	Gap	Gap	R
Health surveillance	R	R	R	R	R	R	R	R
Management plan (as defined in the Management Code)	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
Review of management plan	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
Review of risk assessment and monitoring arrangements for asbestos	R	R	R	R	R	R	R	R
Training arrangements for employees and contractors working with or exposed to asbestos	R	R	R	R	R	R	R	R
Consultation with employees and OHS representatives	R	R	R	R	R	R	R	R
Warning signs and labelling of asbestos products	R	R	Gap	R	R	R	R	R
Warning signs for asbestos '*maintenance*' work	R	R	Gap	R	Gap	R	R	Gap
System or procedures to control access to, and maintenance work on, ACM.	R	R	R	R	Gap	Gap	Gap	R

* The presumption criteria allows the person in control (i.e. employer, building owner/occupier) to assume that a material contains asbestos until proven otherwise. This can provide a cost saving by bypassing the need to undertake material sampling and analysis to identify the presence of asbestos in a material. Presumed ACM must be treated as if it were ACM in all respects.

R Regulated – this requirement is regulated under current State or Territory legislation and/or regulations.

PC Partially Compliant – Under the QLD Regulations, identification and risk assessment is only required to be carried out in regards to 'asbestos materials', which are defined as "installed thermal or acoustic insulation materials comprising or containing asbestos". The identification and risk assessment of all other 'asbestos products' is optional, therefore, those businesses who have only complied with the mandatory requirements will be required to re-conduct workplace inspections for asbestos to identify and perform risk assessments of 'asbestos products'.

Gap This means that this requirement or its equivalent is not regulated under current State or Territory legislation and/or regulations.

APPENDIX D

Gap Analysis: Comparison of the current regulation instruments and the New Removal Code

A gap analysis was undertaken to assess current coverage and guidance of asbestos regulation in Australian states and territories as compared to the requirements of the Removal Code. This assessment was undertaken to determine what is currently required, that is, what OHS regulators in the states and territories consider necessary and reasonable for the safe removal of asbestos. In performing the gap analysis, the primary regulations in each state and territory and supplementary Codes, Standards and Guidance Notes, or their equivalent, were examined regarding specific requirements for the safe removal of asbestos.

The gap analysis was done in three steps. The first step was the comparison of the 1988 Code and the Removal Code. The codes were assessed to classify the requirements of the Removal Code into two groups, common or additional, to the requirements of the 1988 Code.

The second step was a review of the adoption of the 1988 Code by the jurisdictions. Where jurisdictions have adopted the 1988 Code the common requirements of the Removal Code are captured in that jurisdiction and therefore a third step (assessment of the current coverage) would only need to consider the additional requirements of the removal code. This review identified that the 1988 Code had been adopted in all but two jurisdictions. Queensland and Victoria.

The third step was the assessment of the current coverage as compared to the additional requirements of the Removal Code and for Queensland and Victoria, an assessment of the current coverage as compared to the common requirements of the Removal Code.

Table 42, Table 43 and Table 44 show the results of the gap analysis, identifying where there are gaps in the current coverage of State and Territory regulation of the removal of asbestos as they relate to the common and additional requirements of the Removal Code. However, it is acknowledged that, while attempts were made to identify all relevant asbestos regulation, asbestos may also be regulated under provisions other than state and territory OHS regulation (e.g. mining and construction legislation). As such, this legislation may already cover some of the identified gaps. Therefore, the gap analysis provided should be considered to be a worst-case scenario of the scope of regulation of asbestos.

This analysis considered the adoption of the 1988 Code by the states and territories (adopted in all but two jurisdictions) and the requirements of the Removal Code.

Table 42 shows the adoption of the 1988 Code by the jurisdictions.

Table 43 compares the Additional requirements of the Removal Code, i.e. requirements that were not included in the 1988 Code.

Table 44 considers the requirements common to the Removal Code and the 1988 Code.

TABLE 42: GAP ANALYSIS – ADOPTION OF THE 1988 REMOVAL CODE BY JURISDICTION

Jurisdiction	Adopted 1988 Removal Code
NSW[145]	Yes, s259(1)(b)
VIC[146]	No
QLD[147]	No
SA[148]	Refers to SA OHSC CoP – a reproduction of the current NOHSC CoP
WA[149]	Yes, s545(1)(b)(i)
TAS[150]	Yes, s120(1)
NT[151]	Adopted as a CoP under the OHS Act s36
ACT[152]	Adopted as a CoP
Commonwealth[153]	Adopted as a CoP. Requires removal to be undertaken in accordance with applicable state or territory law. In the Maritime regs direct users t the CoP when there is no such state or territory law.

TABLE 43: GAP ANALYSIS – CODE OF PRACTICE FOR THE SAFE REMOVAL OF ASBESTOS – ADDITIONAL REQUIREMENTS FOR SAFE ASBESTOS REMOVAL

Additional requirements of the Removal Code, not required in the 1988 Code	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Consultation with potentially effected parties regarding removal activities.	R	R	R	R	Gap	R	R	Gap
Record of all training must be kept.	R	R	R	R	R	R	R	R
Use of disposable coveralls as the preferred option	R	R	R	R	R	R	R	Gap
Responsibility for the security and safety of the removal site should be designated	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap

145 NSW Occupational Health and Safety Regulation 2001

146 VIC Occupational Health and Safety (Asbestos) Regulations 2003

147 QLD Workplace Health and Safety Regulation 1997
Workplace Health and Safety Regulation 1997

148 SA Occupational Health Safety and Welfare Regulations 1995

149 WA Occupational Safety and Health Regulations 1996

150 TAS Workplace Health and Safety Regulations 1998

151 NT Work Health (Occupational health and Safety) Regulations 2003

152 ACT – No applicable legislation

153 Commonwealth – Occupational health and Safety (Commonwealth Employment) (National Standards) Regulations 1994

Additional requirements of the Removal Code, not required in the 1988 Code	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Emergency Plan and first aid	R	Gap	Gap	Gap	Gap	Gap	Gap	Gap
Safety precautions for electrical and lighting installations and fire/smoke detector units.	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
All plastic disposed of as asbestos waste	Gap	Gap	R	Gap	Gap	Gap	Gap	Gap
Where there is an indication that dust maybe escaping from the enclosure asbestos removal work should be stopped until defect rectified	Gap	Gap	R	Gap	Gap	Gap	Gap	Gap
Repeat smoke test after correction of any leaks	Gap	R	R	Gap	Gap	Gap	Gap	Gap
Non-powered hand tools are preferred option to account for easier decontamination.	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
Electrical tools are not to be used for other work unless fully decontaminated.	Gap	Gap	R	Gap	Gap	Gap	Gap	Gap
Persons outside enclosure	Gap	Gap	Gap	Gap	Gap	Gap	Gap	Gap
Air Monitoring	R	R	R	R	R	R	R	R
Control Levels	Gap	R	R	Gap	Gap	Gap	Gap	Gap
Risk assessment prior to work	R	R	R	R	Gap	Gap	Gap	Gap
Risk assessment should be performed when additional asbestos found	R	R	R	R	Gap	Gap	Gap	Gap
Asbestos removal control plan	R	R	R	R	Gap	Gap	Gap	Gap

R Regulated – this requirement is regulated under current State or Territory legislation and/or regulations.

Gap This means that this requirement or its equivalent is not regulated under current State or Territory legislation and/or regulations.

TABLE 44: GAP ANALYSIS – CODE OF PRACTICE FOR THE SAFE REMOVAL OF ASBESTOS – COMMON REQUIREMENTS FOR SAFE ASBESTOS REMOVAL

Common requirements of both the 1988 Code and the removal Code*	NSW	VIC	QLD	SA	WA	TAS	NT	ACT
Signs and barriers	R	R	R	R	R	R	R	R
Vacuum Cleaners	R	Gap	R	R	R	R	R	R
Negative Pressure exhaust units	R	Gap	R	R	R	R	R	R
Mini Enclosures	R	Gap	R	R	R	R	R	R
Decontamination unit	R	R	R	R	R	R	R	R
Decontamination units not to be located beside the removal area.	R	Gap	R	R	R	R	R	R
Decontamination for small scale asbestos work	R	Gap	R	R	R	R	R	R
Clearance to reoccupy	R	Gap	R	R	R	R	R	R

* All jurisdictions except Victoria, have, by adopting the 1988 Code, covered these requirements.

APPENDIX E

TABLE 45: EXTRAPOLATION OF THE NUMBER OF CASES OF MESOTHELIOMA AND ASBESTOS-RELATED LUNG CANCER 2005-2030

Year	Number of Buildings containing asbestos [1]	Number of persons working in workplaces containing asbestos [2]	Number of workplaces containing friable ACM [3]	Number of workers in workplaces containing friable ACM [4]	Number of workers actually exposed to friable ACM [5]	Number of cases of asbestos-related disease from exposure to poorly maintained, damaged or friable ACM [6]	Number of cases of asbestos-related disease due to work with asbestos friction products [7]	Number of Maintenance and service workers exposed to ACM [8]	Number of cases of asbestos-related disease from maintenance and service work [9]	Total Number of cases of asbestos-related disease from asbestos friction products, poorly maintained, damaged or friable ACM and maintenance and service work on ACM [10]
1990	597,378 (100%)	-	-	-	-	-	-	-	-	-
2005	373,385 (62.5%)	2,613,695	70,943	496,602	24,830	3	5	180,560	23	31
2006	358,450	2,509,150	68,106	476,739	23,837	3	4	166,681	21	28
2007	343,515	2,404,605	65,268	456,875	22,844	3	3	159,737	20	26
2008	328,580	2,300,060	62,430	437,011	21,851	3	2	152,792	19	24
2009	313,645	2,195,515	59,593	417,148	20,857	3	1	145,847	19	22
2010	298,710	2,090,970	56,755	397,284	19,864	3	0	138,902	18	20
2011	283,775	1,986,425	53,917	377,421	18,871	2	0	131,957	17	19
2012	268,840	1,881,880	51,080	357,557	17,878	2	0	125,012	16	18
2013	253,905	1,777,335	48,242	337,694	16,885	2	0	118,067	15	17
2014	238,970	1,672,790	45,404	317,830	15,892	2	0	111,122	14	16

2015	224,035	1,568,245	42,567	297,967	14,898	2	0	104,178	13	15
2016	209,100	1,463,700	39,729	278,103	13,905	2	0	97,233	12	14
2017	194,165	1,359,155	36,891	258,239	12,912	2	0	90,288	12	13
2018	179,230	1,254,610	34,054	238,376	11,919	2	0	83,343	11	12
2019	164,295	1,150,065	31,216	218,512	10,926	1	0	76,398	10	11
2020	149,360	1,045,520	28,378	198,649	9,932	1	0	69,453	9	10
2021	134,425	940,975	25,541	178,785	8,939	1	0	62,508	8	9
2022	119,490	836,430	22,703	158,922	7,946	1	0	55,564	7	8
2023	104,555	731,885	19,865	139,058	6,953	1	0	48,619	6	7
2024	89,620	627,340	17,028	119,195	5,960	1	0	41,674	5	6
2025	74,685	522,795	14,190	99,331	4,967	1	0	34,729	4	5
2026	59,750	418,250	11,353	79,468	3,973	1	0	27,784	4	4
2027	44,815	313,705	8,515	59,604	2,980	0	0	20,839	3	3
2028	29,880	209,160	5,677	39,740	1,987	0	0	13,894	2	2
2029	14,945	104,615	2,840	19,877	994	0	0	6,950	1	1
2030	10	70	2	13	1	0	0	5	0	0
Total	**-**	**-**	**-**	**-**	**-**	**42**	**16**	**-**	**289**	**341**

1 **Number of Buildings containing asbestos =** reducing by 2.5% of the original number (i.e. 597,378) per year

2 **Number of persons working in workplaces containing asbestos** = number of buildings containing ACM x average number of workers per workplace (7)

3 **Number of workplaces containing friable ACM** = number of buildings containing ACM x 0.19 (19%)

4 **Number of workers in workplaces containing friable ACM** = number of buildings containing friable ACM x average number of workers per workplace (7)

5 **Number of workers actually exposed to friable ACM =** Number of workers in workplaces containing friable ACM x 0.05 (5%)

6 **Number of cases of mesothelioma and lung cancer from exposure to poorly maintained, damaged or friable ACM =** [(Number of workers actually exposed to friable ACM / 100,000) x average risk of developing lung cancer 8.6] + [(Number of workers actually exposed to friable ACM / 100,000) x average risk of developing lung cancer 8.6] / 2

7 Assuming that 100% of asbestos friction products in vehicles will be removed after 5 years and assuming a constant rate of removal over the period (i.e. 20% per year).

8 **Number of Maintenance and service workers exposed to ACM =** [0.47 or (180,560 / 388296)] x Number of Buildings containing asbestos

9 **Number of cases of mesothelioma and lung cancer from maintenance and service work** = [(Number of Maintenance and service workers exposed to ACM / 100,000) x average risk of developin ACM / 100,000) x average risk of developing lung cancer 8.6] / 2

10 **Total Number of cases from poorly maintained, damaged or friable and maintenance and service work =** Number of cases of mesothelioma and lung cancer from maintenance and service wor maintained, damaged or friable ACM

APPENDIX F

Costs of Regulation of New Management Code by State

The costs provided below are an estimated average across all businesses containing ACM, regardless of the size of the workplace, and therefore actual costs may be more or less than the figures provided depending on the size of the workplace (i.e. small business is expected to incur costs lower than those provided and large businesses are expected to incur greater costs than those provided).

NSW

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Competent person to conduct risk assessment	$281.25	$2,025	$1,153	-
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Total	-	-	**$1,997**	**$281.25**

VIC

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Competent person to conduct risk assessment	$281.25	$2,025	$1,153	-
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Total	-	-	**$1,997**	**$281.25**

QLD

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Warning signs and labelling of asbestos products	-	-	$281.25	-
Warning signs for asbestos '*maintenance*' work	-	-	$221	-
Identify ACM through inspection (buildings and structures, plant and equipment)	-	-	$281.25	-
Material sampling and analysis	-	-	$2,025	-
Maintenance of the Asbestos register	-	-	$281.25	-
Competent person to conduct risk assessment	$281.25	$2,025 / 2*	$647	-
Total	-	-	**$4,580.50**	**$281.25**

* Assuming the risk assessment and identification components are equally time consuming and therefore cost is equally apportioned.

SA

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Total	-	-	**$843.75**	**$281.25**

WA

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Warning signs for asbestos '*maintenance*' work	-	-	$221	-
System or procedures to control access to, and maintenance work on, ACM.	-	-	$281.25	-
Total	-	-	**$1,346.00**	**$281.25**

TAS

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business	Average ongoing Cost (per year)
Material sampling and analysis	-	-	$2,025	-
Competent person to conduct risk assessment	$281.25	$2,025	$1,153	-
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
System or procedures to control access to, and maintenance work on, ACM.	-	-	$281.25	-
Total	-	-	**$4,303**	**$281.25**

NT

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	Internal expertise	External expertise	Average Cost per Business (first year)	Average ongoing Cost (per year)
Material sampling and analysis	-	-	$2,025	-
Competent person to conduct risk assessment	$281.25	$2,025	$1,153	-
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
System or procedures to control access to, and maintenance work on, ACM.	-	-	$281.25	-
Total	-	-	**$4,303**	**$281.25**

ACT

Requirements under the new NOHSC Code of Practice for the Management and Control of Asbestos in Workplaces [NOHSC:2018(2004)]	**Internal expertise**	**External expertise**	**Average Cost per Business**	**Average ongoing Cost (per year)**
Management plan (as defined in the Management Code)	-	-	$562.50	-
Review of management plan	-	-	$281.25	$281.25
Warning signs for asbestos '*maintenance*' work	-	-	$221	-
Total	-	-	**$1,064.75**	**$281.25**

APPENDIX G

By using extrapolations provided in Appendix E and the costs identified in Appendix F, an estimate of the total costs of implementing the additional requirements of the Management Code can be made. Table 46 below provides this estimate.

TABLE 46: ONGOING COSTS ASSOCIATED WITH THE MANAGEMENT CODE*

Year	Estimated number of buildings containing asbestos	Annual ongoing cost of Management Code per business per year	Total ongoing cost of Management Code per year
1990	597,378 (100%)	-	-
2005	373,385 (62.5%)	-	**Initial cost of implementation $893,018,200**
2006	358,450	$281.25	$100,814,063
2007	343,515	$281.25	$96,613,594
2008	328,580	$281.25	$92,413,125
2009	313,645	$281.25	$88,212,656
2010	298,710	$281.25	$84,012,188
2011	283,775	$281.25	$79,811,719
2012	268,840	$281.25	$75,611,250
2013	253,905	$281.25	$71,410,781
2014	238,970	$281.25	$67,210,313
2015	224,035	$281.25	$63,009,844
2016	209,100	$281.25	$58,809,375
2017	194,165	$281.25	$54,608,906
2018	179,230	$281.25	$50,408,438
2019	164,295	$281.25	$46,207,969
2020	149,360	$281.25	$42,007,500
2021	134,425	$281.25	$37,807,031
2022	119,490	$281.25	$33,606,563
2023	104,555	$281.25	$29,406,094
2024	89,620	$281.25	$25,205,625
2025	74,685	$281.25	$21,005,156
2026	59,750	$281.25	$16,804,688
2027	44,815	$281.25	$12,604,219
2028	29,880	$281.25	$8,403,750
2029	14,945	$281.25	$4,203,281
2030	10	$281.25	$2,813
Total	**-**	**-**	**$2,153,229,138**

* Note: Figures may not match due to rounding

APPENDIX H

Costs of Regulation of New Removal Code by State

The costs provided below are an estimated average across all ACM removal tasks, regardless of the friability of the ACM and the amount to be removed. Therefore actual costs may be more or less than the figures provided depending on the size of the nature of the asbestos removed and the amount to be removed (i.e. the presence of large amounts of ACM is expected to incur higher costs than those provided and vice-versa).

NSW

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
Friable Removal			
Repeat smoke test after correction of any leaks [1]	-	-	$115
Persons outside enclosure [2]	-	-	$2587.50
Cost for Friable			**$2,703**
Total Cost			**$2,703**

1 Assuming only one leak occurs.
2 Assuming an average removal job will take 15 working days to complete.

VIC

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan	-	-	$57.50
Cost for All Removal			**$57.50**
Friable Removal			
Persons outside enclosure [1]	-	-	$2587.50
Cost for Friable Removal			**$2587.50**
Total Cost			**$2,645**

1 Assuming an average removal job will take 15 working days to complete.

QLD

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan	-	-	$57.50
Cost All Removal			**$57.50**
Friable Removal			
Persons outside enclosure [1]	-	-	$2587.50
Cost for Friable Removal			**$2587.50**
Total			**$2,645**

1 Assuming an average removal job will take 15 working days to complete.

SA

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan			$57.50
Cost for All Removal			**$57.50**
Friable Removal			
Repeat smoke test after correction of any leaks [1]			$115
Persons outside enclosure [2]			$2587.50
Cost for Friable Removal			**$2,703**
Total			**$2,760**

1 Assuming only one leak occurs.
2 Assuming an average removal job will take 15 working days to complete.

WA

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan			$57.50
Risk assessment prior to work	$951.25	$218.50	$584.90
Risk assessment should be performed when additional asbestos found			$54.65
Asbestos removal control plan			$345
Cost for All Removal			**$1,042.05**
Friable Removal			
Persons outside enclosure [1]			$2587.50
Repeat smoke test after correction of any leaks [2]			$115
Cost for Friable Removal			**$2,702.50**
Total			**$3,744.55**

1 Assuming an average removal job will take 15 working days to complete.
2 Assuming only one leak occurs.

TAS

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan			$57.50
Risk assessment prior to work	$951.25	$218.50	$584.90
Risk assessment should be performed when additional asbestos found			$54.65
Asbestos removal control plan			$345
Cost for All Removal			**$1,042.05**
Friable Removal			
Persons outside enclosure [1]			$2587.50
Repeat smoke test after correction of any leaks [2]			$115
Cost for Friable Removal			**$2,702.50**
Total			**$3,744.55**

1 Assuming an average removal job will take 15 working days to complete.
2 Assuming only one leak occurs.

NT

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan			$57.50
Risk assessment prior to work	$951.25	$218.50	$584.90
Risk assessment should be performed when additional asbestos found			$54.65
Asbestos removal control plan			$345
Cost for All Removal			**$1,042.05**
Friable Removal			
Persons outside enclosure [1]			$2587.50
Repeat smoke test after correction of any leaks [2]			$115
Cost for Friable Removal			**$2,702.50**
Total			**$3,744.55**

1 Assuming an average removal job will take 15 working days to complete.
2 Assuming only one leak occurs.

ACT

Requirements under the new NOHSC Code of Practice for the Safe Removal of Asbestos [NOHSC:2002(2005)]	Internal expertise	External expertise	Average Cost per Removal Task
All Removal			
Emergency and first aid plan			$57.50
Risk assessment prior to work	$951.25	$218.50	$584.90
Risk assessment should be performed when additional asbestos found			$54.65
Asbestos removal control plan			$345
Cost for All Removal			**$1,042.05**
Friable Removal			
Persons outside enclosure [1]			$2587.50
Repeat smoke test after correction of any leaks [2]			$115
Cost for Friable Removal			**$2,702.50**
Total			**$3,744.55**

1 Assuming an average removal job will take 15 working days to complete.
2 Assuming only one leak occurs.

APPENDIX I

	Current rate of removal of ACM remains unchanged at 2.5% of original total per year		10% increase in rate of removal of ACM		25% increase in rate of removal of ACM		50% increase in rate of removal of ACM	
Year	**Number of workplaces containing ACM**	**Cost**	**Number of workplaces containing ACM**	**Cost**	**Number of workplaces containing ACM**	**Cost**	**Number of workplaces containing ACM**	**Cost**
2005	373,385	$893,018,200	373,385	$893,018,200	373,385	$893,018,200	373,385	$893,018,200
2006	358,450	$100,814,063	356957	$100,394,186	354717	$99,764,139	350983	$98,714,060
2007	343,515	$96,613,594	340529	$95,773,840	336049	$94,513,746	328582	$92,413,589
2008	328,580	$92,413,125	324101	$91,153,495	317381	$89,263,354	306180	$86,113,118
2009	313,645	$88,212,656	307673	$86,533,149	298713	$84,012,961	283778	$79,812,647
2010	298,710	$84,012,188	291246	$81,912,804	280045	$78,762,568	261377	$73,512,176
2011	283,775	$79,811,719	274818	$77,292,458	261377	$73,512,176	238975	$67,211,705
2012	268,840	$75,611,250	258390	$72,672,113	242709	$68,261,783	216573	$60,911,234
2013	253,905	$71,410,781	241962	$68,051,768	224041	$63,011,391	194172	$54,610,763
2014	238,970	$67,210,313	225534	$63,431,422	205372	$57,760,998	171770	$48,310,291
2015	224,035	$63,009,844	209106	$58,811,077	186704	$52,510,605	149368	$42,009,820
2016	209,100	$58,809,375	192678	$54,190,731	168036	$47,260,213	126967	$35,709,349
2017	194,165	$54,608,906	176250	$49,570,386	149368	$42,009,820	104565	$29,408,878
2018	179,230	$50,408,438	159822	$44,950,040	130700	$36,759,428	82163	$23,108,407
2019	164,295	$46,207,969	143394	$40,329,695	112032	$31,509,035	59762	$16,807,936
2020	149,360	$42,007,500	126967	$35,709,349	93364	$26,258,643	37360	$10,507,465
2021	134,425	$37,807,031	110539	$31,089,004	74696	$21,008,250	14958	$4,206,994
2022	119,490	$33,606,563	94111	$26,468,658	56028	$15,757,857	0	0
2023	104,555	$29,406,094	77683	$21,848,313	37360	$10,507,465	-	-
2024	89,620	$25,205,625	61255	$17,227,967	18692	$5,257,072	-	-
2025	74,685	$21,005,156	44827	$12,607,622	24	$6,680	-	-
2026	59,750	$16,804,688	28399	$7,987,276	0	0	-	-
2027	44,815	$12,604,219	11971	$3,366,931	-	-	-	-
2028	29,880	$8,403,750	0	0	-	-	-	-
2029	14,945	$4,203,281	-	-	-	-	-	-
2030	10	$2,813	-	-	-	-	-	-
Total cost	**$2,153,229,138**		**$2,034,390,484**		**$1,890,726,384**		**$1,716,386,631**	

Lives saved	-	**27**	61	102
Min Value of Lives saved	-	$18,009,000	$40,687,000	$68,034,000
Max Value of Lives Saved	-	$164,700,000	$372,100,000	$622,200,000

	75% increase in rate of removal of ACM		100% increase in rate of removal of ACM		150% increase in rate of removal of ACM		200% increase in rate of removal of ACM	
Year	Number of workplaces containing ACM	Cost	Number of workplaces containing ACM	Cost	Number of workplaces containing ACM	Cost	Number of workplaces containing ACM	Cost
2005	373,385	$893,018,200	373,385	$893,018,200	373,385	$893,018,200	373,385	$893,018,200
2006	347250	$97,663,982	343,516	$96,613,903	336,049	$94,513,746	328,582	$92,413,589
2007	321114	$90,313,432	313,647	$88,213,275	298,713	$84,012,961	283,778	$79,812,647
2008	294979	$82,962,882	283,778	$79,812,647	261,377	$73,512,176	238,975	$67,211,705
2009	268844	$75,612,333	253,909	$71,412,019	224,041	$63,011,391	194,172	$54,610,763
2010	242709	$68,261,783	224,041	$63,011,391	186,704	$52,510,605	149,368	$42,009,820
2011	216573	$60,911,234	194,172	$54,610,763	149,368	$42,009,820	104,565	$29,408,878
2012	190438	$53,560,684	164,303	$46,210,134	112,032	$31,509,035	59,762	$16,807,936
2013	164303	$46,210,134	134,434	$37,809,506	74,696	$21,008,250	14,958	$4,206,994
2014	138167	$38,859,585	104,565	$29,408,878	37,360	$10,507,465	0	0
2015	112032	$31,509,035	74,696	$21,008,250	24	$6,680	-	-
2016	85897	$24,158,486	44,827	$12,607,622	0	0	-	-
2017	59762	$16,807,936	14,958	$4,206,994	-	-	-	-
2018	33626	$9,457,386	0	0	-	-	-	-
2019	7491	$2,106,837	-	-	-	-	-	-
2020	0	0	-	-	-	-	-	-
2021	-	-	-	-	-	-	-	-
2022	-	-	-	-	-	-	-	-
2023	-	-	-	-	-	-	-	-
2024	-	-	-	-	-	-	-	-
2025	-	-	-	-	-	-	-	-
2026	-	-	-	-	-	-	-	-
2027	-	-	-	-	-	-	-	-
2028	-	-	-	-	-	-	-	-
2029	-	-	-	-	-	-	-	-
2030	-	-	-	-	-	-	-	-
Total cost	**$1,591,413,929**		**$1,497,943,581**		**$1,365,620,329**		**$1,279,500,531**	

Lives saved	133	156	187	210
Min Value of Lives Saved	$88,711,000	$104,052,000	$124,729,000	$140,070,000
Max Value of Lives Saved	$811,300,000	$951,600,000	$1,140,700,000	$1,281,000,000

APPENDIX J

TABLE 47: ESTIMATES OF NEW CASES OF ASBESTOS-RELATED LUNG CANCER AND MESOTHELIOMA 2005-2030

	Current rate of removal of ACM remains unchanged at 2.5% of original total per year		10% increase in rate of removal of ACM		25% increase in rate of removal of ACM		50% increase in rate of removal of ACM		75% increase in rate of removal of ACM		100% increase in rate of removal of ACM		150% increase in rate of removal of ACM		200% increase in rate of removal of ACM	
Year	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases	Number of workplaces containing ACM	New cases
2005	373,385	31	373,385	31	373,385	31	373,385	31	373,385	31	373,385	31	373,385	31	373,385	31
2006	358,450	29	356957	28	354717	28	350983	27	347250	27	343,516	27	336,049	26	328,582	26
2007	343,515	28	340529	26	336049	25	328582	25	321114	24	313,647	24	298,713	23	283,778	21
2008	328,580	27	324101	24	317381	23	306180	22	294979	22	283,778	21	261,377	19	238,975	17
2009	313,645	26	307673	22	298713	21	283778	20	268844	19	253,909	18	224,041	16	194,172	14
2010	298,710	24	291246	20	280045	19	261377	18	242709	16	224,041	15	186,704	13	149,368	10
2011	283,775	23	274818	18	261377	18	238975	16	216573	15	194,172	13	149,368	10	104,565	7
2012	268,840	22	258390	17	242709	16	216573	15	190438	13	164,303	11	112,032	8	59,762	4
2013	253,905	21	241962	16	224041	15	194172	13	164303	11	134,434	9	74,696	5	14,958	1
2014	238,970	19	225534	15	205372	14	171770	12	138167	9	104,565	7	37,360	3	0	0
2015	224,035	18	209106	14	186704	13	149368	10	112032	8	74,696	5	24	0	-	-
2016	209,100	17	192678	13	168036	11	126967	9	85897	6	44,827	3	0	0	-	-
2017	194,165	16	176250	12	149368	10	104565	7	59762	4	14,958	1	-	-	-	-
2018	179,230	15	159822	11	130700	9	82163	6	33626	2	0	0	-	-	-	-
2019	164,295	13	143394	10	112032	8	59762	4	7491	1	-	-	-	-	-	-
2020	149,360	12	126967	9	93364	6	37360	3	0	0	-	-	-	-	-	-
2021	134,425	11	110539	7	74696	5	14958	1	-	-	-	-	-	-	-	-
2022	119,490	10	94111	6	56028	4	0	0	-	-	-	-	-	-	-	-
2023	104,555	9	77683	5	37360	3	-	-	-	-	-	-	-	-	-	-
2024	89,620	7	61255	4	18692	1	-	-	-	-	-	-	-	-	-	-
2025	74,685	6	44827	3	24	0	-	-	-	-	-	-	-	-	-	-
2026	59,750	5	28399	2	0	0	-	-	-	-	-	-	-	-	-	-
2027	44,815	4	11971	1	-	-	-	-	-	-	-	-	-	-	-	-

2028	29,880	2	0	0	-	-	-	-	-	-	-	-	-	-	-	-
2029	14,945	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2030	10	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total new cases	**-**	**341**	**-**	**314**	**-**	**280**	**-**	**239**	**-**	**208**	**-**	**185**	**-**	**154**	**-**	**131**
Lives saved	**-**	**0**	**-**	**27**	**-**	**61**	**-**	**102**	**-**	**133**	**-**	**156**	**-**	**187**	**-**	**210**

GLOSSARY

ABS	Australian Bureau of Statistics
ACCI	Australian Chamber of Commerce and Industry
ACGIH	American Conference of Governmental Industrial Hygienists
ACM	Asbestos Containing Material
ACPWG	Asbestos Code of Practice Working Group
ACTU	Australian Council of Trade Unions
ATSDR	Agency for Toxic Substances and Disease Registry
APCRG	Asbestos Public Comment Review Group
CAF	Compressed Asbestos Fibre
COAG	Council of Australian Governments
DDB	Dust Diseases Board of NSW
EU	European Union
HSE	Health and Safety Executive (UK)
IARC	International Agency for Research on Cancer
IPCS	International Programme on Chemical Safety
MFMWG	Membrane Filter Method Working Group
NCCOHS	National Consultative Committee on Occupational Health and Safety
NCSCH	National Cancer Statistics Clearing House
NES	National Exposure Standard
NICNAS	National Industrial Chemicals Notification and Assessment Scheme
NIOSH	National Institute for Occupational Safety and Health
NOHSC	National Occupational Health and Safety Commission
NTP	National Toxicology Program (USA)
OHS	Occupational Health and Safety
ORR	Office of Regulation Review (Australian Government)

PEC	Priority Existing Chemical
PRIS	Preliminary Regulatory Impact Statement
RIS	Regulatory Impact Statement
TWA	Time Weighted Average
UICC	Union Internationale Centre le Cancer
VLY	Statistical Value of a Life Year
WHO	World Health Organization
WRMC	Workplace Relations Ministers Council

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