750 Taylorville Road
Taylorville, Greymouth 7805, NZ
P 03 7625672 brunner.bears@gmail.com

24.5.2021

MBIE Building Controls
Po Box 1473 Wellington 6140 NZ

Good morning

While researching construction waste dumping in preparation for our 10 year district plan 21 to 31, we have discovered demolition waste that contains asbestos is being dumped anywhere.
A fire permit for the complete demolition of a building. No asbestos survey or removal required
Re: Building Act 2004 Schedule 1, no building consent required for the demolition up to 3 storeys high. eg Earthquake Prone Buildings requiring demolition under 3 storeys high containing asbestos can be dumped anywhere.
For your consideration.
Can you consider addressing this issue.
I have already spoken to our local councils who share my concerns.

Yours sincerely
Alex Woods

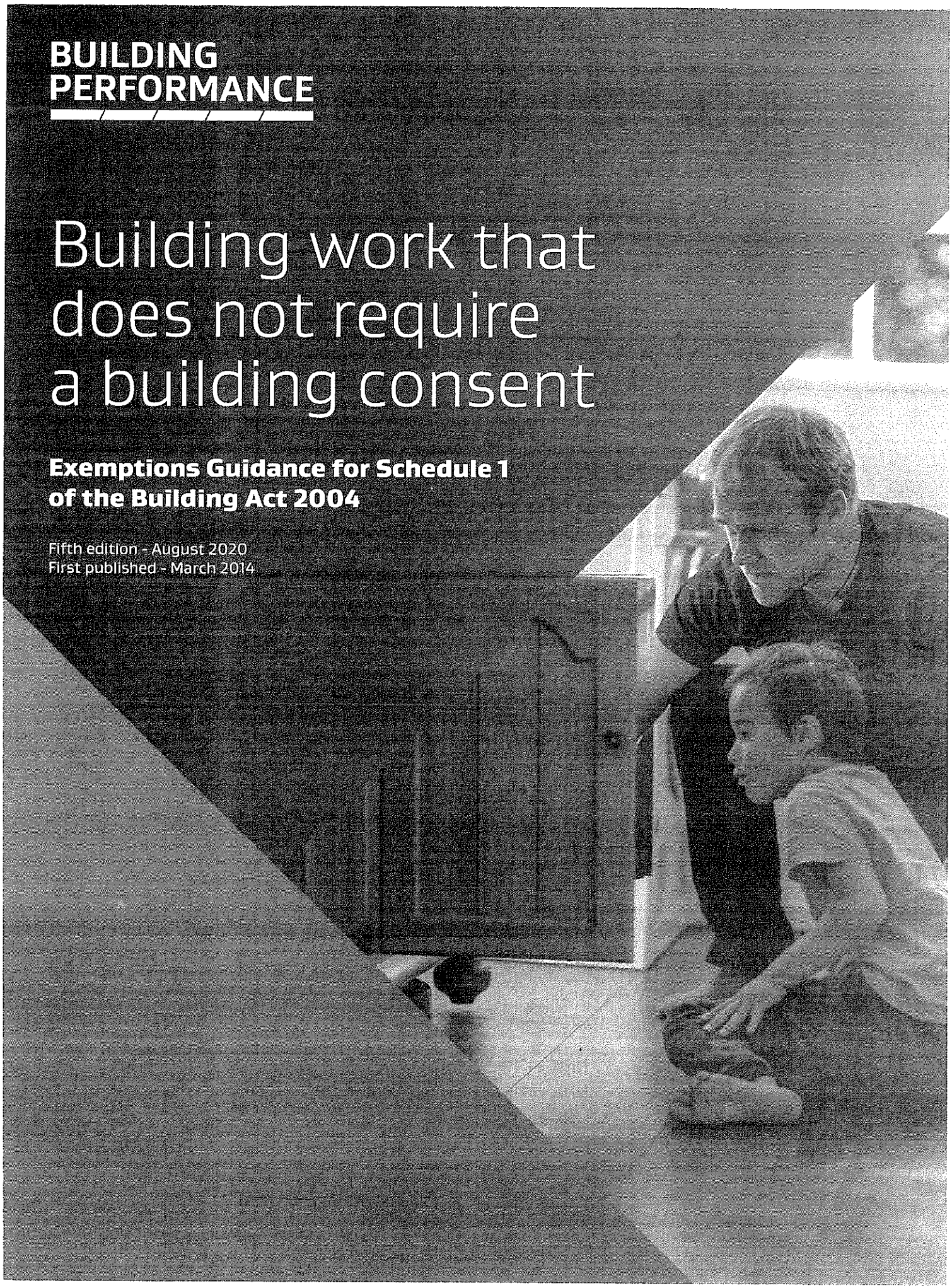
Cc WCRC
Work Safe
GDC

BUILDING PERFORMANCE

Building work that does not require a building consent

Exemptions Guidance for Schedule 1 of the Building Act 2004

Fifth edition - August 2020
First published - March 2014



MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT

Building work that does not require a building consent

Building Act 2004

MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
HIKINA WHAKATUTUKI

Third edition 2014

Demolition

30. Demolition of detached building

The complete demolition of a building that is detached and is not more than 3 storeys.

This exemption has been expanded from the previous exemption (l) to allow the full demolition of all detached buildings up to 3 storeys high whether or not they are damaged. However, partial demolition is no longer exempt from building consent, other than as permitted by exemption 31.

If you are considering demolishing an existing building under this exemption, we recommend that you also consider the following:

- terminating services such as water, sewer, and stormwater by capping and sealing them inside the boundary
- contacting the relevant service authorities to advise them of the extent of your work: this includes electricity, gas, drainage, water, transport, telecommunications, cable television and any other services that may be affected
- handling and disposing of hazardous building materials
- controlling silt runoff, excess noise and dust generated by the demolition work, and
- securing the site (eg with a temporary fence or hoardings) to restrict public access to the area and avoid injury to members of the public.

ALERT:

As a building owner, you should also check council requirements for the repair and reinstatement of any damage to the road reserve.

We recommend that you use skilled and professional building practitioners for major demolition work.

No demolition work should be undertaken on heritage or character buildings without first checking with your local council for its approval.

Examples where this exemption could apply

Following an earthquake, the owner decides to demolish her severely damaged 2 storey, detached family home.

The new owner of an old wooden single storey, detached holiday home plans to demolish it to make way for his new dream holiday home.

Examples where building consent is required

Following a fire, a shop owner decides to demolish his damaged shop which is attached to another building (ie it is semi-detached) that is not damaged. A building consent is required because the building is not detached.

To make way for a new apartment block, the owner of a 4 storey commercial building intends to demolish it. A building consent is required because the building is more than 3 storeys.

750 Taylorville Road
Taylorville
Greymouth 7805
Phone 03 7625672
brunner.bears@gmail.com

31.5.2021

Att: Mike Reid
Local Government New Zealand
P O Box 1214
Wellington 6140 NZ

Re: Illegal dumping

Good morning

We have an electronic petition on the Parliament website. The Petitions Office helped us with the wording. Checked to make sure it follows the Standing Orders of the House of Representatives
Would LGNZ support our electronic petition, title is Stop illegal dumping into and onto Crown land
ref page 5
Improve prevention, detection and prosecution.

Yours sincerely
Alex Woods

Reprint
as at 12 April 2019

Health and Safety at Work (Asbestos) Regulations 2016

(LI 2016/15)

Jerry Mateparae, Governor-General

Order in Council

At Wellington this 15th day of February 2016

Present:
His Excellency the Governor-General in Council

These regulations are made under sections 24(1)(m), 211, and 218 of the Health and Safety at Work Act 2015—

(a) on the advice and with the consent of the Executive Council; and

(b) on the recommendation of the Minister for Workplace Relations and Safety after complying with sections 217 and 219 of that Act.

Contents

Note

Changes authorised by subpart 2 of Part 2 of the Legislation Act 2012 have been made in this official reprint.

Note 4 at the end of this reprint provides a list of the amendments incorporated.

These regulations are administered by the Ministry of Business, Innovation, and Employment.

Part 1
Preliminary provisions and declaration of notifiable incident

Subpart 1—Preliminary provisions

3 Interpretation

(1) In these regulations, unless the context otherwise requires,—

accredited laboratory means a laboratory that is—

(a) accredited by International Accreditation New Zealand (IANZ); or

(b) accredited under another accreditation regime recognised by WorkSafe; or

(c) approved by WorkSafe to test samples under these regulations for up to 12 months while the laboratory is in the process of obtaining accreditation under paragraph (a) or (b)

Act means the Health and Safety at Work Act 2015

airborne contamination standard for asbestos means the standard specified in regulation 4

approved code of practice means a code of practice approved under section 222 of the Act

asbestos means the asbestiform varieties of mineral silicates belonging to the serpentine or amphibole groups of rock-forming minerals, including the following:

(a) actinolite asbestos:

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

(c) anthophyllite asbestos:

(d) chrysotile asbestos (white):

(e) crocidolite asbestos (blue):

(f) tremolite asbestos:

(g) a mixture that contains 1 or more of the minerals referred to in paragraphs (a) to (f)

asbestos-containing material or **ACM** means any material or thing that, as part of its design, contains asbestos

asbestos-contaminated dust or debris or **ACD** means dust or debris that has settled within a workplace and is, or is assumed to be, contaminated with asbestos

asbestos-contaminated soil means soil that is contaminated with asbestos or ACM

asbestos management plan has the meaning given in regulation 13

(b) if it is not reasonably practicable to eliminate exposure to airborne asbestos, exposure is minimised so far as is reasonably practicable.

(2) A PCBU with management or control of a workplace must ensure that the airborne contamination standard for asbestos is not exceeded at the workplace.

(3) Subclauses (1)(a) and (2) do not apply in relation to an asbestos removal area—

(a) that is enclosed to prevent the release of respirable asbestos fibres in accordance with regulation 46; and

(b) in which negative pressure is used in accordance with that regulation.

(4) A PCBU who contravenes subclause (2) commits an offence and is liable on conviction,—

(a) for an individual, to a fine not exceeding $10,000:

(b) for any other person, to a fine not exceeding $50,000.

Compare: Model Work Health and Safety Regulations 2011 (Aust) r 420

Subpart 2—Management of asbestos risks

10 Duty to ensure asbestos identified at workplace

(1) A PCBU with management or control of a workplace who knows or ought reasonably to know that there is a risk of exposure to respirable asbestos fibres in the workplace must ensure, so far as is reasonably practicable, that all asbestos or ACM giving rise to the risk at the workplace is identified.

(2) A PCBU with management or control of a workplace must,—

(a) if material at the workplace cannot be identified but the PCBU reasonably believes that the material is asbestos or ACM, assume that the material is asbestos; and

(b) if part of the workplace is inaccessible to workers and likely to contain asbestos or ACM, assume that asbestos is present in that part of the workplace.

(3) Subclause (1) does not apply if the PCBU—

(a) assumes that asbestos or ACM is present; or

(b) has reasonable grounds to believe that asbestos or ACM is not present.

(4) Subclause (1) does not apply in relation to soil at the workplace unless there is reasonable cause for the PCBU to suspect that asbestos-contaminated soil is present.

(5) If asbestos or ACM is assumed to be present at a workplace, it is taken to be identified at the workplace.

(6) A PCBU who contravenes subclause (1) commits an offence and is liable on conviction,—

(a) for an individual, to a fine not exceeding $10,000:

(b) for any other person, to a fine not exceeding $50,000.

Compare: Model Work Health and Safety Regulations 2011 (Aust) r 422

11 Duty to analyse samples

(1) A PCBU with management or control of a workplace may identify asbestos or ACM by arranging for a sample of material at the workplace to be analysed for the presence of asbestos or ACM.

(2) If a PCBU with management or control of a workplace arranges for an analysis, the PCBU must ensure that the sample is analysed by an accredited laboratory.

(3) A PCBU who contravenes subclause (2) commits an offence and is liable on conviction,—

(a) for an individual, to a fine not exceeding $2,000:

(b) for any other person, to a fine not exceeding $10,000.

Compare: Model Work Health and Safety Regulations 2011 (Aust) r 423

12 Duty to ensure presence and location of asbestos indicated

(1) A PCBU with management or control of a workplace must ensure that the presence and location of asbestos or ACM identified at the workplace under regulation 10 are clearly indicated (and in a way that complies with the requirements of any applicable safe work instrument).

(2) A PCBU who contravenes subclause (1) commits an offence and is liable on conviction,—

(a) for an individual, to a fine not exceeding $10,000:

(b) for any other person, to a fine not exceeding $50,000.

Compare: Model Work Health and Safety Regulations 2011 (Aust) r 424

13 Duty to prepare asbestos management plan

(1) This regulation applies if asbestos or ACM is—

(a) identified at a workplace under regulation 10; or

(b) likely to be present at a workplace from time to time.

(2) A PCBU with management or control of the workplace must ensure that a written plan (an **asbestos management plan**) for the workplace is prepared.

(3) A PCBU with management or control of the workplace must ensure that the information in the asbestos management plan is kept up to date.

(4) An asbestos management plan must include information about the following:

(a) the identification of asbestos or ACM:

(b) decisions, and reasons for decisions, about the management of the risk arising from asbestos at the workplace:

Inventory of New Zealand Imports and Exports of Asbestos-Containing Products

Report to the Ministry for the Environment

Prepared by Dr Bruce Graham

Graham Environmental Consulting Ltd

August 2014

Executive Summary

This report provides an assessment of current New Zealand imports and exports of asbestos-containing products (ACPs). It has been prepared under contract to the New Zealand Ministry for the Environment, with the primary purpose of developing a comprehensive picture of the flow of asbestos-containing products into and out of New Zealand. The Ministry for the Environment will use this information as an evidence base from which to ascertain whether the import, export and use of these products warrants further government intervention and what the best mechanisms for further regulation would be.

Section 2 of this report provides background information for the study, including the properties of asbestos, the past and present patterns of production and use, and a limited review of asbestos regulations in other countries.

Section 3 describes the use of asbestos in different types of products, the reasons for those uses, and the available non-asbestos alternatives. The material presented was based mainly on published information but with additional local details provided where relevant.

Section 4 of the report presents the information collected through a survey of potential importers, distributors and users of ACPs in New Zealand. The survey was carried out during May to July 2014. It covered a total of 130 individual companies and 25 business and industry associations. In addition, contact with the business and industry associations resulted in the enquiries being passed on to many hundreds of other companies and individuals through email distribution lists and newsletters. Further information was also obtained through searches of company web sites and internet searches targeted at specific products.

Section 5 provides a summary and analysis of the available import and export data for ACPs.

When taken together, the information in sections 2 to 5 provides a cohesive picture of the current uses of, and need for, ACPs in New Zealand. This is presented below on the basis of the three main components.

Survey of potential importers, distributors and users of ACPs

Specific feedback was received from 82 companies and this indicated that most uses of asbestos in New Zealand have been discontinued, in many cases more than 10 to 20 years ago. A limited number of residual uses were identified but, with only one exception (uses in aircraft), the users saw no problems with possibly having to switch to alternative non-asbestos products.

The current ACP uses identified in the survey were as follows:

- Asbestos tape, which was sold for wrapping inlet headers and exhaust pipes in performance vehicles.
- An educational resource set of minerals that included a sample of asbestos.
- Gaskets, seals, and possibly also brake pads, for use in aircraft.
- Gaskets for use in ships, especially in the exhaust systems.
- Asbestos cloth for pipe insulation, and possibly brake pads for winches, on ships.
- Some minor legacy uses of gaskets and insulation materials were also reported by several specific industries that involve high temperature or high pressure processes.

The first two of these items are intended for resale, while the remainder would be imported directly by the users.

Several recent product recalls in Australia are also relevant to this study. These have included engine gaskets, a decorative wall tile, novelty Fire Wallets, vehicle underbody protection products, a heat protection plate in a barbeque accessory and a drilling fluid additive. The main point to note about these is that they were usually one-off items, rather than well-established products that had been imported and sold for considerable periods of

time. Some of them, such as the vehicle gaskets, were promptly replaced with non-asbestos alternatives, while others were simply withdrawn from sale.

Import/Export data

This data is available for three specific types of ACPs: friction materials, fabricated asbestos and fibre-cement products. However, there are significant uncertainties in the data because the codes used to identify the products are usually chosen by Customs brokers or clearance agents, who may not have detailed information on the product composition. The data shows the following:

- Asbestos-based brake pads and other friction materials account for just over 10% of current imports, by value. However, this information is totally at odds with the survey responses, which have not identified any current uses of asbestos-containing friction materials, apart from the minor unconfirmed but possible uses in ships and aircraft.
- The value of annual imports of fabricated asbestos (eg. tape or cloth) is currently around $100,000 per year. Some minor uses of these products were identified in the survey but nothing that would account for this stated value. This, coupled with the fact that asbestos tape and cloth is not readily available in any of the main countries of origin (UK, USA, Slovenia, Australia and Japan) suggests that the data may be significantly affected by the use of incorrect codes.
- The imports of all types of fibre-cement products are currently around $4.5 to $5.5 million per year. The reported data for asbestos-cement products accounts for less than 0.2% of this total but may be affected by incorrect coding.
- The only notable exports for any of the categories are some minor amounts of fabricated asbestos.

Alternatives

The information given in section 3 indicates that there are viable non-asbestos alternatives available for all of the ACPs covered by the report. For most products, the search for alternatives started more than 30 years ago, and in those early years, there were valid concerns around relative effectiveness and costs (Pye, 1979). Furthermore, some organisations continued to echo those concerns through to the end of the 1990s (NICNAS, 1999). However, fifteen years on, the use of asbestos-free products appears to have become the established norm.

Most of the alternatives materials are more expensive than asbestos. However, this factor may have become less relevant over time, when considered against overall increases in costs caused by inflation. In addition, many of the uses of ACPs are as relatively minor components of larger items (e.g. in motor vehicles). Performance concerns have also faded over time because there is now often a much wider range of products to choose from, including those that perform equally or even better than the original ACPs.

The feedback received through the survey component of this study indicated no significant concerns around the use of non-asbestos alternatives. The only issue that has been noted relates to replacement parts for aircraft. Rule 21.303 of the *Civil Aviation Rules* requires that any non-OEM replacement part be properly certified. This applies to all parts, no matter how small, and could result in significant costs for aircraft operators if they were no longer able to import and use an original asbestos-based part. However, the extent of the issue appears to be limited to occasional imports of minor replacement parts for a limited number of aircraft.

Conclusions

The key conclusions from the survey of potential importers, distributors and users of ACPs were as follows:

- The number of current uses of ACPs identified in the survey is very small, and only one of these (replacement parts for some aircraft) is seen as definitely needing to continue. One company from the marine sector also indicated a future need for minor imports of ACP exhaust gaskets.

- Non-asbestos materials are the accepted norm for most products, and alternatives are available for all uses, with no significant cost or performance concerns.
- There is the potential for future imports of some ACPs that are still readily available in other countries. This includes non-OEM friction materials for vehicles, asbestos-cement products, floor tiles, and replacement parts for marine vessels.

The final bullet point is also relevant to the import/export data presented in section 5. As noted previously, there are significant uncertainties in the data, especially in relation to the use of the correct product codes. This raises the potential for some imports to be incorrectly labelled as containing asbestos and, conversely, for others to be declared as asbestos-free.

The following limitations of the study are also acknowledged: the survey has relied on the voluntary provision of information by ACP importers and users, and has primarily focused on 'mainstream' importers and users of ACPs.

Contents

List of abbreviations

AC	asbestos-cement
AC&CC	Australia Competition & Consumer Commission
ACP	asbestos-containing product
CAA	Civil Aviation Authority
CAF	compressed asbestos fibre
CEO	Chief Executive Officer
EU	European Union
GRP	glass-reinforced plastics
HS	Harmonised System (of Customs commodity codes)
HSNO	Hazardous Substances and New Organisms Act 1996
LPG	liquefied petroleum gas
MBIE	Ministry of Business, Innovation and Employment
MSDS	Material Safety Data Sheets
NGO	non-governmental organisation
OEM	original equipment manufacturer
PBI	polybenzimidazole
PTFE	polytetrafluoroethylene (Teflon)
PVA	polyvinyl alcohol
PVC	polyvinyl chloride
RNZAF	Royal New Zealand Air Force
UK	United Kingdom (Great Britain)
USA	United States of America
US EPA	United States Environmental Protection Agency
WCO	World Customs Organization

Inventory of New Zealand Imports and Exports of Asbestos-Containing Products

1 Introduction

This report provides an assessment of current New Zealand imports and exports of asbestos-containing products (ACPs). It has been prepared under contract to the New Zealand Ministry for the Environment, and is based on a survey of potential importers, distributors and users of ACPs. The survey information is supported by a limited review of asbestos regulations in other countries and a more extensive review of non-asbestos alternatives.

The Environmental Protection Authority, the Ministry of Business Innovation and Employment, and the New Zealand Customs Service provided additional input to the survey.

1.1 Purpose

The primary purpose of this study was to develop a comprehensive picture of the flow of ACPs into and out of New Zealand. The Ministry for the Environment will use this information as an evidence base from which to ascertain whether the import, export and use of these products warrants further government intervention and what the best mechanisms for further regulation would be.

The inventory was intended to provide information relating to the following questions:

- Are any asbestos-containing products being imported into or exported out of New Zealand?
- If so, what are these products and how are they used?
- What volumes of products are being imported or exported?
- Which industries use these products?
- How important are these products to the relevant industries and are there alternative products that could be used?

1.2 Methodology

The list of past uses of asbestos given in Appendix 1 provided an overall framework for the approach to this work. This list was developed from several sources including a national review of asbestos use in Australia (NICNAS, 1999) and a recent New Zealand guidance document (NZDAA, 2011).

The various types of applications shown in Appendix 1 (Adhesives, Aircraft, Automotive, etc.) were used as the starting point for identifying potential contacts, using internet searches for the relevant business or industry associations and also for specific companies. Generally, the approach adopted was as follows:

- Where available, contacts with industry organisations were preferred over individual companies, in order to minimise the total number of contacts.
- When the use of an ACP was most likely because of its special characteristics (e.g. heat-resistant surface coatings or resins), more emphasis was given to the suppliers of specialist products rather than those servicing general markets.
- Internet searches were used where possible as a pre-screening tool to narrow down the range of possible ACPs (e.g. by searching for product details and/or MSDS).

- Service centres and the suppliers of spare parts were included for most of the equipment-based categories (automotive, marine, industrial plant, etc.), because it was expected that most uses of ACPs were likely to be as replacement items.
- It was assumed that there was no manufacturing of ACPs from raw asbestos in New Zealand.
- Only a representative range of companies was contacted when there were very large lists of possible contacts to choose from (e.g. electrical equipment, or home appliance components).

The individual companies thus identified were contacted directly, mainly by telephone or email, while the business and industry associations were asked to pass on a request for information to their members. A formal questionnaire approach was not used for the survey. Rather, people were asked if they were importing, distributing or using any ACPs and, if so, whether they would foresee any problems if future imports were restricted or banned. They were also asked to respond even if they were not importing, distributing or using ACPs, although there was no obligation to do so.

The survey results were backed up by an analysis of import and export data covering the period 2004 to 2013, although this was only relevant to the following range of ACPs: friction materials, fibre-cement products and asbestos-based textiles.

1.3 Report layout and content

Section 2 of this report provides background information for the study, including the properties of asbestos, the past and present patterns of production and use, and a limited review of asbestos regulations in other countries.

The information given in section 3 covers the use of asbestos in different types of products, the reasons for those uses, and the available non-asbestos alternatives. The material presented was based mainly on published information but with additional local details provided where relevant.

Section 4 presents the information collected through the survey of potential importers, distributors and users of ACPs in New Zealand. The survey was carried out during May to July 2014, and covered a total of 130 individual companies and 25 business and industry associations. Additional information was also obtained through searches of company web sites and internet searches targeted at specific products.

A summary and analysis of import and export data is given in Section 5, backed up by the additional data provided in Appendix 2.

The report concludes with the overall summary and discussion given in Section 6.

2 Background information on asbestos

2.1 Asbestos and its properties

Asbestos is the generic name given to fibrous forms of a number of naturally occurring silicate minerals. The minerals are serpentine, actinolite, amosite, anthophyllite, crocidolite and tremolite (NICNAS, 1999). They can all exist in several different crystalline forms, but only the fibrous forms are classified as asbestos. The other forms are sometimes described as non-asbestiform. In the case of serpentine, the asbestos form has its own name: chrysotile. The three commercially important forms of asbestos are amosite, chrysotile and crocidolite.

Asbestos was widely used in the past because it had a number of desirable physical and chemical properties (Pye, 1979). The minerals do not burn[1], are highly resistant to chemical attack, and are poor conductors of heat and electricity. Asbestos fibres generally have a high aspect ratio (length vs width), which makes them useful for mechanical reinforcement in applications such as fibre-cement and resin products. In addition, the fibres are relatively flexible (e.g. compared to glass fibre), which makes them suitable for use in textiles and as a compressible packing material.

The thermal stability of asbestos is one of its more important properties, but the stability is not unlimited. Degradation of the crystal structure and the associated loss of mechanical strength occur in the temperature range of about 300 to 500 °C, although useful performance of some products can still be obtained at temperatures of up to 600 °C (Pye, 1979). For comparative purposes, the temperatures around the cylinder head of a motor vehicle engine are normally kept below 250 to 350 °C; the flame temperatures in a domestic wood burning fire are around 600 to 800 °C while in a properly designed and controlled industrial incinerator they can be up to 1000 to 1150 °C; and the industrial furnaces used for making glass or steel typically operate at about 1550 to 1650 °C.

2.2 Asbestos production and use

Asbestos has been in use for more than 3000 years. However, the industrial and commercial use of asbestos dates to the early 1800s when an asbestos textile industry was established in Italy (Virta, 2005). These early uses were constrained by supply until the discovery of large asbestos deposits in Canada, Russia and South Africa towards the end of the century. The first machines for the mass-production of asbestos-cement sheets and asbestos-cement pipes were developed in 1900 and 1929 respectively. The use of asbestos in brake linings began in 1906.

The period of most widespread use started after the end of the Second World War, and by 1958 it was estimated that asbestos was being used in about 3000 different applications or types of products. A listing of the typical uses is given in Appendix 1 and includes the following: roofing materials, thermal and electrical insulation, asbestos-cement pipes and sheets, flooring, gaskets, friction materials, surface coatings, plastics, textiles, paper, mastics, fibre jointing and millboard.

The total global production of asbestos reached its peak in the 1970s. It was estimated to be about 5 million tonnes per annum in 1975, with about 25 countries producing asbestos and 85 manufacturing asbestos products (IARC, 2012).

[1] The word asbestos is derived via Latin from the Greek: *a* = not, + *sbennumi* = quench. Hence, asbestos = unquenchable.

The distribution of global usage across the different applications in the 1980s was estimated to be as follows (NICNAS, 1999):

Asbestos cement products	70%
Vinyl asbestos flooring	10%
Friction products	7%
Asbestos paper & felt	5%
Gaskets & packings	3%
Paints, roof coatings, caulks, etc.	2%
Filter media	2%
Asbestos textile products	1%

However, world production and consumption started to decline from the 1980s onwards, and there was a corresponding fall-off in the range of applications. For example, in 1977 the annual usage of asbestos in the USA was about 670,000 tonnes and the distribution was similar to that shown above. By 1991, the annual usage had dropped to only 34,000 tonnes per year. The distribution was mainly limited to asbestos-cement products (62%) and friction products (29%), along with other minor uses in surface coatings, electrical insulation, gaskets and packings. By 2007, the annual USA consumption was only 1730 tonnes.

This drop in consumption has been reflected in many other countries around the world and was prompted by concerns about the potential adverse health effects from asbestos exposures (IARC, 2012). Asbestos has now been banned or severely restricted in at least 54 countries. However its use still continues in others. In 2006, the global production of asbestos was estimated at just over 2 million tonnes and the following 6 countries accounted for 96% of the total production:

Russian Federation	925,000 tonnes
People's Republic of China	360,000 tonnes
Kazakhstan	300,000 tonnes
Brazil	227,000 tonnes
Canada	185,000 tonnes
Zimbabwe	100,000 tonnes.

The annual global production and consumption of asbestos appears to have remained quite steady over the last 5 to 10 years, and in 2012 was still estimated at around 2 million tonnes per year (MBIE, 2014). More than half of the total consumption is concentrated in China (530,000 tonnes) and India (490,000 tonnes).

2.3 Asbestos regulation

Partial or total legislative bans on asbestos have been adopted by at least 54 countries around the world (MBIE, 2014). Some of the most significant of these controls (from a New Zealand perspective) are summarised below.

2.3.1 Australia

In Australia, all uses of chrysotile asbestos were banned with effect from 31 December 2003, subject to a very limited range of exemptions (NOHSC, 2005). This prohibition was originally set out in amendments to Schedule 2 of the *National Model Regulations for the Control of Workplace Hazardous Substances (Prohibition of Asbestos) 2001*, which also confirmed earlier prohibitions on the use of amosite and crocidolite asbestos. There were no known uses in Australia of the other three forms of asbestos: actinolite, anthophyllite and tremolite.

The ban was reinforced by prohibitions under the *Customs (Prohibited Exports) Regulations 1958* and *Customs (Prohibited Imports) Regulations 1956* and subsequently reflected in Australian Government, State and Territory occupational health and safety and hazardous substances legislation. The prohibition did not extend to asbestos-containing materials in place at the time the prohibition took effect. Accordingly, the Customs regulations provide that when an asbestos part or component is disturbed it must be replaced with non-asbestos alternatives.

2.3.2 Europe

The placing on the market, supply and use of all forms of asbestos and products containing asbestos fibres was prohibited in the European Union from January 2005, under the EU *Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) Regulation*. The legislation prohibits the use, reuse, sale, supply, and further adaptation of materials containing asbestos fibres. However, various exemptions are allowed, but subject to special labelling requirements. This includes existing asbestos-containing materials that, provided they are in good condition, may be left in place with their condition monitored and managed.

2.3.3 North America

Until recently, Canada was one of the major producers and exporters of asbestos (MBIE, 2014). However, production ceased at the two remaining asbestos mines in the province of Quebec in 2011. Within the country, products containing asbestos are regulated by the *Asbestos Products Regulation (SOR 2007/260)*, which essentially allow for a range of existing uses of asbestos-containing products to continue, subject to labelling and other usage conditions.

The situation in the United States of America is complicated by bans on different asbestos uses being applied under several different Acts, over the period 1973 to 2000 (US EPA, 2014). In addition, most of a 1989 proposal to ban most asbestos-containing products under Section 6 of the *Toxic Substances Control Act* was overturned in the courts. According to the US EPA, the following products and uses are the only ones currently banned:

- Corrugated paper, roll-board, commercial and specialty papers.
- Flooring felt.
- Asbestos pipe insulation and asbestos block insulation on facility components, such as boilers and hot water tanks, if the materials are either pre-formed (molded) and friable or wet-applied and friable after drying.
- Spray-on application of materials containing more than 1% asbestos to buildings, structures, pipes, and conduits, unless certain conditions are met.
- Asbestos in artificial fireplace embers and wall patching compounds.

The US regulations also prohibit the use of asbestos in products that have not historically contained asbestos (ie. new uses). However, a wide range of other existing products and uses are still permitted.

2.3.4 Asia

Asbestos product regulation in Japan started in 1975 with a prohibition on the spraying of asbestos (Park, Takahashi, & Jiang, 2012). All uses of crocidolite and amosite were prohibited in 1995. However, uses of chrysotile continued at significant levels through to the end of the 20th century. In 2004, the Japanese government prohibited the manufacture of 10 designated products containing asbestos and the importation of raw asbestos into Japan ceased in 2005, although not because of any specific regulations. On 1 September 2006, the government adopted a total ban on asbestos but with exemptions for specific items, such as joint sheets and special gaskets. These exemptions expired on 1 March 2012.

For other parts of South-East Asia, a summary of a regional conference held in 2002 reported that China was the only country where asbestos mining was still carried out, with 120 mines employing about 23,000 workers (Takahashi & Karjalainen, 2002). The situation regarding regulatory bans was summarised as follows:

Country	Crocidolite	Amosite	Chrysotile
China	yes	no	no
Indonesia	n.a.	n.a.	no
Japan	yes	yes	coming
Korea	yes	n.a.	no
Malaysia	yes	no	no
Philippines	yes	yes	no
Singapore	yes	yes	most products
Thailand	yes	no	no*
Vietnam	(no use)	(no use)	no
Taiwan	yes	yes	no

n.a. = information not available

* headed for ban (unconfirmed information based on personal communication)

A more recent web site summary indicates the following additional developments (IBase Secretariat, 2014):

China: The import and export of amosite and crocidolite was banned in 2005, and the use of all types of asbestos in siding and wall construction materials was banned in 2010.

Republic of Korea (South Korea): The use of all types of asbestos was banned, effective 2009.

Thailand: Legislation was passed in 2011 to ban the use of asbestos, with all imports to cease immediately and the sale of all asbestos products to cease in 2012.

Taiwan: The use of asbestos for the manufacture of extruded cement composite hollow panels and construction sealants was prohibited from August 2012, and the manufacture of asbestos roof tiles was prohibited from February 2013. In addition, the use of asbestos in the manufacture of brake linings will be prohibited from July 2018.

Finally, India would appear to be one of the least regulated countries in this region. In principle, asbestos mining is no longer allowed since a decision by the Ministry of Mines in 1996 not to issue or renew any mining licences. However, some illegal mining may still be occurring (Supreme Court of India, 2011). Apart from the operational controls applied under environmental and health & safety legislation, there are no restrictions on the manufacturing of asbestos products (Joshi, 2012). There are over 100 asbestos manufacturing operations in India producing a wide range of different products, although asbestos-cement materials appear to be the dominant products. There have been some attempts by NGOs and others to have the use of asbestos banned, and a private member's bill to this effect was introduced to the Parliament in 2009. According to Joshi (2012), this was stalled in the Upper House.

2.3.5 International instruments

All forms of asbestos except chrysotile, are subject to the country-to-country controls applied under the *Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade*. This requires party countries *inter alia* to recognise and adhere to any

regulatory controls applying within each other's borders, especially any import restrictions or bans. The last 3 Conferences of the Parties have failed to reach agreement on the recommendation to also add chrysotile to the Convention, and this matter will be considered again in 2015 (Rotterdam Convention, 2013).

The World Customs Organisation introduced some limited differentiation in tariff codes between asbestos and non-asbestos-containing products in January 2007. This was part of general moves to facilitate the monitoring and control of a range of hazardous products.

2.4 Asbestos use in New Zealand

Raw asbestos was not imported here in significant quantities prior to the Second World War. However, the post-war period saw the development of local manufacturing of cement-asbestos products (MBIE, 2014). In addition, a national construction 'boom' and an extended period of economic growth and development, lead to significant rates of production and use, and much the same pattern of use as noted previously for the global distribution. The volumes of imported asbestos peaked in 1975 at 12,500 tonnes but declined steadily thereafter.

The importation into New Zealand of three forms of raw asbestos fibre (amosite, crocidolite and chrysotile) was prohibited by a succession of temporary Customs Import Prohibition Orders from 1984 for the first two forms, and from 1999 for chrysotile. The most recent Order expired in September 2008, when it was effectively replaced by the approval process under the *Hazardous Substances and New Organisms Act 1996*. All six forms of raw asbestos are unapproved hazardous substances under the HSNO Act. Anyone wishing to import, manufacture or mine raw asbestos must apply to the Environmental Protection Authority for approval. It is unlikely that approval would be given (MBIE, 2014).

3 Types of ACPs

The information presented in this section describes the use of asbestos in different types of products, the reasons for those uses, and the available non-asbestos alternatives. The material presented is based mainly on published information but with additional local details, where relevant, based on some of the responses received through the survey described in section 4. The division into sub-sections has been based on the historical use patterns described by others (eg. Pye 1979, MBIE, 2014), although there can be significant overlaps between some of the different categories.

3.1 Textiles

The flexibility of chrysotile and the length of some of the fibres made them suitable for spinning into yarn, which could then be woven into tapes, rope, or cloth (Pye, 1979). Two basic types of yarn were produced: plain yarn or reinforced yarn, which incorporated metal wire or other synthetic fibres such as nylon, cotton or polyester. The wire-reinforced yarns could retain their mechanical properties at temperatures of up to 600°C, while non-reinforced materials were stable to about 300°C.

Asbestos tapes and cords were used as sealing materials around fireproof doors and shutters; on kilns, boilers and other high-temperature installations; around flanges on heating pipes and ventilation ducts; and as filling materials for expansion joints. Cloths were used in jointing and packing; in gaskets, thermal insulation and lagging; and in fire protection equipment, including fire blankets, fire curtains, gloves, aprons, and overalls.

The electrical industry was another significant user of asbestos textiles (Pye, 1979). These were employed for the insulation of wires and cables, especially those designed for low-voltage, high-current uses; as arcing barriers in switches and circuit breakers; and for braided sleeves for the wires in electrical appliances.

When alternatives to asbestos were being considered in the 1970s, Pye (1979) noted that glass fibres could be a satisfactory substitute for many of the textile applications, provided that the softening of the glass at about 300°C was not significant. For higher-temperature applications, textile forms of ceramic and silica fibres might be suitable, subject to price.

The situation today is significantly different, with Virta (2006) listing more than 20 different types of fibrous substitutes for asbestos. Aramid fibres, carbon fibre, ceramic fibre, fiberglass, mineral wool and polybenzimidazole fibre are the most common alternatives for textile use. Aramid fibres are aromatic polyamides such as poly(metaphenylene isophthalamide), which were first developed commercially in the 1960s and 70s. They are more commonly known by their trade names, such as Nomex and Kevlar (Bajaj, 2000). The effective service temperatures for some of these materials are similar to or lower than that of asbestos, but they can by increased by pre-treatment or through using combinations of several different materials. The service temperatures for other materials, such as carbon fibre and ceramic fibres is considerably higher than asbestos. Reference should also be made here to various other organic polymers, the fire resistance of which can be enhanced by treatment with chemical flame retardants. This includes nylon, which is a non-aromatic polyamide.

Nearly all of the materials noted above are more expensive than asbestos (Virta, 2006). However, this is no longer a significant consideration in countries where asbestos uses have been restricted or banned. It also doesn't appear to be an issue in New Zealand because the cheaper asbestos textile products just aren't available anymore – at least from mainstream suppliers. For example, internet searches for fire blankets and fire curtains found only asbestos-free products, typically made from glass fibre. Similarly, searches for asbestos insulation tape or cloth generally resulted in listings for asbestos-free products (with only two minor exceptions, which are noted in sections 4.1 and 4.13).

Asbestos textiles can still be purchased from companies based in China and India, but even here the asbestos-free alternatives appear to be given just as much prominence (eg. see http://www.shreefirepackindia.com).

3.2 Fibre-cement

Asbestos-cement products were made from a slurry of cement, water and asbestos fibres by a process similar to that used in paper making (Pye, 1979). The primary function of the asbestos was to provide reinforcement, but the asbestos fibres also conferred good drainage properties to the mixture as it dried. In addition, the wet strength of the mixture allowed moulding into sheets with complex shapes (eg. corrugated roofing tiles).

Asbestos cement has been used in the manufacture of:

- Profiled and patterned sheets for roofing, wall cladding and weatherboards.
- Semi-compressed and fully-compressed flat sheets and partition board for use in a wide range of building applications. The degree of compression determined the overall panel strength.
- Tiles and slates, which were made from compressed sheet.
- Pre-formed moulded products such as water cisterns and tanks, mains water pipes, sewer pipes, chimney flues, cable troughs and conduits, ventilators and ducts, and window boxes.

Asbestos-cement products were also used in the electrical industry for the construction of mechanically strong and heat-resistant rods, tubes, cylinders and plates. Applications included panel boards, arcing barriers, and the insulating tubes and cylinders used in the construction of air-cooled transformers.

All three of the main types of asbestos were used in asbestos cement products, but chrysotile was the most common. The fibre content varied from about 10 to 50% but was most typically around 15% (Pye, 1979), although it was only about half that level in the products made by James Hardie Industries (Coutts, 2005).

There were two asbestos-cement manufacturers in New Zealand, Durock Industries, which was part of the Fletcher group of companies, and James Hardie Ltd, which was a subsidiary of the Australian company, James Hardie Industries. The latter first started manufacturing asbestos cement products in 1917, and opened its New Zealand plant in 1938. According to Coutts (2005), James Hardie Industries first took an active interest in the use of cellulose (wood) as an asbestos substitute in fibre-reinforced cement during and after the Second World War. However, this interest was then dropped until the early 1960s, when it was discovered that boards made with a 50:50 mixture of asbestos and wood fibres gave a better product than the material they were selling at the time. This board became the first generation Hardiflex®.

Further developments of alternatives followed in the 1970s and, according to Coutts (2005), Australia became the first country in the world to be totally free of asbestos in fibre-cement production. James Hardie have been manufacturing asbestos-free cement sheeting since 1981, and all other products were free of asbestos by 1987, in both Australia and New Zealand. Interestingly, the processes used in manufacturing the fibre-cement products are much the same as those first developed at the start of last century. The breakthrough for successfully switching to cellulose fibres was in pre-processing to give the fibres similar reinforcing characteristics to the asbestos fibres.

Virta (2006) reports that cellulose is the most common substitute for asbestos in fibre-cement products; although fibreglass, polyacrylonitrile and polyvinyl alcohol (PVA) fibres have also been used. In addition, there are numerous other alternative products that can be used instead of fibre-cement; for example plastic and concrete water pipes; and timber, metal and plastic (PVC) cladding materials.

It is also relevant to note the availability of non-asbestos fibre-cement products in China. A conference presentation in 2006 describes three alternatives based on the use of cellulose, PVA and glass fibres. It notes that

these accounted for 8% of total fibre-cement sheet production in 2005 (Shen, Lin, & Zhang, 2006). The authors suggest that this proportion will steadily increase over time.

3.3 Insulation board

Asbestos insulation board was made from asbestos in a calcium silicate (lime/silica) binder (Pye, 1979). It was predominantly made from amosite, which provided a high degree of reinforcement at low board densities and had favourable drainage properties. In addition, the use of amosite gave better board integrity and low rates of shrinkage when subjected to fire. The boards were used on internal surfaces and partitions in buildings to provide acoustic insulation and protection from the spread of fire. They had similar applications in marine construction and were also used to provide fire protection to the structural elements of ships.

Asbestos boards were also used in electrical equipment (Pye, 1979). These materials were not suitable for high-voltage or high-frequency insulation because of their high dielectric loss even when dry. The main electrical uses were for the confinement of arcs and in low-voltage, high-temperature situations.

Pye (1979) indicated that boards made from mineral wool and vermiculite were the most likely alternatives to asbestos insulation boards. These options are still available today, but the range has broadened out to include boards made from materials such as rock wool and other ceramic materials, coupled with the use of either minerals (lime/silica) or organic resins as the binder. In addition, there are other types of products available for most of the original applications, including specialised types of Gib® board and boards made from expanded or extruded polystyrene, treated with a flame retardant.

3.4 Millboard, papers, cardboard and felt

These materials were made by mixing asbestos fibres with various binders including latex, rubber, and plasticisers, and then compressing the mixture between rollers to form a paper or cardboard-like product (Virta, 2005). The term millboard was generally used to refer to the thicker products. They were used to provide heat insulation and fire protection in electrical appliances; for insulating electrical wires; as pipe coverings; as a cushioning layer under floor coverings; and for roofing felt (Pye, 1979). Another major use was in the manufacture of gaskets, which could be used under moderately high temperatures and pressures and were quite tolerant of corrosive liquids, such as acids, and oils. The gaskets were known as Compressed Asbestos Fibre (CAF) gaskets.

CAF Gaskets served the needs of industry for many years. However, as with many other asbestos applications, gasket manufacturers have now developed a myriad of alternative products, some of which simply utilise other types of fibres within the same basic matrix, while others are totally fibre free (Flexitallic, 2009)[2]. Some of the initial replacements were found to be inferior to their CAF predecessors in regard to operational temperature limits, chemical resistance, creep resistance and sealing characteristics. However, the range now available includes products that approach and often surpass the capabilities of the original CAF gaskets. The product range includes gaskets based on exfoliated vermiculite, graphite, PTFE (Teflon), glass-fibre, aramid, and carbon fibre.

The other uses of millboard and papers have also been superseded by alternative materials. For example, thermal and electrical insulation in modern electrical appliances is usually achieved through the use of plastics treated with flame retardants and/or coated metal foil; flooring underlay is typically made from crumbed rubber or polyurethane foam; while roofing felt is made from paper impregnated with bitumen.

---

2 According to their brochures, Flexitallic Ltd (UK) is the world's leading manufacturer and supplier of static seals (ie gaskets)

3.5 Plaster boards and spray-on coatings

Plaster is one of the oldest known synthetic building materials, with known uses dating back to the time of the Egyptian Pharaohs (NZIC, 1998a). The most common uses of plaster are in products such as Gib® board, fibrous plaster, and plaster cornices and mouldings.

Fibrous plaster is based around the use of pre-cast boards of plaster held together with a fibrous material. Historically, a wide range of natural fibres have been used and there is some evidence that this included asbestos (Millar, 1899). However, the reinforcing material of choice for many years has been Sisal, which is obtained from the Agave plant. Plasterboards reinforced with fibreglass have also been available since the 1970s and have greater rigidity and lateral strength (Ali & Grimer, 1969).

The most widely known use of plaster/asbestos mixtures was in textured ceiling coatings. Here, the asbestos provided the texture and also helped to hold the plaster together. These finishes were used in New Zealand from 1964 to 1985 (Ministry of Health, 2013), and were replaced with plaster mixtures utilising paper and/or small pieces of polystyrene to achieve a similar texture.

Another plaster-based use of asbestos was in the spray-on coatings applied to steel beams and other structural building elements, to provide heat and acoustic insulation (Pye, 1979). These also provided protection against fire and helped to reduce corrosion problems caused by moisture condensation, because the sprayed material was quite porous. Similar coatings are still available today, but with the asbestos replaced by materials such as mineral wool, glass fibre, cellulose or other organic materials treated with fire retardants.

3.6 Loose and encapsulated asbestos

Loose asbestos was used as a filling material for heat proofing, sound proofing, and fire protection purposes, on pipework and ducting; and as an insulation layer in lofts and between floors (Pye, 1979). It was made into shaped blocks for lagging of high-temperature pipes by mixing with a lime/silica binder (similar to the insulation boards described in section 3.3). Similar lime/asbestos mixtures were applied directly to pipework, as a paste, and were also used as lagging and a gap filler in boilers and pressure vessels.

Another application was as a heat shield in the engine compartment of motor vehicles. The preferred approach here was to either place the asbestos between layers of aluminium or bond it to a single sheet using adhesive, to provide additional fire protection and assist with material integrity.

A similar approach was taken with the cylinder head gaskets used in many older motor vehicles. These used an inner layer of asbestos cloth, paper or millboard held between thin copper sheets in a sandwich construction.

The replacements for asbestos in these applications are much the same as those described previously in sections 3.1 (textiles) and 3.4 (millboard).

3.7 Friction materials

Asbestos was a primary component of the brake pads and clutch plate facings used in motor vehicles and in a range of other non-road applications. These include in the brake drums used on lifts (elevators) and ships' winches, and in brake drums or clutches fitted to large industrial equipment. The friction materials were either moulded from a mixture of short chrysotile fibres, phenolic resin and fillers, or used a woven asbestos cloth impregnated with phenolic resin and often reinforced with metal wire. The asbestos fibres were intended to stiffen and strengthen the resin matrix in these products, and could maintain their properties at the high temperatures generated during use (Pye, 1979).

The introduction of alternatives to asbestos-based friction materials started in the mid-1980s; although there had been some aeronautical uses involving metals in resins since the 1950s. According to Virta (2006), the rate of

development of asbestos brake pad replacements was much slower than for most other products, because of the technical difficulties encountered. However, by the end of the 20th century there were over 2000 different types of alternative materials being used in commercial brake pads (Maluf, Milan, & Spinelli, 2004). Today the most commonly used materials can be broadly divided into three types; organic, sintered metal and exotics (Davis, 2010). The organic pads are based on an organic resin reinforced with iron or steel powders, or non-asbestos fibres, such as carbon, Kevlar or fibreglass. Sintered metal pads are formed by compressing metal powders, usually copper, at temperatures close to their melting point to form a solid uniform mass. Finally, the 'exotics' are made from ceramic materials or carbon fibre composites and are usually targeted at high-performance uses because of their relatively high costs.

There do not appear to be any concerns around the availability and performance of these alternative materials. Rather, the industry now has a much wider range of products to choose from and is in a much better position to select the most appropriate materials for each particular use

3.8 Bitumen and tar products, and other surface coatings

Asbestos fibres were combined with bitumen or tar to make building products such as caulking compounds or mastics (Pye, 1979). The primary functions of the asbestos were to control the flow of the products, through increased viscosity, reduce the potential for sag, and provide reinforcement. However, it also acted as a fill material to provide additional bulk to the product.

Asbestos was also used in a variety of spray or brush-on metal coatings, to control viscosity and give improved film strength (Virta, 2006). These uses were mainly in specialty products such as fireproofing coatings, anti-rust treatments, and materials used for underbody protection and noise deadening on cars and trucks. There does not appear to have been any significant use in decorative surface coatings.

The asbestos in these products has generally been replaced with a combination of the alternative fibres noted previously (eg fibreglass, ceramic fires, or aramids) and mineral fillers, such as talc, silica, kaolin or mica. The exact mixture used depends on the specific properties required of the finished product (Virta, 2006).

3.9 Composites

The term composite is used in the chemical industry to refer to materials in which a homogeneous resin matrix is reinforced by stronger and stiffer materials, which are usually fibrous in nature. Perhaps the most widely known example is glass-reinforced plastic (GRP), which has been used for many years for the manufacture of 'fibreglass' boats, tanks, and other structures. The friction products described in section 3.7 are another example.

The products to be considered under this heading can be divided into two groups on the basis of the resins: thermosets and thermoplastics.

Thermoset resins (literally *setting under heat*) are produced from mixtures of organic chemicals that are made to polymerise by the addition of chemical catalysts and/or heating. The final cured products are strong cross-linked polymers that cannot be melted and reprocessed. Hence, the resins are normally formed to the finished product shape prior to the addition of catalyst and/or curing. The most common thermosets are polyesters, epoxies, phenolics, polyurethanes, silicones and polyamides.

Asbestos fibres were added to thermoset resins to provide reinforcement of the polymer matrix, thereby enhancing its strength, stiffness and durability (Pye, 1979). Typical applications included for small machine parts (such as vehicle distributor caps), vacuum pump rotor blades, fans, fan shrouds and equipment casings. The materials were also used for electrical componentry, such as the winding frames in electric motors, transformers, and heating equipment, where the addition of asbestos gave increased electrical resistivity.

Thermoplastic resins are based on linear polymers with little or no cross-linking. Thus, they can be repeatedly melted and solidified by heating and cooling. The common types of thermoplastic resins include acrylics, nylon, polyethylene, polypropylene, polystyrene, polyvinyl chloride (PVC) and Teflon (polytetrafluoroethylene).

Thermoplastic polymers are usually supplied in the form of small pellets, which may contain additives to enhance processing or to provide specific characteristics in the finished product (eg. colour or fire resistance). Asbestos is one such additive, which was used to provide reinforcement for structural uses (Virta, 2006). Apparently, one common application in the UK was in PVC panels used for junction, destination and mileage signs on roads and motorways (Pye, 1979).

Another use involving thermoplastics was in the vinyl-asbestos floor tiles described in section 3.11.

In general, glass fibre provides an adequate replacement for asbestos in many composite applications, because the primary requirement is for reinforcement (Pye, 1979). However, other materials such as aramids, Teflon and carbon fibre may also be used, depending on the specific requirements (Virta, 2006).

3.10 Dry bearings

Another application of asbestos composite materials is for dry rubbing bearings (Pye, 1979). In this a matrix of thermosetting phenolic resin is applied to asbestos cloth or yarn to form a solid shaped product. The principal advantage of these products is that they are able to function effectively without lubrication, or simply obtain their lubrication from the fluids associated with their use.

Typical applications of dry rubbing bearings, with or without asbestos, include as vehicle steering column bushes; brake and clutch pedal bushes; and as bearings for textile spindles, food slicing equipment, copy machine rollers, conveyor rollers, aircraft controls and undercarriage parts, railway rolling stock, dock equipment and lock gates. In addition, asbestos bearings were preferred for heavy duty marine applications where high loads and low sliding speeds were encountered and seawater could act as the lubricant. This included their use in ships and boats for rudder and steering gear bearings and stem shaft bearings (Pye, 1979).

The alternatives to the use of asbestos in these composites are similar to those noted in previous sections, but graphite and Teflon are the most relevant because they perform well in dry rubbing applications.

3.11 Floor coverings

Asbestos was used in several types of floor covering: in vinyl floor tiles; as an underlay for sheets of vinyl flooring; and in ceramic tiles, especially those made from clay. Some ceramic tiles may also be used on walls.

The vinyl floor tiles are another example of the use of asbestos in thermoplastic resins, as described in section 3.9 (composites). They usually contained chrysotile asbestos, which was intended to provide reinforcement, and were often laid on top of a bitumen mastic material, which could also contain asbestos (see section 3.8) (Pye, 1979). It is believed that vinyl floor tiles were used in New Zealand up to about 1989 (Ministry of Health, 2013).

Sheets of vinyl flooring were also used with an asbestos support material – in this case a type of asbestos-paper or cardboard (see section 3.5). This was either applied to the underside of the vinyl sheets during manufacturing or was installed separately as an underlay (Virta, 2006).

The use of asbestos in ceramic tiles is not mentioned in many lists of past asbestos uses, including the very comprehensive list given in the recent NZ *Guidelines for the Management and Removal of Asbestos* (NZDAA, 2011). However, it is included in a guidance leaflet produced for the Christchurch rebuild (Fletcher Construction, 2013), and it is also noted on several advisory web sites (eg. www.mesothelioma.com/asbestos-exposure/products/ceramic-tiles). In principle, there seems no reason why it would not have been used in some ceramic tiles, especially those made from clay, which would benefit from the additional strengthening.

The non-asbestos alternatives for these applications would include the various fibres discussed in section 3.9 (composites), and for the ceramic tiles, those noted in section 3.2 (asbestos-cement).

3.12 Acetylene cylinders

Acetylene is quite different from most other compressed gases in that the gas cylinders are filled with a porous solid material to which the acetylene is added as a solution in liquid acetone. Both of these measures are intended to have a diluting effect on the gas to minimise the potential for explosive decomposition (Linde AG, undated). Early acetylene cylinders were completely filled with a mixture of diatomaceous earth, charcoal, asbestos and cement. The first two of these components were the porous elements, asbestos acted as a strengthening material and the cement was a binder. In 1994, the cylinders were described as being filled with a mixture of silica and lime, to which some manufacturers added asbestos, charcoal and other materials (Air Products, 1994). However, a more recent publication from the UK indicates that the asbestos had since been replaced by man-made fibres (Blanchard, Fletcher, & Hill, 2007).

3.13 Minerals

This final section covers materials where the asbestos is present as an inadvertent component of a product, rather than being deliberately added.

As indicated previously in section 2, asbestos is the name given to fibrous forms of a number of naturally occurring silicate minerals. These minerals can all exist in several different crystalline forms, and fibrous and non-fibrous forms of the same mineral can occur in a single ore deposit. As a result, non-fibrous supplies of these minerals have the potential to be contaminated with small amounts of asbestos (IARC, 2012). This is a particular concern with serpentine. The same problem can arise with other common minerals, such as talc and vermiculite, which are sometimes found in or alongside asbestos mineral deposits.

Minerals such as serpentine, talc and vermiculite have numerous industrial uses, including as a filler in paints and resins. Serpentine also finds use in agriculture as a source of magnesium. Therefore, these uses all represent potential sources of asbestos, both in the raw materials and the finished products.

The approach to non-asbestos alternatives for these materials relates to product quality rather than the use of different substances. For example, talc is commonly available in three different grades: industrial, cosmetic (>98% talc)[3] and pharmaceutical (>99% talc). Only the industrial grade has the potential to contain asbestos (IARC, 2012). Even then, asbestos may not be present if the talc was produced from an asbestos-free resource or has been partially purified after mining.

3.14 Summary

Table 3.1 provides a summary of the information given in this section.

---

3 Within New Zealand, the *Cosmetics Products Group Standard 2006* requires that all substances used in cosmetics must not contain any asbestos.

Table 3.1: Summary of information on ACP uses and alternatives

Type of ACPs and their Uses	Primary Function of the Asbestos	Alternatives	Other Information
Textiles Yarn, tape, cord, rope and cloth, and items fabricated from these, such as fire blankets, protective clothing and gloves	Strengthening material, fire resistance, thermal and electrical insulation.	Glass fibre, mineral wool, carbon fibre, ceramic fibre, aramid fibre, polybenzimidazole (PBI) fibre, other plastics treated with flame retardants	All alternatives cost more than asbestos. Most are comparable to asbestos when strength or insulation is the primary requirement. The 'modern' synthetics such as aramid and PBI perform much better than asbestos in high temperature situations.
Fibre-cement Profiled, patterned and flat sheets and tiles, for use in buildings Moulded products such as water pipes, tanks, and ducting	The asbestos mainly served as a strengthening material, but also had benefits during manufacture due to the porosity and strength of the wet asbestos-cement mixture.	The dominant alternative is cellulose (wood) fibre, but glass fibre and various organic fibres are also used. There are also numerous other materials available for most applications (eg. wood, plastic, metal).	Fibre cement products made from cellulose are now the established alternative to asbestos-cement, with no significant performance or cost concerns.
Insulation board Building panels and insulation boards Panels used in electrical equipment, such as switchboards	Strength, fire resistance, electrical resistance.	Similar boards can be made from vermiculite, mineral wool, and other ceramic materials. Products such as fire-resistant Gib® board and plastics treated with flame retardants are acceptable alternatives for use in buildings. Many plastics are good electrical insulators.	This study has not identified any concerns regarding the acceptability of alternative products, or any specific applications where asbestos-based boards are considered to be the only viable option.
Millboard, papers, cardboard, felt Compressed asbestos fibre (CAF) gaskets Thermal and electrical insulation papers, cardboard and felt Also see floor coverings below	Strengthening material, thermal and electrical insulation. Also, the gaskets maintained their performance at elevated temperatures and had good tolerance to corrosive or oily liquids.	Similar products can be made using vermiculite, graphite, Teflon, glass fibre, aramid or carbon fibres. Alternative insulation materials include plastics treated with flame retardants, and coated metal foil.	Most of these products are minor components in larger items of equipment – hence the cost of alternatives is not a major consideration. Also, alternative materials are now available for a wide range of different service conditions, and many perform better than the asbestos-based products.
Plaster boards and coatings Textured ceilings Sprayed coatings for steel beams and other structures	Strengthening of the coating, thermal and acoustic insulation.	Paper or small pieces of polystyrene for textured ceiling mixtures, possibly including a flame retardant. Mineral wool, glass fibre, or cellulose (paper or wood fibres) for sprayed coatings	The cellulose options are similar in cost to asbestos, while others are more expensive. There are no significant performance differences.
Loose or encapsulated asbestos General 'fill' insulation Shaped insulation for pipes Engine head gaskets and heat shields in vehicles	Thermal insulation and tolerance to heat (in gaskets).	Mineral wool, glass fibre, cellulose or various plastics for insulation (eg in the form of Batts). Most head gaskets are now made from graphite-based composite resins, or multi-layer steel sheets coated with rubber. Heat shields are commonly made from layers of aluminium foil and synthetic rubber.	The products noted here are all well-established alternatives to those based on asbestos, with no significant performance or cost concerns.
Friction materials	Product strengthening and heat	The asbestos in resin-based products has been	These are all well-established alternatives, with no

Type of ACPs and their Uses	Primary Function of the Asbestos	Alternatives	Other Information
Brake pads and clutch plate facings, for use in vehicles, ships, elevators, and other industrial uses	resistance (ie continued performance at elevated temperatures).	replaced with metal powders, glass fibre, carbon fibre or aramids. However, alternative products are also available based on sintered metal, ceramics, or carbon fibre composites.	significant performance or cost concerns. Some of the materials (eg. ceramics) are intended for high performance uses, where asbestos-based products would not be good enough
Bitumen/tar products, surface coatings Caulking compounds and mastics Specialty surface coatings	Product reinforcement and filler in caulks and mastics. Heat or fire protection and noise deadening in surface coatings.	Glass or ceramic fibres, aramids, and/or other mineral fillers (talc, silica, kaolin, mica).	This study has not identified any concerns regarding the acceptability of alternative products, or any specific applications where asbestos-based products are considered to be the only viable option.
Composites Thermoset resins used for machine parts (distributor caps, fans, switches and other electrical parts, pump rotor blades). Various thermoplastic products, including vinyl floor tiles.	Thermosets: strengthening, thermal tolerance, and electrical resistance. Thermoplastics: strengthening.	The asbestos fibres may be replaced with glass fibre, aramids, Teflon or carbon fibre. Also, there is a wide range of plastic materials now available that would be just as suitable for most of these applications.	Many of these products are minor components in larger items of equipment – hence the cost of alternatives is not a major consideration. Also, performance should not be a concern where the primary function of the asbestos was strengthening. Most plastics are good insulators and some also have a better temperature tolerance than asbestos.
Dry bearings Dry (unlubricated) bearings and bushes in commercial, industrial, aviation and maritime applications.	These are thermoset resins, with the asbestos mainly acting as a strengthening agent.	The asbestos fibres in the resins can be replaced with glass fibre, aramids, Teflon, carbon fibre or graphite. In addition, there are alternative materials available, including nylon, carbon-graphite mixtures, solid film lubricants (eg molybdenum sulphide), and ceramics.	Many of the alternative dry bearing materials have been available for many years, and asbestos-based resins were never the dominant product.
Floor coverings Vinyl floor tiles Underlay for vinyl floor coverings Clay tiles and other ceramics	Product strengthening.	The asbestos fibres in the products can be replaced with glass or other fibres. Alternative underlay materials include rubber, polyurethane, and cork.	This study has not identified any concerns regarding the acceptability of alternative products, or any specific applications where asbestos-based products are considered to be the only viable option.
Acetylene cylinders Cylinder fill material	Strengthening of the fill.	Glass or other man-made fibres.	Cost should not be an issue because the fill material is never replaced.
Minerals Asbestos is only an unintentional contaminant of these products	Not applicable	Not applicable	The asbestos contamination can be managed through product purity specifications.

4 Current ACP applications in New Zealand

The information given in this section is based on the responses received through a survey of potential importers, distributors and users of asbestos-containing products (ACPs) in New Zealand. The survey was carried out during May to July 2014. It involved direct contact with individual companies, mainly by telephone or email, and indirect contact with others via business and industry associations, who were asked to advise their members.

The survey was not based on a formal questionnaire approach. Rather, people were simply asked if they were importing, distributing or using any ACPs and, if so, whether they would foresee any problems if future imports were restricted or banned. They were also asked to respond even if they were not importing, distributing or using ACPs, although there was no obligation to do so.

A total of 130 individual companies and 25 business and industry associations were contacted directly for the survey. In addition, the contacts with the business and industry associations resulted in the enquiries being passed on to many hundreds of other companies and individuals through email distribution lists and newsletters. Specific responses were received from about 70 companies. Additional information has also been obtained through searches of company web sites and other internet searches targeted at specific products.

The sub-sections used below are mainly based on the types of industries or application areas, rather than product types. This is because many industries have the potential to be using multiple types of ACPs.

4.1 Automotive industry

This group covers asbestos use in motorcycles, cars, trucks, buses and other mobile equipment. The main uses of ACPs were in friction materials (brake and clutch pads) and engine gaskets. Other minor uses have included in resins (eg. distributor caps and underbody insulation) and as insulation material (eg. exhaust pipe wrapping).

Two industry bodies were contacted: the Motor Industry Association, which represents vehicle manufacturers and distributors; and the Motor Trade Association, which represents the motor vehicle service sector, including suppliers of spare parts.

The members of the Motor Industry Association account for over 98% of all passenger vehicles, light and heavy commercial vehicles and motorcycles sold in New Zealand. After contacting members, the CEO advised that none of the vehicle manufacturers now use asbestos-containing products. The only rider to that advice was the potential for small amounts of asbestos to be present as 'natural' contaminants in the minerals used in some components.

The information on new vehicles was reinforced by internet searches for various companies, including Ford, Holden, Honda, Hyundai Mercedes, Mitsubishi, Peugeot, Saab, Toyota, Volvo, Komatsu and Caterpillar. The latter two companies are manufacturers of heavy-duty mobile machinery. These searches also showed that non-OEM replacement parts are still offered for sale in some countries, both with and without asbestos.

The Motor Trade Association distributed the information request to all members, but no specific responses were received. One nation-wide auto parts retail group was contacted directly and they confirmed that they no longer imported any ACPs. A company specialising in older performance cars (eg. Ford Escort and Mini rally cars) was also contacted, and they confirmed that all of their replacement spare parts were asbestos-free. This included brake pads, clutch plates and engine gaskets. A similar response was given by two importers of Chinese motor bikes and spare parts, although one noted that some non-OEM items contained no information on product composition.

Other specific contacts for the different types of vehicle parts are covered under the sub-headings given below.

Friction materials

The website for the Australian manufacturer of the Bendix brand of brake and clutch pads indicates that they started to phase out all uses of asbestos in the 1990s. The company's Product Engineering Manager confirmed that all their products were asbestos free by 2003. In a similar vein, Ferodo describe their company as a world leader in the development and use of non-asbestos brake technology. Both of these companies also make brakes for other applications, including in industry, locomotives and marine applications.

Five New Zealand companies specialising in vehicle brakes were contacted, and three of these replied, confirming that they no longer imported any asbestos-containing brake materials.

Gaskets

The New Zealand distributor of the Great Wall Motors and Chery ranges of vehicles was contacted because of past reports of a product recall related to asbestos in those vehicles (WorkCover NSW, 2012). The asbestos was present in some gaskets, but the distributor advised that they had since moved to using non-asbestos alternatives.

A local supplier of replacement gaskets for vintage cars was also contacted because his on-line catalogue indicated that some gaskets were based on the copper/asbestos mix noted in section 3.6. However, this was not the case – the replacement gaskets are actually non-asbestos alternatives to the original copper/asbestos parts. The replacements are made in New Zealand to his specifications and about 90% are exported to overseas owners of vintage cars.

Other internet searches for New Zealand gasket suppliers only found companies supplying non-asbestos parts.

Other applications

An on-line supplier of parts for performance vehicles was contacted because their catalogue included an asbestos tape product used to wrap inlet headers and exhaust pipes to reduce heat loss. (Each roll is 2" wide by 50 ft long). He advised that he had imported 1000 rolls of the product several years ago and was now getting towards the end of this stock. However, he would not have any concerns if he could not import the product in future.

An internet search for exhaust pipe wrap indicated that there were numerous other asbestos-free products available for this purpose, based on materials such as fibreglass, ceramic fibres and coated metal foils.

Another Australian product recall identified in this study was for several bitumen-based products used for underbody protection and sound deadening (MTAA, 2008). The presence of asbestos was identified when the company was being purchased by the multinational company, 3M. Some of the products are still sold under the original brand names by 3M, and by automotive retailers in New Zealand. However, the current safety data sheets indicate that the products are now asbestos-free. In addition, 3M New Zealand Ltd advised that all of their products are asbestos-free.

No other New Zealand suppliers of ACPs were identified in internet searches for underbody sealers and sound deadening coatings.

Summary

The information given here generally supports that given in section 3.7 in that most automotive uses of asbestos were discontinued over the last 10 to 20 years. However, some non-OEM parts containing asbestos are still available from countries such as India and China. Only one local supplier of an automotive ACP was identified in the survey, but they did not have any concerns about possible restrictions on future imports. In addition, no other supplier contacted for the survey, or any of those advised indirectly through the industry bodies, has come forward with any specific concerns.

4.2 Aviation

This group covers asbestos use in aircraft, including large and small commercial airplanes, helicopters, recreational aircraft and vintage aircraft. The most likely uses of ACPs were in friction materials, gaskets and insulation materials. This is generally consistent with the results of a 1994 Australian survey which identified the following ACPs in Boeing 747 and 767 aircraft (NICNAS, 1999):

- High-temperature sealing compounds (similar to mastics).
- Insulation clamps for protecting hydraulic lines close to gas turbine engines.
- Gaskets and seals.
- Rubber pads and blocks.
- Heat shields and shrouds around gas turbines.

The international literature and several asbestos-focused web sites (e.g. www.asbestos.com) list similar applications, and also engine and electrical insulation, asbestos blankets (most likely for fire response), cockpit heating systems, torque valves and thermal insulation in the cargo bays. However, it appears that many of these uses are quite historical and the aircraft industry was quick to move towards non-asbestos alternatives.

The primary contacts for this user group were companies involved in aircraft maintenance, including helicopters. Fourteen companies were contacted, including the Air New Zealand Technical Operations Group and Safe Air, which is a wholly owned subsidiary of Air New Zealand and mainly involved in servicing the RNZAF aircraft fleet[4]. In addition, the Sport Aircraft Association of NZ included the information request in a newsletter to members. Contact was also made with the Civil Aviation Authority (CAA).

Responses were obtained from six companies. One aircraft maintenance company advised that asbestos had been used in the past in brake linings, gaskets, pipe clamps and exhaust wraps but they no longer imported any ACPs. Another advised that they were uncertain but suspected asbestos would still be present in some brake pads and gaskets, including in some Chinese training aircraft that they maintained. A third company advised that, while they believed there was no asbestos in their current aircraft, they had been unable to confirm that with their suppliers in the time available. Similarly, the fourth company indicated that they were not aware of any uses of ACPs but were unable to absolutely confirm that.

One of the helicopter maintenance companies advised that there would be asbestos in some gaskets, although the numbers used would be minimal. A second helicopter company was asked about a specific part – asbestos cloth used on a drive shaft fairing – that had been identified through an internet search. However, this was for an older model helicopter that had not been imported here.

Generally, it appears that the use of ACPs in commercial passenger airplanes relates to older models. For example copper/asbestos gaskets are available from several on-line suppliers of aircraft parts, but only for the 747-200 series and for the Airbus A300. A similar situation was found for smaller aircraft, with gaskets and other ACPs listed for various models of Beechcraft, Bombardier and Cessna aircraft.

Rule 21.303 of the *Civil Aviation Rules* covers the use of replacement parts in aircraft and essentially requires that any non-OEM part be properly certified as being suitable for its intended use. This would usually involve provision of a formal statement by an aeronautical engineer, supported by relevant test data or other technical information, that the replacement part would have no adverse effect on the airworthiness of the aircraft. The Team Leader Airworthiness of the CAA advised that this requirement applies to all parts, no matter how small.

---

[4] This study has not considered ACP use by the armed forces. That matter has been addressed separately between the Ministry for the Environment and the Ministry of Defence.

He considered that aircraft operators would face significant difficulties and costs if they were unable to import original parts.

Summary

The information obtained for this user group is very limited, but suggests that there will be a continuing need for imports of small numbers of ACPs as replacement parts for mainly older aircraft.

4.3 Building products

Most types of ACP building products are covered under other specific sub-sections, including sections 4.4 (electrical), 4.6 (fibre cement), 4.8 (flooring and wall tiles), and 4.16 (surface coatings and resins). However, it is relevant to note here the contacts made with a range of industry associations.

Information about the survey was distributed to all members of the NZ Building Industry Federation (BIFNZ) and was also tabled at a Board meeting, but no responses were received. BIFNZ represents the supply chain of the building industry, including merchants, importers, distributors, manufacturers and wholesalers.

Responsible Care (NZ) Ltd (formerly the NZ Chemical Industry Council) distributed the survey information to their members. Once again, no specific responses were received, although the most relevant members were also targeted through the individual companies discussed under section 4.16, some of whom did respond.

The Executive Officer of the Claddings Institute of NZ advised key members of the survey but had no specific responses to report.

The President of the NZ Fibrous Plaster Association advised that there was no issue with asbestos in fibrous plaster sheets and mouldings. Plasterers were involved with the historical issue of textured ceilings but only as the applicators of products supplied by other parties.

The survey was discussed by the Executive Committee of the Association of Wall and Ceiling Industries of NZ. The Committee includes experienced representatives of the fibrous plastering, plasterboard and ceilings installation sectors of the construction industry. The last recollection anyone had of any material containing asbestos was in interior ceiling textures. Asbestos was removed from these products by around 1980. Nobody knew of any imported products that contain asbestos or of any companies supplying ACPs.

Finally, the Building Research Association (BRANZ) advised that they have not tested or had any manufacturer or distributor approach them to test any product containing asbestos over the last five or so years. They did issue an asbestos alert in 2012 relating to some imported tiles that were identified in Australia (see section 4.8).

4.4 Electrical

In the past the most likely use of asbestos in electrical equipment would have been in insulation materials, including backing sheets on switchboards and textile covers for wiring. It was also used as a strengthening material in switches and other componentry made from plastic resins.

Contact was made with the NZ Electrical Institute and the Electrical Contractors Association of NZ. The first of these covers individual electricians and small companies, while the other one mainly covers larger contracting businesses. Both organisations advised their members of the survey, but no responses were received.

Two New Zealand switchboard manufacturers were contacted, and both confirmed that they did not use asbestos in their products. A national (but now part of a multinational company) manufacturer of electrical switches and fittings was also contacted by email, but they have not responded.

Teltherm Instruments NZ Ltd were contacted in relation to a specific Honeywell instrument that was identified as possibly having a gasket made of asbestos in rubber. However, they were advised by Honeywell that this had been replaced with one based on aramid fibres in rubber.

None of the national power companies were contacted for this survey because it was expected that any uses of ACPs would have been largely historical. The only relevant information identified for the power sector was that Transpower have documented the presence of asbestos in the rotor and stator windings of eight synchronous condensors at the Haywards substation (Transpower, 2013). The asbestos was removed from four of these during refurbishment and partially removed from a fifth unit. The asbestos remaining in the other units is fully encapsulated but will be replaced when they are refurbished.

4.5 Elevators

Four elevator companies were contacted and also a consultant with about 30 years' experience in this industry. The responses obtained from the consultant and all four of the companies indicate that the use of asbestos-based brake pads in elevators was phased out many years ago.

4.6 Fibre-cement industry

No specific companies were contacted for this user group because the history of asbestos-cement (AC) products in New Zealand is well documented (see section 3.2). James Hardie New Zealand Ltd is the only local manufacturer of fibre-cement sheets and their products have been asbestos-free since 1987. Some AC water pipes were manufactured in New Zealand but they were also imported from Australia, Italy and the UK (NZWWA, 2001). An internet search for New Zealand distributors of AC sheets and AC pipes only picked up companies that supply plastic and metal fittings for use on existing AC pipes. However, it was noted that the AC products are still available from other countries, especially India.

Most water supply and wastewater operators in New Zealand appear to be progressively replacing their AC pipes with alternative materials as they come up for renewal (eg. see Porirua City Council, 2012).

4.7 Fire protection and safety products

The main ACPs for this user group are in products based on asbestos textiles, such as fire blankets and fire curtains, safety gloves and aprons, and the protective clothing worn by fire fighters and race car drivers. Three national safety equipment suppliers were contacted for the survey and one of those responded to say that they were not importing or manufacturing any ACPs. In addition, searches of the on-line catalogues for three other safety companies only identified non-asbestos alternative products, such as those made from Nomex or other aramid fibres. Similar searches for fire blankets and curtains identified several other suppliers of non-asbestos products that utilised materials based on glass or mineral fibres, or various fabrics treated with flame retardants.

The NZ Fire Services advised that they have not identified any instances of ACPs in their current equipment.

4.8 Flooring and wall tiles

This group covers the suppliers of underlay for vinyl floor coverings, vinyl floor tiles and ceramic floor tiles. Ceramic tiles were also considered more generally to include their decorative uses on walls.

Contact was made with the National Flooring Association (Floor NZ) who advised that asbestos is no longer used in flooring products. Six tile retailers were also contacted directly but no responses were received. Floor coverings and decorative tiles are also sold by hardware stores, and one of the nationwide companies contacted via the NZ Retailers Association advised that there was no asbestos in any of their products (see section 4.11).

New Zealand suppliers of vinyl sheet flooring still recommend the use of underlay. Based on an internet search, the available options include products made from polyurethane foam, recycled rubber crumb and mixtures of cork and rubber, or cork and polyurethane. In addition, some vinyl sheeting includes an internal layer of fibreglass cloth for reinforcement.

No references to asbestos were found on the web sites for New Zealand suppliers of vinyl floor tiles or ceramic tiles — either as a component or in relation to the products being asbestos-free. However, some floor tiles available overseas were specifically advertised as being made from vinyl-asbestos mixtures, while others were clearly stated to be asbestos-free, including some of those made in China.

The only local evidence for the recent availability of ACPs in this group relates to some decorative wall tiles sold in Australia under the Snow White brand name. These were the subject of a consumer product alert because they were found to contain tremolite asbestos (AC&CC, 2010). They were imported from China and were described as being made up of a number of pieces of white quartz-like materials glued together to give the appearance of stacked stone. No similar products have been identified for sale in New Zealand, although 2 boxes (16 tiles) of Snow White broken stone tiles were sold on Trade Me in March 2013. These are not necessarily the same type as the stacked stone tiles identified in Australia.

4.9 Generators and other stationary heavy equipment

This sub-section has a significant amount of overlap with the mobile heavy equipment already covered in section 4.1, which included machinery such as bulldozers, excavators and tractors. Here the focus is on stationary equipment, but the potential uses of asbestos would be very similar (apart from the use in brakes) i.e. gaskets, insulation materials and componentry made from resins. There is a significant overlap in the suppliers, with some distributors of heavy machinery also supplying stationary equipment such as generators and compressors.

Four nationwide suppliers were identified as covering a reasonable range of international manufacturers (i.e. Atlas Copco, Caterpillar, Hitachi, Isuzu, John Deer, Kubota, Mercedes, Mitsubishi and Isuzu). These suppliers were all contacted, but only one has responded. They advised that there is no asbestos in any of the equipment parts that they supply for either early or late model machines.

No response has been received in relation to Caterpillar equipment, but the technical information available on-line for some of the company's products includes the statement that *Caterpillar equipment and replacement parts that are shipped from Caterpillar are asbestos free* (Caterpillar, 2011).

4.10 Heating, ventilation and air conditioning

The main uses of asbestos in heating, ventilation and air conditioning systems were for thermal and electrical insulation. This group also includes home heating equipment, especially wood burners and other solid-fuel fires, where asbestos rope or tape may have been used for sealing around the fire doors.

The members of the Institute of Refrigeration, Heating & Air Conditioning Engineers of New Zealand were advised of the survey by newsletter, but no responses have been received to date.

The Home Heating Association was also contacted. This body represents most of the leading wood fire manufacturers, retailers and installers in New Zealand. After checking with their members, the contact person advised that there has been no asbestos use in New Zealand heating appliances for the last 20 years or more, and most door ropes and seals are now made from fibreglass.

The suppliers of LPG equipment, including gas heaters, are covered in the next sub-section.

4.11 Home appliances

The past uses of asbestos in home appliances would have included materials used for thermal and general electrical insulation, and in switches and other componentry made from resins.

The New Zealand Retailers Association advised members of the survey through their monthly newsletter. They also sought specific feedback from two companies with a national network of stores selling home appliances and other household goods, and two national hardware store chains. The only feedback received to date is from two of the nationwide businesses, who have both advised that there is no asbestos in any of their products.

The Executive Director of the LPG Association of New Zealand forwarded information on the survey to about 14 members that import gas appliances and equipment. Two responses have been received so far advising that there is no asbestos in their products.

Consumer New Zealand advised that they had not found any new products containing asbestos for many years. Their testing is largely done on mainstream, major brand consumer goods. They would be very surprised if any such products currently contained asbestos. However, they acknowledged that they do not look specifically for asbestos.

There is one recent example of an ACP being identified in a consumer product in Australia (Australian Char, 2009). This was a container used for pre-heating barbeque fuel, which included a protective insulation strip around the handle that appeared to be made from asbestos card. The product was sold by the company that makes Heat Beads barbeque fuel. This fuel is sold in New Zealand by the major hardware stores, but it appears from an internet search that the pre-heating unit is not.

4.12 Incinerators, furnaces, boilers

The past uses of asbestos for this group would have been in insulation, especially door sealing tapes, sealants and shaped insulation blocks. Five New Zealand manufacturers, distributors and service agents for incinerators, furnaces and boilers were contacted for the survey, and three responses were received. Two of these companies advised that there was no asbestos in any of their products and the third, a furnace manufacturer, indicated that they stopped using asbestos over 20 years ago.

It should be noted that the companies in this sub-section overlap with those covered under section 4.15 (marine industry). The latter group includes heavy engineering companies, some of whom also service land-based boilers and other furnaces.

4.13 Industrial pumps and filters

Asbestos was used in the past as a filtration material, including in the food industry for filtering beer and wine (IARC, 1977). It was also used as a filter medium in gas masks manufactured during the Second World War (AC&CC, undated). However, all of these uses are very historical, and it was not expected that any such examples would be found today. Four New Zealand suppliers of industrial filter equipment were contacted for the survey. One of these responded to say that they did not deal with any products containing asbestos.

Asbestos may have been used in pump gaskets and rotor blades, although the latter was more likely in dry applications such as vacuum pumps, which are covered under section 4.17. A more common use was in valve packings (i.e. material packed around the valve stem) and other gaskets used in the pipework associated with pumping systems. These materials were even more common in steam valves, steam traps and other high pressure/high temperature systems.

Two of the filter equipment suppliers also provide pumping equipment, and three of the vacuum pump suppliers noted in section 4.17 also deal in liquid pumps and associated equipment. The responses received from individual suppliers in each of these groups indicated that they were not importing any ACPs.

No specific contacts were made with companies supplying industrial valves, gaskets and valve packing. However, searches of the on-line catalogues for five New Zealand suppliers found no references to asbestos, other than for products that were specifically identified as non-asbestos substitutes for particular components. Similar searches internationally identified only a limited number of suppliers of asbestos-based valve packing materials but many references to non-asbestos alternatives based on fibreglass, aramids, carbon fibre and ceramic fibres.

4.14 Laboratory products

There are several examples of specific uses of asbestos in laboratories. Many years ago the loose fibres were added to so-called Gooch crucibles, which were used for gravimetric analysis. However, these were replaced by crucibles fitted with sintered glass filter elements. Asbestos tape and cloth was used for wrapping pieces of heated glassware, and asbestos boards were commonly used to form the external casings for laboratory furnaces and ovens. Other more general uses were for thermal and electrical insulation in laboratory instruments and in vacuum pump rotors (see section 4.17).

Ten New Zealand suppliers of laboratory equipment were contacted for the survey and one manufacturer of laboratory ovens. Three of these companies responded to say that they were not importing any ACPs, and the oven manufacturer confirmed that there was no asbestos in any of their products. Another company declined to provide any response; however, the on-line catalogue for this global company includes a listing for asbestos tape as a general instrument service part.

The on-line catalogues for most of the other laboratory supply companies were searched for references to asbestos but none were found.

4.15 Marine industry

Asbestos was used extensively in ships and boats in the past and, in fact, some of the early definitive studies of asbestos health effects were based on shipyard workers and sailors, especially those associated with the navy. Sprayed asbestos was widely used for insulation and fire protection of the steel structures and pipe work, as were asbestos textiles and plaster/asbestos blocks. It was also used in gaskets, resin bearings, valve packings and in friction materials.

Thirteen companies associated with the shipping industry were contacted for the survey. These included a major dockyard in Auckland, two large fishing companies that service their own and other companies' vessels, two companies that provide support for off-shore fishing vessels and the oil exploration industry, seven heavy engineering companies specialising in ship and boat repair, and two companies that supply or service marine engines – one of which specialises in older diesel engines. Responses were received from eight of these companies.

Three of the companies advised that they had not come across asbestos in any of the boats or engines that they worked on. Another indicated that they had identified asbestos-based brake linings on the winches of one of their vessels, which was built in China in 2005. However, this ship does not operate in New Zealand waters. A fifth company was not aware of any ACPs, but noted that some replacement parts are supplied by the ship owners without any supporting information on the product composition.

One company reported that they used asbestos cloth in small volumes for pipe insulation. However, they had not imported any of this material for the past few years and had no intention of importing any in the future. Two others indicated that they did occasionally come across insulation materials that contain asbestos, but these were routinely replaced with non-asbestos products. One of these also reported that some small engine parts still contain ACPs such as exhaust gaskets, although the frequency of these is reducing. The gaskets are made from copper sheets with an inner asbestos layer, and are only used when there is no alternative. The company would not like to see these gaskets regulated out of use.

One of the respondents provided additional personal comment about the need for asbestos in steam valve packings in old traction engines and locomotives. He did not believe that there were any suitable substitutes, although this may simply reflect a lack of awareness of the availability of modern alternatives. These were noted previously in section 4.13.

4.16 Surface coatings and resins

This group includes manufacturers and distributors of decorative surface coatings, specialty paints (eg. temperature resistant and acoustic coatings), building products (mastics and building papers) and the industrial resins generally (eg epoxies, phenolics, etc.). The main use of asbestos was as a reinforcing material.

The support office for the New Zealand Paint Manufacturers Association advised all members of the survey via email but no responses were received. The membership covers a range of different companies but the main focus appears to be on decorative paints.

Six manufacturers and distributors of specialty coatings were contacted directly, and two responses were received indicating that there was no asbestos in their products.

Direct contact was made with ten industrial resin manufacturers and distributors, many of whom also offer a wide range of other related chemical products. Five of them responded, stating that there was no asbestos in any of their products.

Five manufacturers or distributors of building products were also contacted, including two specialising in building papers and three in mastics. Three replied, indicating that there was no asbestos in their products. In addition to this, the safety data sheets (MSDS) for the mastics supplied by several other companies were checked on-line and none made any reference to asbestos being present in the products.

4.17 Vacuum pumps

There are many different types of vacuum pumps, but most of them share a need for operation in the absence of oil or other lubricants. As a result, they were a key area for the use of the resin-based dry bearings described in section 3.10. Similar materials were also used for the vanes in rotary vacuum pumps, while diaphragm pumps may have used rubber diaphragms reinforced with asbestos. Other general uses would have been in gaskets and electrical componentry.

Eleven manufacturers and distributors of vacuum pumps were contacted for the survey, and six of those replied to say that there was no asbestos in any of their products.

4.18 Specific industries

There are a number of large industrial installations throughout New Zealand that utilise high temperature and/or high pressure processes, and that may have used asbestos in the past, including for insulation purposes or in valve packings and gaskets. These include the Marsden Point oil refinery; two cement plants in Northland and Westport; an Auckland glassworks; two fibreglass plants in Auckland and Christchurch; a primary and a

secondary steel mill, both in the Auckland region; the Huntly power station; the two pulp and paper mills at Kinleith and Kawerau; and the Tiwai Point aluminium smelter. The operators of all of these plants were contacted, and responses were received from eight of them. Two companies reported that they had no ACPs on-site, but six of them did, mainly in gaskets and insulation. However, most of these companies intended to replace the items with non-asbestos alternatives when they came due for servicing. No companies had any concerns about the possibility of not being able to import ACPs in the future.

Another historical use of asbestos that falls under this heading is the use of asbestos diaphragms in the mercury cell method of manufacturing chlorine gas by the electrolysis of brine. There are two chlorine plants in New Zealand at the two pulp and paper mills. However, both of those plants installed alternative membrane technology systems in the 1980s (NZIC, 1998b).

4.19 Mineral products

Specific importers and distributors of mineral products were not directly targeted for this study because it was expected that the most significant industrial uses would have been picked up under other categories, especially those covered under section 4.16. The only exception was the use of serpentine as fertiliser additive.

Serpentine is used in New Zealand as an additive to superphosphate, where it acts as a source of magnesium. The two major fertiliser companies both sell this type of product under the brand names Serpentine Super (Ballance Agrinutrients) and Serpentine Super/Drilling Super (Ravensdown Fertiliser Co.). These companies were contacted via the Fertiliser Association of New Zealand. They both advised that the serpentine was essentially asbestos-free (<0.01 – 0.001%). Both companies currently obtain the serpentine from local sources.

Contact was also made with a third company that manufactures a type of fertiliser using processing waste (dross) from the Tiwai Point aluminium smelter. This is refined and then blended with serpentine and other additives to give the final product. The company advised that the serpentine is obtained from a local source and has been shown through testing to be essentially asbestos-free. The product is only sold within New Zealand.

4.20 Miscellaneous products

Several other potential ACPs were identified during this study, as discussed below.

Fire Wallets

These are novelty items intended for use by magic enthusiasts. They have the appearance of a normal leather wallet, but when opened they burst into flame. The products contain absorbent pads that the user pre-fills with lighter fluid, and some of the pads can contain chrysotile asbestos. The wallets were the subject of a recent consumer alert in Australia (AC&CC, 2014). Twelve different samples of the wallets were tested and asbestos was found in 3 of them. The AC&CC commissioned an expert risk assessment on the wallets, which concluded that the potential health risks would be negligible.

Several New Zealand sources of fire wallets were identified through an internet search, including through the direct importing service offered by www.fishpond.co.nz, and also a specialty on-line supplier of equipment and accessories for magicians. Contact was made with the latter company, and they advised that they obtained the wallets from the USA. Also, they were not a major sales item, so the company would have no concerns if the products could no longer be imported.

Educational materials

A search of the on-line catalogue for an Auckland-based supplier of educational materials identified a mineral set which included a sample of asbestos. After being contacted for this survey, the company has withdrawn the product from their catalogue.

Drilling materials

A recent safety bulletin issued by the New South Wales government indicates that asbestos was found in a drilling additive called Nutplug (NSW Trade & Investment, 2014). This bulletin was first picked up through the website of the MINEX Health & Safety Council (NZ). Contact was made with the MINEX Chief Executive who indicated that he was not aware of Nutplug being used in New Zealand, and nor had he heard of asbestos being used in any other drilling materials. He passed on information about the survey to members of the Council, but this has not resulted in any subsequent responses.

Acetylene cylinders

No specific contacts were made in relation to asbestos use in acetylene cylinders because the available literature gives a clear indication that asbestos is no longer used (see section 3.12).

4.21 Summary and analysis of the survey findings

Table 4.1 provides a summary of the key information presented in this section, including the current New Zealand uses of ACPs identified in the survey. Further analysis of this information is given in Table 4.2, including an assessment of the extent of coverage for each industry or product sector, the amount of additional (i.e. non-survey) information identified, and specific conclusions on the need for future imports of ACPs. The final column in the table gives a subjective assessment of the certainty of the conclusions, based on an overall evaluation of the information given in the third, fourth and fifth columns of the table.

The key points arising from the survey are as follows:

- The number of current uses of ACPs identified in the survey is very small, and only one of these (replacement parts for some aircraft) is seen as definitely needing to continue. One company from the marine sector also indicated a future need for minor imports of ACP exhaust gaskets.
- Non-asbestos materials are the accepted norm for most products, and alternatives are available for all uses, with no significant cost or performance concerns.
- There is the potential for future imports of some ACPs that are still readily available in other countries. This includes non-OEM friction materials for vehicles, asbestos-cement products, floor tiles, and replacement parts for marine vessels.

The final bullet point reflects one of the limitations of the survey, in that it has relied on the voluntary provision of information by ACP importers and users. None of the companies that responded is importing or using any of the listed ACPs. However, there may be others (non-respondents) who are.

Another limitation of the survey is that it has primarily focused on 'mainstream' importers and users of ACPs (i.e. those that belong to industry associations and/or have a significant internet presence). It is possible that some smaller importers have been missed.

Table 4.1: Summary of ACP survey information

Industry or Product Sector	Types of ACPs	Current Uses of new ACPs in NZ	Issues Noted
Automotive Industry	Textiles (exhaust pipe wrap) Millboards, paper, card (gaskets) Loose or encapsulated asbestos (head gaskets, heat shield) Friction materials (brakes, clutches) Bitumen products, surface coatings (underbody sealants) Composites (distributor caps, switches)	No known uses in new vehicles, and only one ACP identified on sale locally, which was an exhaust pipe wrap. Other suppliers of spare parts indicated that their products were asbestos-free.	Some non-OEM ACPs are available overseas. Replacement gaskets for Great Wall Motors vehicles were reported to contain asbestos in 2012, but these have been replaced.
Aviation Industry	Textiles (pipe wrap) Millboards, paper, card (gaskets, insulation) Friction materials (brake pads) Bitumen products, surface coatings (sealants) Composites (rubber pads and blocks)	Asbestos doesn't appear to be an issue for new aircraft but may still be present in brake pads and gaskets for a limited number of older aircraft.	Under CAA regulations, non-standard replacement parts must be certified by an appropriate person (eg aeronautical engineer) as unlikely to have any adverse effect on the airworthiness of the equipment.
Building Products	Insulation board (wall panels) Plaster boards and coatings (textured ceilings, insulation) Loose or encapsulated asbestos (insulation) Also see entries for: Electrical Equipment, Fibre-Cement Products, Flooring and Wall Tiles, Surface Coatings and Resins	Members of the Building Industry Federation, Responsible Care, and the Claddings Institute, were notified of the survey but nobody came forward with any current uses of ACPs. The Fibrous Plaster Association, and the Assn of Wall and Ceiling Industries advised no ACPs for their sectors. The Building Research Association (BRANZ) is not aware of any current uses.	None
Electrical Equipment	Textiles (wire insulation) Insulation board (switchboard panels) Millboards, paper, card (general insulation) Composites (switches and other componentry)	Members of two electrical associations were notified of the survey but nobody came forward with any current uses of ACPs. Two switchboard manufacturers reported no uses of ACPs, and an instrument supplier confirmed that a specific instrument gasket no longer contained asbestos.	None
Elevators	Friction materials (brake pads)	No known uses of ACPs in new elevators or replacement parts for older equipment.	None
Fibre-Cement Products	Fibre-cement (cladding, roofing, pipes, tanks)	No known uses of new asbestos-cement products, although they are still readily available in some countries overseas.	None
Fire Protection and Safety Products	Textiles (fire blankets, safety gloves, protective clothing)	No known uses of new ACPs.	None

Industry or Product Sector	Types of ACPs	Current Uses of new ACPs in NZ	Issues Noted
Flooring and Wall Tiles	Millboards, paper, card (vinyl flooring underlay) Composites (vinyl floor tiles) Floor coverings (clay/ceramic tiles, plus the above vinyl underlay and vinyl floor tiles)	No known current uses of ACPs in flooring products or wall tiles, although some are still available overseas.	The industry association advised no uses of ACPs but no responses were received from any of the individual tile importers contacted for the survey.
Generators and other Stationary Heavy Equipment	Textiles (exhaust pipe wrap) Millboards, paper, card (gaskets) Loose or encapsulated asbestos (head gaskets, heat shield) Composites (distributor caps, switches)	No known uses of ACPs. The response rate for this group was low but most overseas manufacturers indicate that they no longer use asbestos.	Some non-OEM ACPs are available overseas.
Heating, Ventilation and Air Conditioning (HVAC)	Textiles (asbestos rope, wire insulation) Millboards, paper, card (thermal insulation) Bitumen products, surface coatings (sealants) Composites (switches and other electrical components)	The Home Heating Assn advised that asbestos is no longer used in NZ wood burners. Members of IHRACE were notified of the survey but nobody came forward with any current ACP uses.	None
Home Appliances	Textiles (wire insulation) Millboards, paper, card (thermal insulation) Composites (switches and other electrical components)	Two suppliers of LPG equipment and two nationwide appliance retailers advised no current uses of ACPs. Other members of the Retailers Assn and the LPG Assn were notified of the survey but nobody came forward with any current ACP uses. Consumer NZ is not aware of any current ACP uses.	One use of an ACP insulation card was reported in Australia in 2009, on a barbeque accessory.
Incinerators, Furnaces, Boilers	Textiles (asbestos rope, wire insulation) Millboards, paper, card (thermal insulation) Bitumen products, surface coatings (sealants)	No known uses of new ACPs.	None
Industrial Pumps and Filters	Textiles (filter media, valve packings) Millboards, paper, card (gaskets) Composites (gaskets, rotor blades, switches)	No known uses of new ACPs.	None
Laboratory Products	Textiles (filter media, insulation tape and cloth) Insulation board (oven/furnace panels) Millboards, paper, card (general insulation) Composites (gaskets, rotor blades, switches and other electrical componentry)	No known uses of ACPs. The response rate for this group was low but no evidence of significant asbestos use was found through internet searches of any of their equipment catalogues (with the one exception noted under issues).	One of the companies does offer an asbestos insulation tape as a general service part. However, the applications for this should be easily addressed through the use of alternative products.

Industry or Product Sector	Types of ACPs	Current Uses of new ACPs in NZ	Issues Noted
Marine Industry	Textiles (insulation tape and cloth, valve packing) Insulation board (wall linings and panels) Millboards, paper, card (general insulation, gaskets) Plaster boards and coatings (spray-on coatings) Friction materials (winch brakes) Dry bearings (bearings and bushes)	Some minor uses of asbestos textiles were reported but there were no concerns about terminating these. Asbestos may be present in some winch brake pads and is known to be present in some gaskets. The valve packing on some old traction engines and locomotives may contain asbestos but non-ACP replacement parts are readily available.	Replacement parts for overseas-owned ships may be supplied by the owners, with no information provided on the presence or otherwise of asbestos. One company would not like to see future restrictions on exhaust gaskets.
Surface Coatings and Resins	Bitumen products, surface coatings (specialty paints, caulks and mastics, building paper, damp-proof course) Composites (industrial resins)	No known uses of new ACPs.	None
Vacuum Pumps	Millboards, paper, card (gaskets) Composites (rotor blades, diaphragms, switches)	No known uses of new ACPs.	None
Specific Industries **(12 plants involving high-temperature processes)**	Textiles (insulation tape and cloth, valve packing) Fibre-cement (cladding, roofing, pipes, tanks) Insulation board (wall linings and panels) Millboards, paper, card (general insulation, gaskets) Plaster boards and coatings (spray-on coatings) Loose or encapsulated asbestos (gaskets) Bitumen products, surface coatings (paints, caulks, mastics)	Several companies reported existing (old) ACPs, such as gaskets and insulation, but these would be replaced with non-asbestos materials when required. There were no known uses of new ACPs.	None
Mineral Products	Mineral products (industrial uses of serpentine, talc and vermiculite, including serpentine-based fertilisers)	The serpentine used in fertilisers is reported to be asbestos-free. No specific enquiries made for other industrial uses, but most of these should have been picked up under other categories (eg. surface coatings and resins).	The potential for asbestos contamination could be addressed through specifying a maximum allowable limit (ca. <0.1%)
Miscellaneous Products	Textiles (Fire Wallets) Loose or encapsulated asbestos (acetylene cylinder fill material, drilling fluid additive – plugging agent) Mineral products (educational samples)	Fire Wallets can be purchased over the internet, although only some contain asbestos. Asbestos is not used in new acetylene cylinders. The drilling fluid additive is not known to be used in NZ and alternatives are readily available. The mineral educational set has been withdrawn from sale.	Prohibiting future imports of any of these products should not cause any significant problems for the users, because asbestos-free alternatives are readily available.

Table 4.2: Summary of survey coverage and certainty of the conclusions

Notes

1. In column 3: Very High = >90% of all businesses identified for each group, High = 75 -90%, medium = 50 - 75%, Low = 25 - 50%, very low = <25%.
2. Column 5 covers the information obtained through searches of company catalogues, general internet searches for types of products, and published information about the alternatives.
3. The certainty assessment given in the final column is based on a combination of columns 3, 4 and 5, with the non-quantitative options of very low, low, medium, high and very high.
4. Some of the individual contacts can apply to multiple categories so the sums of all the numbers shown in columns 2 and 4 are greater than the total numbers of contacts or responses

Industry or Product Sector	No. of Contacts	Extent of Coverage	No. of Specific Responses	Evidence from Other Sources	Conclusions	Certainty of the Conclusions
Automotive Industry	Associations: 2 Individual: 13	Medium	11	Extensive	No future need for ACP imports, although some may occur	High
Aviation Industry	Associations: 1 Individual: 14	Medium	7	Moderate	Some requirement for minor imports of ACPs in the future	High
Building Products	Associations: 6 Individual: 0	Medium (also considering the coverage under other groups)	3	Extensive	No future need for ACP imports	High
Electrical Equipment	Associations: 2 Individual: 3	Medium	3	Moderate	No future need for ACP imports	High
Elevators	Associations: 0 Individual: 5	Very high	5	Moderate	No future need for ACP imports	Very high
Fibre-Cement Products	Associations: 1 Individual: 0	Not surveyed other than through Building Products	-	Extensive	No future need for ACP imports, although some may occur	High
Fire Protection and Safety Products	Associations: 1 Individual: 3	Medium	2	Extensive	No future need for ACP imports	High
Flooring and Wall Tiles	Associations: 1 Individual: 6	Medium	1	Moderate	No future need for ACP imports, although some may occur	Medium
Generators and other Stationary Heavy Equipment	Associations: 0 Individual: 4	High	1	Moderate	No future need for ACP imports	High
Heating, Ventilation and Air Conditioning (HVAC)	Associations: 2 Individual: 0	Medium	1	Moderate	No future need for ACP imports	Medium
Home Appliances	Associations: 3 Individual: 4	Medium	5	Moderate	No future need for ACP imports	Medium

Industry or Product Sector	No. of Contacts	Extent of Coverage	No. of Specific Responses	Evidence from Other Sources	Conclusions	Certainty of the Conclusions
Incinerators, Furnaces, Boilers	Associations: 0 Individual: 5	High	3	Moderate	No future need for ACP imports	High
Industrial Pumps and Filters	Associations: 0 Individual: 7	Medium	2	High	No future need for ACP imports	High
Laboratory Products	Associations: 0 Individual: 11	Medium	5	Moderate	No future need for ACP imports	High
Marine Industry	Associations: 0 Individual: 13	High	8	Moderate	Minor imports of ACP gaskets may be required in the future	High
Surface Coatings and Resins	Associations: 1 Individual: 21	High	10	High	No future need for ACP imports	High
Vacuum Pumps	Associations: 0 Individual: 11	High	11	Moderate	No future need for ACP imports	High
Specific Industries	Associations: 0 Individual: 12	High	8	not applicable	No future need for ACP imports	High
Mineral Products	Associations: 1 Individual: 1	High (for fertiliser use only)	2	not applicable	No future need for ACP imports	High
Miscellaneous Products	Associations: 1 Individual: 2	not applicable	2	moderate	No future need for ACP imports	High

5 Import and export data

The Statistics NZ on-line InfoShare system was used to obtain annual data on imports and exports for groups of products listed under the categories that specifically refer to asbestos. The data in the InfoShare system is classified using the *New Zealand Harmonised System Classification* codes (NZHSC, but referred to here as HS) which are based on the World Customs Organization's (WCO) *Harmonized Commodity Description and Coding System*. The current set of codes was published in 2012 and replaced the previous version from 2007. These codes are used by importers and exporters in their Customs' clearance declarations, most of which are submitted electronically using the Customs' on-line declaration website, or through the use of the Electronic Data Interchange software. It is relevant to note that most declarations are submitted by Customs brokers, clearance agents or freight forwarders, who will usually be less familiar with the products than the actual importers

The InfoShare data was collected for the 10-year period 2004 to 2013. The data for imports is all based on 'value for duty', which was the only quantity measure available for most of these products, while the data for exports is based on 'free on-board' cost. A summary and analysis of the data is provided below based on the different product categories covered by the Customs' HS codes. Additional detail is provided in the tables given in Appendix 2.

5.1 Friction materials

Friction materials are covered under HS code 68.13, with the following primary description:

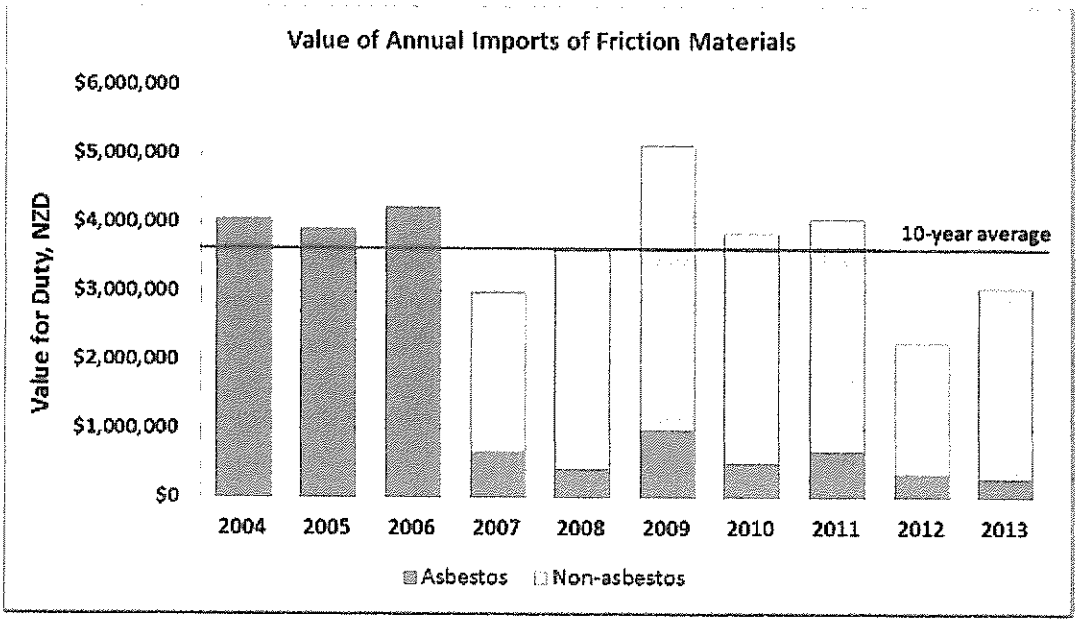
> *Friction material and articles thereof (e.g. sheets, rolls, strips, segments, discs, washers, pads) not mounted; for brakes, clutches or the like, with a basis of asbestos, other mineral substances, or cellulose.*

The group is then subdivided by different types of articles and has separate codes for non-asbestos articles. However, the asbestos/non-asbestos split was only introduced in New Zealand in 2007, following on from its introduction by the WCO in 2006.

5.1.1 Imports

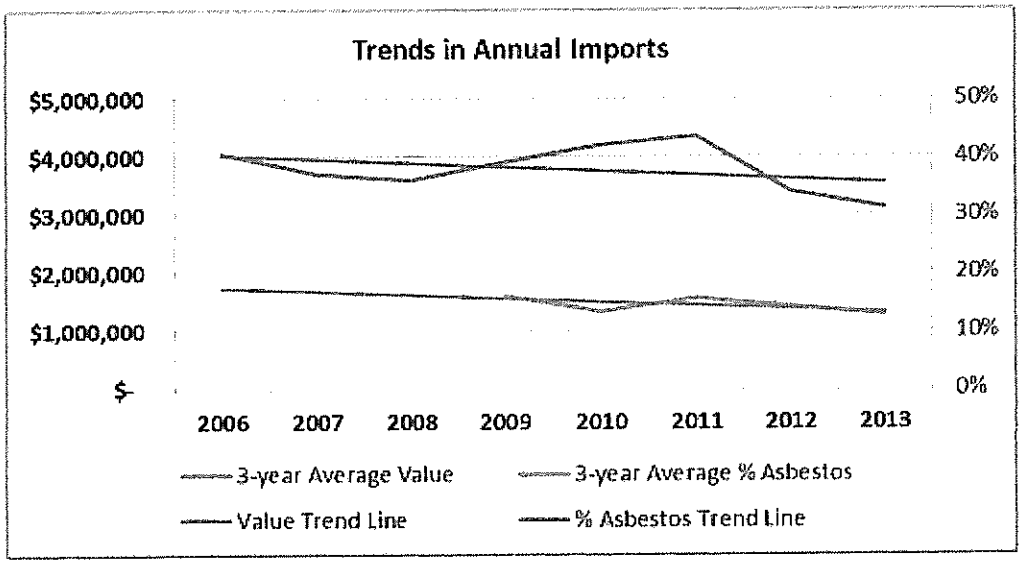
The import data for these products is summarised in the two graphs below. The first one shows the total imports of all articles on a yearly basis, along with the asbestos and non-asbestos split (from 2007 onwards).

Figure 5.1: Annual Imports of Friction Materials, by Value



The second plot is based on 3-yearly running averages of the same data that help to smooth out the marked variations that occur from year to year. This also includes a trend line for total imports, which shows an overall downwards trend, at a rate of about 1.4% per year (but see notes below on exports). The lines towards the bottom of the chart are for the articles containing asbestos, shown as a percentage of the total imports. These are plotted against the right hand axis, and show a similar downwards trend.

Figure 5.2: 3-Yearly Running Average Imports of Friction Materials



(Note: the data points marked 2006 are for the average of 2004 to 2006, 2007 is for 2005 to 2007, 2008 is for 2006 to 2008, and so on).

Brake pads account for about 90% of the imports under this group of codes, and the imports over the last 3 years were spread across 29 different countries, although the bulk of the imports were from only about 12 of these. Table A1 of Appendix 2 gives a breakdown of the asbestos-based friction material import data by country. The data for non-asbestos friction materials is distributed across much the same group of countries but only starts from 2007. The effect of the introduction of the separate codes for non-asbestos materials can be clearly seen in Table A1, with marked reductions showing up for most countries between 2006 and 2007.

Some asbestos-based brake pads are still made in China or India. However, these do not appear to be a major contributor to the current imports. The data for 2013 shows that ACPs make up only 0.1% of the total imports of friction materials from China, and there are no imports of ACP friction materials from India.

Validity of the Data

There are significant uncertainties with some of these import statistics, mainly as a result of miscoding. The Customs agency does monitor the use of the codes, but their primary focus is on jurisdictional matters such as identifying goods subject to tariffs or specific import/export restrictions. Currently there are no such controls on ACPs so there is no immediate driver for ensuring that the clearance agents make absolutely certain that they are using the correct codes for each particular item. In the case of friction materials, all imports were grouped under the asbestos-based codes prior to 2007, including those that were asbestos-free. About 80% of the total imports were immediately switched to the non-asbestos codes in 2007. However, given the feedback received in the current survey, it may be that the percentage of non-asbestos imports should have been even higher.

5.1.2 Exports

This data has not been analysed in as much detail because it is only a minor contributor to the overall picture. In particular, the information given below makes no distinction between asbestos and non-asbestos products.

For the period 2004 to 2006, the average value of friction material exports was just under $400,000 per year. This figure has been dropping steadily over time and in 2011 to 2013 was down to less than $75,000 per year. The exports are spread across 31 countries altogether but most are to the Pacific Island countries and Australia.

The drop of about $325,000 in export value over the 10 year period corresponds to more than three-quarters of the drop in the value of imports (i.e. $400,000) over that same period. This indicates that most of the reduction in imports may be due to the cessation of re-exporting.

5.2 Fabricated asbestos

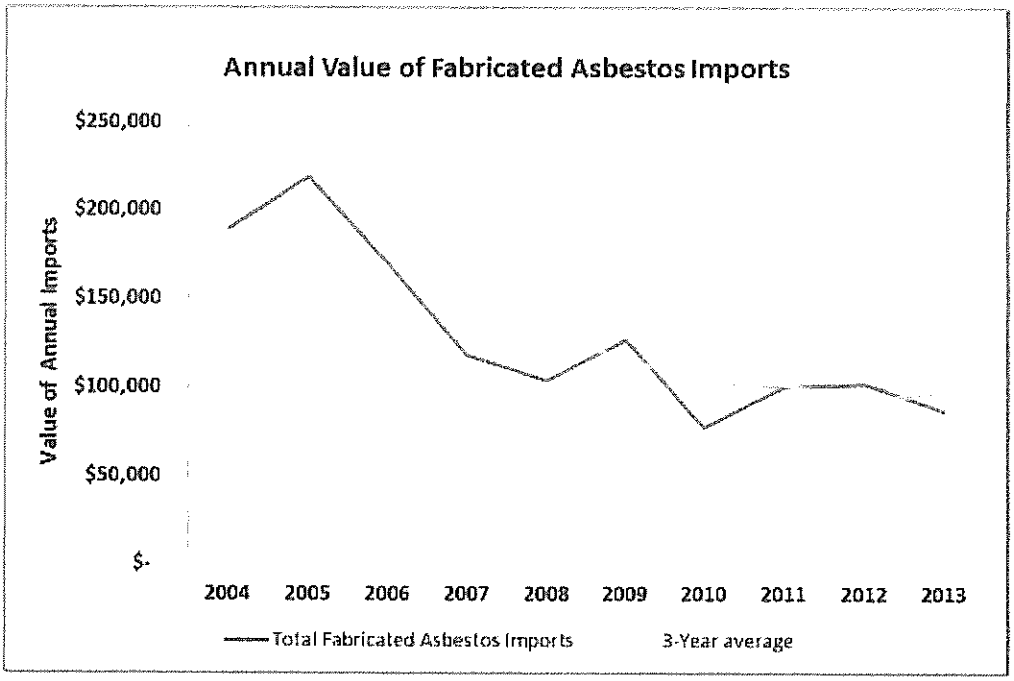
These products are covered under HS code 68.12, with the following primary description:

> *Fabricated asbestos fibres; mixtures with a basis of asbestos or of asbestos and magnesium carbonate; articles of such mixtures or of asbestos (e.g. thread, woven fabric, clothing, footwear), whether or not reinforced, not goods of heading 6811 or 6813)*

5.2.1 Imports

The changes in the total annual value of fabricated asbestos imports over the 10-year period are shown in the figure below. The blue line shows individual yearly data while the lighter coloured line shows the 3-yearly running average (2004–2006, 2005–2007, 2006–2008, etc.). As shown, there has been a marked drop in these imports over time, although they appear to have levelled out over the last few years.

Figure 5.3: Annul imports of fabricated asbestos



The distribution across different countries is shown in Table A2 of Appendix 2. The imports have come from 20 different countries, but with about two-thirds of the total coming from the UK, USA and Slovenia. Australia and Japan contribute a further 5% each. However, internet searches for asbestos tape and asbestos cloth found no such products offered for sale in any of these countries[5].

The current price for asbestos tape and cloth made in China appears to be around $1 to $5 per kilogram.

[5] Apparently all uses of asbestos were banned in Slovenia in 1996, see: www.zdravstvo.com/medrada/radovi/dodicf.

Some current users of asbestos rope or cloth were identified in the current survey. However, the quantities identified do not account for the current apparent volume of imports. The potential for mis-coding these materials is lower than for brake pads, because there are quite separate HS codes for products made with some of the alternative materials (eg. 70.19: fabrics of glass fibres, woven).

5.2.2 Exports

The values of annual exports of fabricated asbestos articles are shown in Table 5.1. As indicated, the values are quite minor apart from two much higher quantities in 2007 and 2009. For 2009, the exports actually exceeded the total value of imports ($150, 290 vs $126,825). However, the most surprising point about that year is that 97% of the exports were to Australia – where imports of asbestos-containing products are prohibited.

In 2007, 70% of the exports were to the Cook Islands. Other than that, the exports are generally spread across 16 different countries, predominantly the Pacific Islands.

Table 5.1: Annual exports of fabricated asbestos articles

Year	Annual Value	Year	Annual Value
2004	$5,454	**2009**	$150,290
2005	$3,373	**2010**	$6,094
2006	$7,620	**2011**	$1,676
2007	$21,062	**2012**	$5,067
2008	$2,606	**2013**	$1,356

5.3 Asbestos-cement

The annual imports of cement-asbestos products are shown in Table 5.2 below, and the imports of all fibre-cement products are given in Table A3 of Appendix 2 (HS code 68.11). In this case, the codes used prior to 2007 did distinguish between most forms of asbestos and non-asbestos products, apart from pipes and fittings. Separate codes were introduced in 2007 to cover the different forms of the latter.

The dominant source countries for the current imports of fibre-cement products are Australia (~40%), China (~40%) and Malaysia (~10%). The minor quantities shown for China in Table 5.2 indicate that nearly all of the Chinese imports are declared as asbestos-free. However, given the predominance of asbestos-cement products in that country (Shen, Lin, & Zhang, 2006), it may be appropriate to carry out targeted testing of these.

Asbestos-cement products are still manufactured in Malaysia as well. However, the use of ACP building materials is prohibited in all government buildings, and their use in private buildings is discouraged by some local government authorities (Zen, Ahamad, Rampal, & Omar, 2013). An internet search for Malaysian asbestos-cement products mainly produced references to asbestos-free products.

The imports from New Caledonia are believed to relate to asbestos-cement wastes that are shipped to New Zealand for controlled disposal. These imports are subject to an approval process in accordance with the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal* (http://www.epa.govt.nz/hazardous-substances/import-export/Pages/default.aspx).

Table 5.2: Annual imports of cement-asbestos products

	Australia	China	Malaysia	New Caledonia	Russia	Thailand
2004	-	-	-	-	-	-
2005	-	-	-	-	-	-
2006	-	-	-	-	-	-
2007	$111,836	$10,004	-	-	-	$1,843,616
2008	$49,747	-	-	-	$123	-
2009	$7,190	-	-	-	-	-
2010	-	-	-	$7,427	-	-
2011	-	-	$8,040	$2,124	-	-
2012	$1,239	-	-	$1,227	-	-
2013	-	$1,499	-	$2,911	-	-

The total value of our imports of fibre-cement products is currently around $4.5 to $5.5 million per year (see Table A3, Appendix 2). Hence, the asbestos-cement products shown in Table 5.2 are only a trivial contributor to the total fibre cement imports, with the one exception of those from Thailand in 2007.

There are no significant exports of asbestos-cement products.

5.4 Mastics

There are significant annual imports of mastic preparations which may or may not contain asbestos. These products are covered under HS code 2715.00.01, with the following description:

Mastic preparations; including mastics incorporating mineral substances such as sand or asbestos

The data for annual imports under this code show the following totals for the last three years:

2011: $348,660 2012: $285,571 2013: $664,362

This information has not been examined in any more detail because there is no way of telling what proportion of these figures, if any, relate to asbestos-containing materials. However, it was noted that 99% of the imports were from Australia, Canada, USA and EU countries, which suggests that they are unlikely to contain asbestos. Also, there was no indication of current use of asbestos-containing mastics in the survey responses noted in section 4.16.

6 Summary and discussion

There were three primary components to this study: the survey of potential importers, distributors and users of ACPs; the analysis of import and export data; and the collection of information on alternative non-asbestos products and materials. The limited review of asbestos regulations in other countries is also relevant because it helps to identify which of our major trading partners have the potential to be significant sources of ACPs.

When taken together, this information provides a cohesive picture of the current uses of, and need for, ACPs in New Zealand. This is presented below on the basis of the three main components.

Survey of potential importers, distributors and users of ACPs

A total of 130 individual companies and 25 business and industry associations were contacted directly for the survey. In addition, the contacts with the business and industry associations resulted in the enquiries being passed on to many hundreds of other companies and individuals through email distribution lists and newsletters. Specific responses were received from about 70 companies, and additional information was obtained through searches of company web sites, and internet searches targeted at specific products.

The feedback received from the survey indicated that most uses of asbestos in New Zealand have been discontinued, and in many cases this happened more than 10 to 20 years ago. A limited number of residual uses were identified but, with only one exception, the users saw no problems with possibly having to switch to alternative non-asbestos products. The only exception was the use in aircraft, which is discussed below under the alternatives heading.

The current ACP uses identified in the survey were as follows:

- Asbestos tape, which was sold for wrapping inlet headers and exhaust pipes in performance vehicles.
- An educational resource set of minerals that included a sample of asbestos.
- Gaskets, seals, and possibly also brake pads, for use in aircraft.
- Gaskets for use in ships, especially in the exhaust systems.
- Asbestos cloth for pipe insulation, and possibly brake pads for winches, on ships.
- Some minor legacy uses of gaskets and insulation materials were also reported by several specific industries that involve high temperature or high pressure processes.

The first two of these items are intended for resale, while the remainder would be imported directly by the users.

Several recent product recalls in Australia are also relevant to this study. These have included engine gaskets, a decorative wall tile, novelty Fire Wallets, vehicle underbody protection products, a heat protection plate in a barbeque accessory and a drilling fluid additive. The main point to note about these is that they were usually one-off items, rather than well-established products that had been imported and sold for considerable periods of time. Some of them, such as the vehicle gaskets, were promptly replaced with non-asbestos alternatives, while others were simply withdrawn from sale.

Import/Export data

This data is available for three specific types of ACPs: friction materials, fabricated asbestos and fibre-cement products. However, there are significant uncertainties in the data because the codes used to identify the products are usually chosen by Customs brokers or clearance agents, who may not have detailed information on the product composition. The data shows the following:

- Asbestos-based brake pads and other friction materials account for just over 10% of current imports, by value. However, this information is totally at odds with the survey responses, which have not identified any current uses of asbestos-containing friction materials, apart from the minor unconfirmed but possible uses in ships and aircraft.
- The value of annual imports of fabricated asbestos (eg. tape or cloth) is currently around $100,000 per year. Some minor uses of these products were identified in the survey but nothing that would account for this stated value. This, coupled with the fact that asbestos tape and cloth is not readily available in any of the main countries of origin (UK, USA, Slovenia, Australia and Japan) suggests that the data may be significantly affected by the use of incorrect codes.
- The imports of all types of fibre-cement products are currently around $4.5 to $5.5 million per year. The reported data for asbestos-cement products accounts for less than 0.2% of this total but may be affected by incorrect coding.
- The only notable exports for any of the categories are some minor amounts of fabricated asbestos.

Alternatives

The information given in section 3 indicates that there are viable non-asbestos alternatives available for all of the ACPs covered by the report. For most products, the search for alternatives started more than 30 years ago, and in those early years, there were valid concerns around relative effectiveness and costs (Pye, 1979). Furthermore, some organisations continued to echo those concerns through to the end of the 1990s (NICNAS, 1999). However, fifteen years on, the use of asbestos-free products appears to have become the established norm.

Most of the alternatives materials are more expensive than asbestos. However, this factor may have become less relevant over time, when considered against overall increases in costs caused by inflation. In addition, many of the uses of ACPs are as relatively minor components of larger items (eg. in motor vehicles). Performance concerns have also faded over time because there is now often a much wider range of products to choose from, including those that perform equally or even better than the original ACPs.

The feedback received through the survey component of this study indicated no significant concerns around the use of non-asbestos alternatives. The only issue that has been noted relates to replacement parts for aircraft. Rule 21.303 of the *Civil Aviation Rules* requires that any non-OEM replacement part be properly certified. This applies to all parts, no matter how small, and could result in significant costs for aircraft operators if they were no longer able to import and use an original asbestos-based part. However, the extent of the issue appears to be limited to occasional imports of minor replacement parts for a limited number of aircraft.

Conclusions

The key conclusions from the survey of potential importers, distributors and users of ACPs were as follows:

- The number of current uses of ACPs identified in the survey is very small, and only one of these (replacement parts for some aircraft) is seen as definitely needing to continue. One company from the marine sector also indicated a future need for minor imports of ACP exhaust gaskets.
- Non-asbestos materials are the accepted norm for most products, and alternatives are available for all uses, with no significant cost or performance concerns.
- There is the potential for future imports of some ACPs that are still readily available in other countries. This includes non-OEM friction materials for vehicles, asbestos-cement products, floor tiles, and replacement parts for marine vessels.

The final bullet point is also relevant to the import/export data presented in section 5. As noted previously, there are significant uncertainties in the data, especially in relation to the use of the correct product codes. This raises the potential for some imports to be incorrectly labelled as containing asbestos and, conversely, for others to be declared as asbestos-free.

The following limitations of the study are also acknowledged: the survey has relied on the voluntary provision of information by ACP importers and users, and has primarily focused on 'mainstream' importers and users of ACPs.

7 List of References

AC&CC. (2010). *Media Release: Urgent Safety Alert on Stacked Stone Tiles; 13 February.* Canberra: Australian Competition & Consumer Commission.

AC&CC. (2014). *Notice of the Results of an Investigation into Fire Wallets Containing Asbestos: Consumer Protection Notice No 1.* Canberra: Australian Competition and Consumer Commission.

AC&CC. (undated). *Gas Masks Containing Asbestos.* Retrieved June 2, 2014, from Australian Competition & Consumer Commission: www.productsafety.gov.au/content/index.phtml/itemId/973441

Air Products. (1994). *Safetygram - 13: Acetylene.* Allentown, Pennsylvania: Air Products and Chemicals.

Ali, M., & Grimer, F. (1969). Mechanical Properties of Glass Fibre-reinforced Gypsum. *Journal of Materials Science*, v4 (5), p389 - 395.

Australian Char. (2009). *Product recall - Heat Beads Barbecue Starter Safety Alert.* Dandenong South, Victoria: Australian Char Pty Ltd.

Bajaj, P. (2000). Heat and Flame Protection. In A. R. Horrcks, *Hanbook of Technical Textiles* (pp. 223 - 263). Cambridge, UK: Woodhead Publishing.

Blanchard, R., Fletcher, J., & Hill, D. (2007). *Safety of Acetylene Containing Cylinders During and After Involvement in a Fire.* London: Health & Safety Laboratory Science Group: Fire & Explosion, Department for Communities and Local Government.

Caterpillar. (2011). *Operation and Maintenance Manual: C15 Petroleum Engines.* Peoria, Illinois: Caterpillar.

Coutts, R. S. (2005). A Review of Australian Research into Natural Fibre Cement. *Cement & Concrete Composites*, 518 -526.

Davis, M. (2010). Brake Pad technology - What's New in Brake Pads. *Hot Rod Magazine*, January 29.

Porirua City Council. (2012). *Water Supply Asset Management Plan.* Porirua: Porirua City Council.

Fletcher Construction. (2013). *Toolbox Talk: Asbestos - Unusual Locations.* Christchurch: Fletcher Construction Company.

Flexitallic. (2009). *Gasket Design Criteria.* Cleckheaton, UK: Flexitallic Ltd.

IARC. (1977). *IARC Monographs on the Evaluation of Carcinogenic Risk of Chemicals to Man: v14 Asbestos.* Lyon, France: International Agency for Research on Cancer.

IARC. (2012). A Review of Human Carcinogens. Part C: Metals, Arsenic, Fibres and Dust. *IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, v100*, pp. 219 - 309.

IBase Secretariat. (2014, January 27). *Chronology of National Asbestos Bans.* Retrieved June 19, 2014, from International Ban Asbestos Secretariat: http://www.ibasecretariat.org/asbestos_ban_list.php

Joshi, T. K. (2012). The Indian Perspective. *Asbestos Disease Symposium, 27 September.* Ontario: Occupational Health Clinics for Ontario Workers.

Linde AG. (undated). *Safety Advice 10 - Handling of Acetylene.* Pullach: Linde Gas Germany.

Maluf, O., Milan, M. T., & Spinelli, D. (2004). Development of Materials for Automotive Disk Brakes. *Minerva*, 4(2): 149-158.

MBIE. (2014). *Asbestos Background Document in Support of the Discussion Document on Developing Regulations to Support the New Health and Safety at Work Act.* Wellington: Ministry of Business Innovation and Employment.

Millar, W. (1899). *Plastering, Plain and Decorative.* London: B T Batsford.

Ministry of Health. (2013). *The Management of Asbestos in the Non-occupational Environment.* Wellington: Ministry of Health.

MTAA. (2008). *Notification of Voluntary Product Recall.* Barton, ACT, Australia: Motor Trades Association of Australia.

NICNAS. (1999). *Chrysotile Asbestos: Priority Existing Chemical No.9.* Canberra: National Industrial Chemicals Notification and Assessment Scheme; Commonwealth of Australia.

NOHSC. (2005). *Code of Practice for the Management and Control of Asbestos in Workplaces, HOHSC: 2018.* Canberra: National Occupational Health and Safety Commission.

NSW Trade & Investment. (2014). *Safety Bulletin SB14-02: Drilling Material Contains Asbestos.* Sidney, Australia: NSW Government.

NZDAA. (2011). *Asbestos - New Zealand Guidelines for the Management and Removal of Asbestos; 3rd edition.* Auckland: NZ Demolition and Asbestos Association (in association with the Department of Labour).

NZIC. (1998a). Plaster and Plasterboard Production. In *Chemical Processes in New Zealand, 2nd edition, volume 1.* Auckland: New Zealand Insitute of Chemistry.

NZIC. (1998b). The Pulp and Paper Industry. In *Chemical processes in New Zealand, 2nd edition, volume 1.* Auckland: NZ Insitute of Chemistry.

NZWWA. (2001). *New Zealand Asbestos Cement Watermain Manual.* Auckland: NZ Water and Wastes Association.

Park, E.-K., Takahashi, K., & Jiang, Y. (2012). Elimination of Asbestos use and Asbestos-related Diseases: an Unfinished Story. *Cancer Science*, v 103 (10), 1751-1755.

Pye, A. M. (1979). A Review of Asbestos Substitute Materials in Industrial Applications. *Journal of Hazardous Materials*, v3, p125 - 147.

Rotterdam Convention. (2013). *Report of the Conference of the Parties to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade on the Work of its Sixth Meeting.* Rome: Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade.

Shen, R., Lin, Z., & Zhang, Y. (2006). Development of Non-Asbestos Fibre Cement Products in China. *10th International Inorganic Bonded Fiber Composites Conference*, (pp. 68 - 78). Sao Paulo, Brazil.

Supreme Court of India. (2011). *Judgement, Kalyaneshwari vs Union of India & Ors.* Supreme Court of India.

Takahashi, K., & Karjalainen, A. (2002). An International Comparison of Asbestos-related Issues in Asia. *Proceedings of the Asbestos Symposium for the Asian Countries; Journal of UOEH, v24, supplement 2* (pp. 109 - 114). Kitakyushu, Japan: University of Occupational and Environmental Health (UOEH).

Transpower. (2013). *ACS Reactive Power: Fleet Strategy.* Wellington: Transpower.

US EPA. (2014, March 16). *US Federal Bans on Asbestos.* Retrieved July 8, 2014, from US Environmental Protection Agency: http://www2.epa.gov/asbestos/us-federal-bans-asbestos

Virta, R. L. (2005). *Mineral Commodity Profiles - Asbestos.* Reston, Virginia: US Geological Survey, circular 1255-KK.

Virta, R. L. (2006). Asbestos Substitutes. In *Industrial Minerals and Rocks: Commodities, Markets and Uses; 7th ed.* Ltlletone, Colorodo: Society for Mining, Metallurgy and Exploration.

WorkCover NSW. (2012). *Safety Alert: Asbestos in Vehicles.* Gosford, NSW, Australia: WorkCover NSW.

Zen, I., Ahamad, R., Rampal, K., & Omar, W. (2013). Use of Asbestos Building Materials in Malaysia. *International Journal of Occupational and Environmental Health*, 19 (3), 169 - 178.

Appendix 1: Indicative List of the Types of Products Previously Known to Contain Asbestos

- Adhesives
- Aircraft industry
  - Gaskets and seals
  - Thermal insulation
- Automotive products
  - Brake linings
  - Brake pads
  - Clutch plates
- Building Products
  - Damp-proof base course
  - Mastics
  - Plaster/drywall materials
  - Stucco finishes
  - (also see listings under other headings)
- Ceiling Products
  - Acoustical plaster
  - Ceiling panels
  - Ceiling textures
  - Ceiling tiles
  - Ceiling tile mastic
- Electrical products
  - Cloth wire insulation
  - Electrical breakers
  - Electrical panel arc chutes
  - Electrical panels and partitions
  - Insulating cloth
  - Lighting fixture backings
- Elevator equipment
  - Elevator car brake shoes
  - Elevator equipment panels
- Fibre-cement products (Fibrolite)
  - Chimney flue lining
  - Ducting
  - Exterior cladding
  - Interior panels
  - Pipes
  - Roofing shingles/tiles/panels
- Fire protection products
  - Fire blankets
  - Fire curtains
  - Fire doors
  - Spray-on fireproofing
  - Theatre curtains
- Flooring Products
  - Asphalt floor tiles
  - Carpet mastic
  - Coving mastic
  - Felt underlay (for vinyl flooring)
  - Floor tile mastic
  - Vapour barriers
  - Vinyl floor tiles
  - Vinyl sheet flooring (linoleum)
- Generators
  - Thermal insulation
  - Exhaust manifolds
- Heating, Cooling and Ventilation Systems
  - Boiler insulation
  - Boiler breeching insulation
  - Cooling towers
  - Duct work insulation
  - Furnace insulation
  - Gaskets
  - Heat shields (paper and corrugated cardboard)
  - Pipe lagging insulation
  - Pipe elbow insulation
  - Tank insulation
  - Tank casings
  - Thermal taping compounds
  - Vibration dampeners
- Home appliance components
- Industrial use products
  - Beverage filters
  - Friction materials (brakes, gaskets)
  - Welding blankets and screens
- Laboratory products
  - Heat resistant gloves
  - Laboratory hoods
  - Laboratory tables and countertops
- Marine Industry
  - Gaskets and seals
  - Thermal insulation/lagging
- Paints and other surface coatings
- Roofing Products
  - Base flashing
  - Felt
- Vacuum pump blades

Table A2: Total value of fabricated asbestos imports (with minor deletions*)

(Based on value for duty, in NZ dollars)

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Australia	11,651	8,743	5,843	8,140	12,622	6,619	7,352	9,287	617
Canada	5	-	8,470	26	-	-	12	62	-
China	516	-	42	12,188	807	6,498	2,570	3,638	6,895
Czech Rep.	-	-	-	-	430	-	-	-	-
Germany	539	1,081	1,278	276	2,568	2,128	1,745	1,444	13,416
Hong Kong	-	-	-	1,676	-	-	-		-
India	154	4,635	-	2,050	7,004	1,926	195	4,408	695
Italy	497	-	1,350	421	-	-	-	115	105
Japan	16,887	12,613	7,490	10,523	7,686	5,951	7,112	10,513	12,970
Korea	1,114	2,608	1,564	657	786	1,983	1,352	1,658	2,650
Mexico	8	-	-	-	1,012	7	1,546	1,927	1,835
Netherlands	-	-	-	-	-	549	-	-	-
Russia	25	28	-	59	2,872	3,188	-	22	-
Slovenia	43,906	63,471	44,615	27,972	19,285	48,410	20,310	28,794	27,604
South Africa	6,423	-	-	-	-	80	-	-	-
Spain	34	12	-	-	653		13	2	6
Taiwan	141	132	157	146	66	385	22	121	-
Ukraine	-	-	2,395	526	332	1,907	2,907	2,266	3,550
UK	24,754	42,369	18,550	3,011	10,572	2,699	841	846	741
USA	82,420	83,021	78,453	49,953	37,056	44,311	31,013	33,579	31,085
Total	**189,074**	**218,713**	**170,207**	**117,624**	**103,751**	**126,641**	**77,112**	**100,417**	**102,441**

(* the data for several countries were not included in the table because the quantities were trivial. Hence the values shown in the total row may not exactly match the sum of the individual values shown)

Table A3: Total value of fibre-cement imports (with minor deletions*)

(Based on value for duty, in NZ dollars)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Australia	3,743,794	3,435,376	2,550,317	2,428,963	1,492,492	1,582,071	2,181,778	1,918,604	1,816,308	2,186,562
Belgium	2,026	240,069	64,062	6,202	248,053	782,289	794,386	352,336	313,329	214,539
Canada	5,691	5,895	3,843	-	326	-	234	736	-	-
China	958,622	930,307	1,011,349	1,374,091	1,496,420	1,399,560	1,817,913	1,809,377	1,536,303	2,377,470
Denmark	-	-	-	-	-	-	-	-	9,418	-
Germany	21,555	29,838	33,866	-	69,002	25,979	6,610	12,056	6,880	74,222
Hong Kong	-	-	-	13,078	5,723	-	-	-	-	-
India	7,784	-	-	-	-	-	-	-	-	-
Italy	19,014	3,885	2,376	-	-	-	-	-	-	
Japan	9,299	12,981	14,128	103	206	-	913	21,090	-	-
Malaysia	305,195	344,648	291,778	267,402	282,600	408,141	478,162	466,338	667,138	602,371
Netherlands	-	-	-	2,207	21,560	-	-	-	30,868	-
New Caledonia	-	-	-	-	-	-	7,427	2,124	1,227	2,911
Philippines	-	-	-	779,953	-	-	-	-	-	-
Singapore	17,856	37,789	8,679	128	56	-	-	-	-	
Spain	-	-	-	-	-	-	7,069	19,453	-	-
Switzerland	17,046	6,198	-	-	-	-	-	242	-	-
Taiwan	28,787	25,714	29,852	52,715	36,966	-	-	-	50	-
Thailand	-	-	323,188	1,843,616	-	-	-	385	-	-
UK	77,817	70,627	163,688	71,364	49,995	107,871	44,694	57,182	12,030	8,699
USA	93,973	54,311	147,724	5,049	3,050	3,299	20,160	1,316	23,751	100
Totals	**5,312,411**	**5,199,687**	**4,648,203**	**6,844,871**	**3,706,595**	**4,309,256**	**5,364,592**	**4,662,524**	**4,417,302**	**5,466,874**

(* the data for several countries were not included in the table because the quantities were trivial. Hence the values shown in the total row may not exactly match the sum of the individual values shown)